2 Acemoglu, Johnson and Robinson - The Colonial Origins of Comparative Development : An Empirical Investigation

2.1 Question

- What is the impact of institutions on development?
- What are institutions?
- Alternative theories of development
  - Capital Accumulation (Pre-Solow)
  - Technological Change (Solow)

  - Health / Geography / Disease (Sachs)
  - Colonialism / Discrimination
  - Property Rights (North and Thomas) / Institutions
    * Extractive
    * Growth-oriented
  - Culture
  - Development of Public Capacity (Tilly)

- Problems with cross country regressions
  - Most variables measured poorly and highly correlated with other variables for which there is no measure (especially for institutions)

- Acemoglu, Johnson and Robinson Approach:

- Disease environment in 19th century lead to differential short run settlement across colonies

- Differential settlement across colonies lead to differential adoption of institutions across colonies

- Differential adoption of institutions across colonies lead to differential growth across former colonies

- Regress Level of Development on Institutions, Instrument with 19th century settler mortality

2.2 Data : Main Variables

- Log GDP per capita - World Bank Development Indicators

- Average Expropriation Protection Against Risk (Scale from 1 to 10) from Political Risk Services - averaged over 1985 to 1995

- Log output per worker (robustness) - Hall and Jones

- Excluded Instrument : Settler Mortality per 1000 settlers
  - Mainly from Phillip Curtin (1989: **Death by Migration**, 1998: **Disease and Empire**)
    * Take first available barrack (not campaign) death rate of soldiers
    * Fill in with laborer deaths for four countries
  - Latin American Mortality from Hector Gutierrez (1986: "The Mortality of Latin-American Bishops in the 17th and 18th centuries)
  - Big debate with David Albouy over construction of settler mortality variable
    * Some countries use identical numbers (should cluster)

APPENDIX TABLE A1: DATA DESCRIPTIONS AND SOURCES

Log GDP per capita, 1975 and 1995: Purchasing Power Parity Basis, from World Bank, World Development Indicators, CD-Rom, 1999.
Log output per worker, 1988: As used in Hall and Jones (1999), from www.stanford.edu/~chadj.
Average protection against expropriation risk, 1985–1995: Risk of expropriation of private foreign investment by government, from 0 to 10, where a higher score means less risk. Mean value for all years from 1985 to 1995. This data was previously used by Knack and Keefer (1995) and was organized in electronic form by the IRIS Center (University of Maryland); originally Political Risk Services.
Constraint on executive in 1900, 1970, 1990 and in first year of independence: Seven-category scale, from 1 to 7, with a higher score indicating more constraints. Score of 1 indicates unlimited authority; score of 3 indicates slight to moderate limitations; score of 5 indicates substantial limitations; score of 7 indicates executive parity or subordination. Equal to 1 if country was not independent at that date. Date of independence is the first year that the country appears in the Polity III data set. From the Polity III data set, downloaded from Inter-University Consortium for Political and Social Research. See Gurr (1997).
Democracy in 1900 and first year of independence: An 11-category scale, from 0 to 10, with a higher score indicating more democracy. Points from three dimensions: Competitiveness of Political Participation (from 1 to 3); Competitiveness of Executive Recruitment (from 1 to 2, with a bonus of 1 point if there is an election); and Constraints on Chief Executive (from 1 to 4). Equal to 1 if country not independent at that date. From the Polity III data set. See Gurr (1997).
European settlements in 1900 and percent of European descent 1975: Percent of population European or of European descent in 1900 and 1975. From McEvedy and Jones (1975) and other sources listed in Appendix Table A6 (available from the authors).
Ethnolinguistic fragmentation: Average of five different indices of ethnolinguistic fragmentation. Easterly and Levine (1997), as used in La Porta et al. (1999).
Religion variables: Percent of population that belonged to the three most widely spread religions of the world in 1980 (or for 1990–1995 for countries formed more recently). The four classifications are: Roman Catholic, Protestant, Muslim, and "other." From La Porta et al. (1999).
French legal origin dummy: Legal origin of the company law or commercial code of each country. Our base sample is all French Commercial Code or English Common Law Origin. From La Porta et al. (1999).
Colonial dummies: Dummy indicating whether country was a British, French, German, Spanish, Italian, Belgian, Dutch, or Portuguese colony. From La Porta et al. (1999).
Temperature variables: Average temperature, minimum monthly high, maximum monthly high, minimum monthly low, and maximum monthly low, all in centigrade. From Parker (1997).
Mean temperature: 1987 mean annual temperature in degrees Celsius. From McArthur and Sachs (2001).
Humidity variables: Morning minimum, morning maximum, afternoon minimum, and afternoon maximum, all in percent. From Parker (1997).
Soil quality: Dummies for steppe (low latitude), desert (low latitude), steppe (middle latitude), desert (middle latitude), dry steppe wasteland, desert dry winter, and highland. From Parker (1997).
Natural resources: Percent of world gold reserves today, percent of world iron reserves today, percent of world zinc reserves today, number of minerals present in country, and oil resources (thousands of barrels per capita.) From Parker (1997).
Dummy for landlocked: Equal to 1 if country does not adjoin the sea. From Parker (1997).
Malaria in 1994: Population living where falciporum malaria is endemic (percent). Gallup and Sachs (1998).
Latitude: Absolute value of the latitude of the country (i.e., a measure of distance from the equator), scaled to take values between 0 and 1, where 0 is the equator. From La Porta et al. (1999).
Log European settler mortality: See Appendix Table A2, reproduced below, and Appendix B (available from the authors).
Yellow fever: Dummy equal to 1 if yellow fever epidemics before 1900 and 0 otherwise. Oldstone (1998 p. 69) shows current habitat of the mosquito vector; these countries are coded equal to 1. In addition, countries in which there were epidemics in the nineteenth century, according to Curtin (1989, 1998) are also coded equal to 1.
Infant mortality: Infant mortality rate (deaths per 1,000 live births). From McArthur and Sachs (2001).
Life expectancy: Life expectancy at birth in 1995. From McArthur and Sachs (2001).
Distance from the coast: Proportion of land area within 100 km of the seacoast. From McArthur and Sachs (2001).

    * Claims of selectively using barrack vs. campaign death rates

    * Claim that when recomputed properly, effects go away and also weak instrument problem

3 Specifications

- OLS Specfication:

$$\log y_i = \mu + aR_i + X_i'\gamma + \epsilon_i$$

Note: Nigeria at 25^{th} percentile of expropriation measure and South Korea at 75^{th} (from 5.6 to 7.8). Coefficient from OLS is 0.52. 0.52*2.2=1.14. $e^{1.14} - 1 = 2.1$ but actual gap is 11 times difference.

- IV Specification:

$$\begin{aligned} \log y_i &= \mu + aR_i + X_i'\gamma + \epsilon_i \\ R_i &= \varsigma + \beta \log M_i + X_i' + \delta \end{aligned}$$

- – Other specifications:
  - ∗ Adding continent dummies
  - ∗ Adding other included instruments
  - ∗ Exlcuding Settlements Countries (US, Canada, New Zealand, Australia)
  - ∗ Overidentification Test

- Problems?
  - – Exclusion Restriction Satisfied?

TABLE 2—OLS REGRESSIONS

	Whole world (1)	Base sample (2)	Whole world (3)	Whole world (4)	Base sample (5)	Base sample (6)	Whole world (7)	Base sample (8)
	Dependent variable is log GDP per capita in 1995						Dependent variable is log output per worker in 1988	
Average protection against expropriation risk, 1985–1995	0.54 (0.04)	0.52 (0.06)	0.47 (0.06)	0.43 (0.05)	0.47 (0.06)	0.41 (0.06)	0.45 (0.04)	0.46 (0.06)
Latitude			0.89 (0.49)	0.37 (0.51)	1.60 (0.70)	0.92 (0.63)		
Asia dummy				−0.62 (0.19)		−0.60 (0.23)		
Africa dummy				−1.00 (0.15)		−0.90 (0.17)		
"Other" continent dummy				−0.25 (0.20)		−0.04 (0.32)		
R^2	0.62	0.54	0.63	0.73	0.56	0.69	0.55	0.49
Number of observations	110	64	110	110	64	64	108	61

Notes: Dependent variable: columns (1)–(6), log GDP per capita (PPP basis) in 1995, current prices (from the World Bank's World Development Indicators 1999); columns (7)–(8), log output per worker in 1988 from Hall and Jones (1999). Average protection against expropriation risk is measured on a scale from 0 to 10, where a higher score means more protection against expropriation, averaged over 1985 to 1995, from Political Risk Services. Standard errors are in parentheses. In regressions with continent dummies, the dummy for America is omitted. See Appendix Table A1 for more detailed variable definitions and sources. Of the countries in our base sample, Hall and Jones do not report output per worker in the Bahamas, Ethiopia, and Vietnam.

Sachs and coauthors, have argued for a direct effect of climate on performance, and Gallup et al. (1998) and Hall and Jones (1999) document the correlation between distance from the equator and economic performance. To control for this, in columns (3)–(6), we add latitude as a regressor (we follow the literature in using the absolute value measure of latitude, i.e., distance from the equator, scaled between 0 and 1). This changes the coefficient of the index of institutions little. Latitude itself is also significant and has the sign found by the previous studies. In columns (4) and (6), we also add dummies for Africa, Asia, and other continents, with America as the omitted group. Although protection against expropriation risk remains significant, the continent dummies are also statistically and quantitatively significant. The Africa dummy in column (6) indicates that in our sample African countries are 90 log points (approximately 145 percent) poorer even after taking the effect of institutions into account. Finally, in columns (7) and (8), we repeat our basic regressions using the log of output per worker from Hall and Jones (1999), with very similar results.

Overall, the results in Table 2 show a strong correlation between institutions and economic performance. Nevertheless, there are a number of important reasons for not interpreting this relationship as causal. First, rich economies may be able to afford, or perhaps prefer, better institutions. Arguably more important than this reverse causality problem, there are many omitted determinants of income differences that will naturally be correlated with institutions. Finally, the measures of institutions are constructed *ex post,* and the analysts may have had a natural bias in seeing better institutions in richer places. As well as these problems introducing positive bias in the OLS estimates, the fact that the institutions variable is measured with considerable error and corresponds poorly to the "cluster of institutions" that matter in practice creates attenuation and may bias the OLS estimates

TABLE 4—IV REGRESSIONS OF LOG GDP PER CAPITA

	Base sample (1)	Base sample (2)	Base sample without Neo-Europes (3)	Base sample without Neo-Europes (4)	Base sample without Africa (5)	Base sample without Africa (6)	Base sample with continent dummies (7)	Base sample with continent dummies (8)	Base sample, dependent variable is log output per worker (9)
Panel A: Two-Stage Least Squares									
Average protection against expropriation risk 1985–1995	0.94 (0.16)	1.00 (0.22)	1.28 (0.36)	1.21 (0.35)	0.58 (0.10)	0.58 (0.12)	0.98 (0.30)	1.10 (0.46)	0.98 (0.17)
Latitude		−0.65 (1.34)		0.94 (1.46)		0.04 (0.84)		−1.20 (1.8)	
Asia dummy							−0.92 (0.40)	−1.10 (0.52)	
Africa dummy							−0.46 (0.36)	−0.44 (0.42)	
"Other" continent dummy							−0.94 (0.85)	−0.99 (1.0)	
Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995									
Log European settler mortality	−0.61 (0.13)	−0.51 (0.14)	−0.39 (0.13)	−0.39 (0.14)	−1.20 (0.22)	−1.10 (0.24)	−0.43 (0.17)	−0.34 (0.18)	−0.63 (0.13)
Latitude		2.00 (1.34)		−0.11 (1.50)		0.99 (1.43)		2.00 (1.40)	
Asia dummy							0.33 (0.49)	0.47 (0.50)	
Africa dummy							−0.27 (0.41)	−0.26 (0.41)	
"Other" continent dummy							1.24 (0.84)	1.1 (0.84)	
R^2	0.27	0.30	0.13	0.13	0.47	0.47	0.30	0.33	0.28
Panel C: Ordinary Least Squares									
Average protection against expropriation risk 1985–1995	0.52 (0.06)	0.47 (0.06)	0.49 (0.08)	0.47 (0.07)	0.48 (0.07)	0.47 (0.07)	0.42 (0.06)	0.40 (0.06)	0.46 (0.06)
Number of observations	64	64	60	60	37	37	64	64	61

Notes: The dependent variable in columns (1)–(8) is log GDP per capita in 1995, PPP basis. The dependent variable in column (9) is log output per worker, from Hall and Jones (1999). "Average protection against expropriation risk 1985–1995" is measured on a scale from 0 to 10, where a higher score means more protection against risk of expropriation of investment by the government, from Political Risk Services. Panel A reports the two-stage least-squares estimates, instrumenting for protection against expropriation risk using log settler mortality; Panel B reports the corresponding first stage. Panel C reports the coefficient from an OLS regression of the dependent variable against average protection against expropriation risk. Standard errors are in parentheses. In regressions with continent dummies, the dummy for America is omitted. See Appendix Table A1 for more detailed variable descriptions and sources.

creating a typical measurement error problem. Moreover, what matters for current income is presumably not only institutions today, but also institutions in the past. Our measure of institutions which refers to 1985–1995 will not be perfectly correlated with these.[19]

Does the 2SLS estimate make quantitative sense? Does it imply that institutional differences can explain a significant fraction of income dif-

[19] We can ascertain, to some degree, whether the difference between OLS and 2SLS estimates could be due to measurement error in the institutions variable by making use of an alternative measure of institutions, for example, the constraints on the executive measure. Using this measure as an instrument for the protection against expropriation index would solve the measurement error, but not the endogeneity problem. This exercise leads to an estimate of the effect of protection against expropriation equal to 0.87 (with standard error 0.16). This suggests that "measurement error" in the institutions variables (or the "signal-to-noise ratio" in the institutions variable) is of the right order of magnitude to explain the difference between the OLS and 2SLS estimates.

TABLE 5—IV REGRESSIONS OF LOG GDP PER CAPITA WITH ADDITIONAL CONTROLS

	Base sample (1)	Base sample (2)	British colonies only (3)	British colonies only (4)	Base sample (5)	Base sample (6)	Base sample (7)	Base sample (8)	Base sample (9)
Panel A: Two-Stage Least Squares									
Average protection against expropriation risk, 1985–1995	1.10	1.16	1.07	1.00	1.10	1.20	0.92	1.00	1.10
	(0.22)	(0.34)	(0.24)	(0.22)	(0.19)	(0.29)	(0.15)	(0.25)	(0.29)
Latitude		−0.75				−1.10		−0.94	−1.70
		(1.70)				(1.56)		(1.50)	(1.6)
British colonial dummy	−0.78	−0.80							
	(0.35)	(0.39)							
French colonial dummy	−0.12	−0.06							0.02
	(0.35)	(0.42)							(0.69)
French legal origin dummy					0.89	0.96			0.51
					(0.32)	(0.39)			(0.69)
p-value for religion variables							[0.001]	[0.004]	[0.42]
Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995									
Log European settler mortality	−0.53	−0.43	−0.59	−0.51	−0.54	−0.44	−0.58	−0.44	−0.48
	(0.14)	(0.16)	(0.19)	(0.14)	(0.13)	(0.14)	(0.13)	(0.15)	(0.18)
Latitude		1.97				2.10		2.50	2.30
		(1.40)				(1.30)		(1.50)	(1.60)
British colonial dummy	0.63	0.55							
	(0.37)	(0.37)							
French colonial dummy	0.05	−0.12							−0.25
	(0.43)	(0.44)							(0.89)
French legal origin					−0.67	−0.7			−0.05
					(0.33)	(0.32)			(0.91)
R^2	0.31	0.33	0.30	0.30	0.32	0.35	0.32	0.35	0.45
Panel C: Ordinary Least Squares									
Average protection against expropriation risk, 1985–1995	0.53	0.47	0.61	0.47	0.56	0.56	0.53	0.47	0.47
	(0.19)	(0.07)	(0.09)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Number of observations	64	64	25	25	64	64	64	64	64

Notes: Panel A reports the two-stage least-squares estimates with log GDP per capita (PPP basis) in 1995 as dependent variable, and Panel B reports the corresponding first stage. The base case in columns (1) and (2) is all colonies that were neither French nor British. The religion variables are included in the first stage of columns (7) and (8) but not reported here (to save space). Panel C reports the OLS coefficient from regressing log GDP per capita on average protection against expropriation risk, with the other control variables indicated in that column (full results not reported to save space). Standard errors are in parentheses and *p*-values for joint significance tests are in brackets. The religion variables are percentage of population that are Catholics, Muslims, and "other" religions; Protestant is the base case. Our sample is all either French or British legal origin (as defined by La Porta et al., 1999).

the effect of institutions.[27] Finally, column (9) adds all the variables in this table simultaneously. Again, these controls have very little effect on our main estimate.

Another concern is that settler mortality is correlated with climate and other geographic characteristics. Our instrument may therefore be picking up the direct effect of these variables. We investigate this issue in Table 6. In columns (1) and (2), we add a set of temperature and humidity variables (all data from Philip M. Parker, 1997). In the table we report joint significance levels for these variables. Again, they have little effect on our estimates.

[27] The religion dummies are significant in the first stage, but once again they are estimated to have offsetting effects in the second stage, implying little net effect of religion on income.

TABLE 6—ROBUSTNESS CHECKS FOR IV REGRESSIONS OF LOG GDP PER CAPITA

	Base sample (1)	Base sample (2)	Base sample (3)	Base sample (4)	Base sample (5)	Base sample (6)	Base sample (7)	Base sample (8)	Base sample (9)
Panel A: Two-Stage Least Squares									
Average protection against expropriation risk, 1985–1995	0.84 (0.19)	0.83 (0.21)	0.96 (0.28)	0.99 (0.30)	1.10 (0.33)	1.30 (0.51)	0.74 (0.13)	0.79 (0.17)	0.71 (0.20)
Latitude		0.07 (1.60)		−0.67 (1.30)		−1.30 (2.30)		−0.89 (1.00)	−2.5 (1.60)
p-value for temperature variables	[0.96]	[0.97]							[0.77]
p-value for humidity variables	[0.54]	[0.54]							[0.62]
Percent of European descent in 1975			−0.08 (0.82)	0.03 (0.84)					0.3 (0.7)
p-value for soil quality					[0.79]	[0.85]			[0.46]
p-value for natural resources					[0.82]	[0.87]			[0.82]
Dummy for being landlocked					0.64 (0.63)	0.79 (0.83)			0.75 (0.47)
Ethnolinguistic fragmentation							−1.00 (0.32)	−1.10 (0.34)	−1.60 (0.47)
Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995									
Log European settler mortality	−0.64 (0.17)	−0.59 (0.17)	−0.41 (0.14)	−0.4 (0.15)	−0.44 (0.16)	−0.34 (0.17)	−0.64 (0.15)	−0.56 (0.15)	−0.59 (0.21)
Latitude		2.70 (2.00)		0.48 (1.50)		2.20 (1.50)		2.30 (1.40)	4.20 (2.60)
R^2	0.39	0.41	0.34	0.34	0.41	0.43	0.27	0.30	0.59
Panel C: Ordinary Least Squares									
Average protection against expropriation risk, 1985–1995	0.41 (0.06)	0.38 (0.06)	0.39 (0.06)	0.38 (0.06)	0.46 (0.07)	0.42 (0.07)	0.46 (0.05)	0.45 (0.06)	0.38 (0.06)

Notes: Panel A reports the two-stage least-squares estimates with log GDP per capita (PPP basis) in 1995, and Panel B reports the corresponding first stages. Panel C reports the OLS coefficient from regressing log GDP per capita on average protection against expropriation risk, with the other control variables indicated in that column (full results not reported to save space). Standard errors are in parentheses and *p*-values for joint significance tests are in brackets. All regressions have 64 observations, except those including natural resources, which have 63 observations. The temperature and humidity variables are: average, minimum, and maximum monthly high temperatures, and minimum and maximum monthly low temperatures, and morning minimum and maximum humidity, and afternoon minimum and maximum humidity (from Parker, 1997). Measures of natural resources are: percent of world gold reserves today, percent of world iron reserves today, percent of world zinc reserves today, number of minerals present in country, and oil resources (thousands of barrels per capita). Measures of soil quality/climate are steppe (low latitude), desert (low latitude), steppe (middle latitude), desert (middle latitude), dry steppe wasteland, desert dry winter, and highland. See Appendix Table A1 for more detailed variable definitions and sources.

A related concern is that in colonies where Europeans settled, the current population consists of a higher fraction of Europeans. One might be worried that we are capturing the direct effect of having more Europeans (who perhaps brought a "European culture" or special relations with Europe). To control for this, we add the fraction of the population of European descent in columns (3) and (4) of Table 6. This variable is insignificant, while the effect of institutions remains highly significant, with a coefficient of 0.96 (s.e. = 0.28). In columns (5) and (6), we control for measures of natural resources, soil quality (in practice soil types), and for whether the country is landlocked. All these controls are insignificant, and have little effect on our 2SLS estimate of the effect of institutions on income per capita.

In columns (7) and (8), we include ethnolinguistic fragmentation as another control and treat it as exogenous. Now the coefficient

TABLE 7—GEOGRAPHY AND HEALTH VARIABLES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Instrumenting only for average protection against expropriation risk						Instrumenting for all right-hand-side variables			Yellow fever instrument for average protection against expropriation risk	
Panel A: Two-Stage Least Squares											
Average protection against expropriation risk, 1985–1995	0.69 (0.25)	0.72 (0.30)	0.63 (0.28)	0.68 (0.34)	0.55 (0.24)	0.56 (0.31)	0.69 (0.26)	0.74 (0.24)	0.68 (0.23)	0.91 (0.24)	0.90 (0.32)
Latitude		−0.57 (1.04)		−0.53 (0.97)		−0.1 (0.95)					
Malaria in 1994	−0.57 (0.47)	−0.60 (0.47)					−0.62 (0.68)				
Life expectancy			0.03 (0.02)	0.03 (0.02)				0.02 (0.02)			
Infant mortality					−0.01 (0.005)	−0.01 (0.006)			−0.01 (0.01)		
Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995											
Log European settler mortality	−0.42 (0.19)	−0.38 (0.19)	−0.34 (0.17)	−0.30 (0.18)	−0.36 (0.18)	−0.29 (0.19)	−0.41 (0.17)	−0.40 (0.17)	−0.40 (0.17)		
Latitude		1.70 (1.40)		1.10 (1.40)		1.60 (1.40)	−0.81 (1.80)	−0.84 (1.80)	−0.84 (1.80)		
Malaria in 1994	−0.79 (0.54)	−0.65 (0.55)									
Life expectancy			0.05 (0.02)	0.04 (0.02)							
Infant mortality					−0.01 (0.01)	−0.01 (0.01)					
Mean temperature							−0.12 (0.05)	−0.12 (0.05)	−0.12 (0.05)		
Distance from coast							0.57 (0.51)	0.55 (0.52)	0.55 (0.52)		
Yellow fever dummy										−1.10 (0.41)	−0.81 (0.38)
R^2	0.3	0.31	0.34	0.35	0.32	0.34	0.37	0.36	0.36	0.10	0.32
Panel C: Ordinary Least Squares											
Average protection against expropriation risk, 1985–1995	0.35 (0.06)	0.35 (0.06)	0.28 (0.05)	0.28 (0.05)	0.29 (0.05)	0.28 (0.05)	0.35 (0.06)	0.29 (0.05)	0.29 (0.05)	0.48 (0.06)	0.39 (0.06)
Number of observations	62	62	60	60	60	60	60	59	59	64	64

Notes: Panel A reports the two-stage least-squares estimates with log GDP per capita (PPP basis) in 1995, and Panel B reports the corresponding first stages. Panel C reports the coefficient from an OLS regression with log GDP per capita as the dependent variable and average protection against expropriation risk and the other control variables indicated in each column as independent variables (full results not reported to save space). Standard errors are in parentheses. Columns (1)–(6) instrument for average protection against expropriation risk using log mortality and assume that the other regressors are exogenous. Columns (7)–(9) include as instruments average temperature, amount of territory within 100 km of the coast, and latitude (from McArthur and Sachs, 2001). Columns (10) and (11) use a dummy variable for whether or not a country was subject to yellow fever epidemics before 1900 as an instrument for average protection against expropriation. See Appendix Table A1 for more detailed variable definitions and sources.

institutions being the major determinant of income per capita differences, with little effect from geography/health variables.

Columns (7)–(9) report estimates from models that treat both health and institutions as endogenous, and following McArthur and Sachs, instrument for them using latitude, mean temperature, and distance from the coast as instruments in addition to our instrument, settler mortality. McArthur and Sachs (2001) report that in these regressions the institution variable is still significant, but geography/health are also significant. In contrast to McArthur and Sachs' results, we find that only institutions are signif-

TABLE 8—OVERIDENTIFICATION TESTS

	Base sample (1)	Base sample (2)	Base sample (3)	Base sample (4)	Base sample (5)	Base sample (6)	Base sample (7)	Base sample (8)	Base sample (9)	Base sample (10)
Panel A: Two-Stage Least Squares										
Average protection against expropriation risk, 1985–1995	0.87	0.92	0.71	0.68	0.72	0.69	0.60	0.61	0.55	0.56
	(0.14)	(0.20)	(0.15)	(0.20)	(0.14)	(0.19)	(0.14)	(0.17)	(0.12)	(0.14)
Latitude		−0.47		−0.34		0.31		−0.41		−0.16
		(1.20)		(1.10)		(1.05)		(0.92)		(0.81)
Panel B: First Stage for Average Protection Against Expropriation Risk										
European settlements in 1900	3.20	2.90								
	(0.62)	(0.83)								
Constraint on executive in 1900			0.32	0.26						
			(0.08)	(0.09)						
Democracy in 1900					0.24	0.20				
					(0.06)	(0.07)				
Constraint on executive in first year of independence							0.25	0.22		
							(0.08)	(0.08)		
Democracy in first year of independence									0.19	0.17
									(0.05)	(0.05)
R^2	0.30	0.30	0.20	0.24	0.24	0.26	0.19	0.25	0.26	0.30
Panel C: Results from Overidentification Test										
p-value (from chi-squared test)	[0.67]	[0.96]	[0.09]	[0.20]	[0.11]	[0.28]	[0.67]	[0.79]	[0.22]	[0.26]
Panel D: Second Stage with Log Mortality as Exogenous Variable										
Average protection against expropriation risk, 1985–1995	0.81	0.88	0.45	0.42	0.52	0.48	0.49	0.49	0.4	0.41
	(0.23)	(0.30)	(0.25)	(0.30)	(0.23)	(0.28)	(0.23)	(0.25)	(0.18)	(0.19)
Log European settler mortality	−0.07	−0.05	−0.25	−0.26	−0.21	−0.22	−0.14	−0.14	−0.19	−0.19
	(0.17)	(0.18)	(0.16)	(0.17)	(0.15)	(0.16)	(0.16)	(0.15)	(0.13)	(0.12)
Latitude		−0.52		0.38		0.28		−0.38		−0.17
		(1.15)		(0.89)		(0.86)		(0.84)		(0.73)

Notes: Panel A reports the two-stage least-squares estimates with log GDP per capita (PPP basis) in 1995 as the dependent variable, and Panel B reports the corresponding first stage (latitude is included in even-numbered columns but is never significant and not reported here to save space). Panel C reports the p-value for the null hypothesis that the coefficient on average protection against expropriation risk in the second-stage regression (i.e., Panel A) is the same as when instrumented using log mortality of settlers in addition to the indicated instruments. Panel D reports results from the regression in which log mortality is included as an exogenous variable and current institutions are instrumented using the alternative instrument indicated. Standard errors are in parentheses. All regressions with constraint on executive and democracy in first year of independence also include years since independence as a regressor. All regressions have 60 observations, except those with democracy in 1900 which have 59 observations and those with European settlements in 1900 which have 63 observations.

The results of the overidentification tests, and related results, are reported in Table 8. In the top panel, Panel A, we report the 2SLS estimates of the effect of protection against expropriation on GDP per capita using a variety of instruments other than mortality rates, while Panel B gives the corresponding first stages. These estimates are always quite close to those reported in Table 4. For example, in column (1), we use European settlements in 1900 as the *only* instrument for institutions. This results in an estimated effect of 0.87 (with standard error 0.14), as compared to our baseline estimate of 0.94. The other columns add latitude, and use other instruments such as constraint on the executive in 1900 and in the first year of independence, and democracy in 1900.

Panel D reports an easy-to-interpret version of the overidentification test. It adds the log of mortality as an exogenous regressor. If mortality rates faced by settlers had a direct effect on income per capita, we would expect this variable to come in negative and significant. In all cases, it is small and statistically insignificant. For example, in column (1), log mortality has a coefficient of −0.07 (with standard error 0.17). This confirms that the

    * Capital Accumulation
    * Geography / Disease Environment
    * Culture
    * Capital Flows / Discrimination
    * Others
- Weakness of Instrument
- Manipulation of construction of main instrument?

Colonialism and Modern Income

James Feyerer and Bruce Sacerdote

Colonialism and Modern Income: Islands as Natural Experiments

Table I
Summary Statistics

These are summary statistics for the variables in the islands database. See the text for details on variable sources and construction. Islands still without an elected legislature are coded as getting a legislature in 2004.

Variable	Obs	Mean	Std. Dev.	Min	Max
Island's GDP per Capita 2000	80	7,953.38	8,909.50	264.00	53,735.00
Log (GDP Capita)	80	8.42	1.12	5.57	10.89
Infant Mortality 2002	80	18.68	15.21	4.00	79.00
Number of Centuries as a Colony	80	2.18	1.54	0.00	5.11
Northerly Vector of Prevailing Wind	80	0.18	1.28	-1.55	4.20
Easterly Vector of Prevailing Wind	80	-4.20	2.02	-6.88	4.42
No Historical (1500-1820) Off Island Trade Except Fish or Coconuts (0-1)	80	0.48	0.50	0.00	1.00
Agriculture Used Imported Slaves	80	0.40	0.49	0.00	1.00
Year of First Elected Legislature	80	1939	69	1639	2004
Had Legislature by 1800	80	0.08	0.27	0.00	1.00
Had Legislature by 1900	80	0.14	0.35	0.00	1.00
Percent Current Pop Native	77	49.07	45.06	0.00	100.00
Percent Current Pop White	77	7.86	16.06	0.00	95.88
Percent Current Pop Black	77	23.65	36.98	0.00	95.00
Percent Current Pop Mixed	77	12.60	24.05	0.00	93.20
Number of Centuries British	80	0.86	1.23	0.00	3.95
Number of Centuries French	80	0.40	0.82	0.00	3.69
Number of Centuries Spanish	80	0.38	0.95	0.00	4.05
Ever British	80	0.68	0.47	0.00	1.00
Ever French	80	0.31	0.47	0.00	1.00
Ever Spanish	80	0.25	0.44	0.00	1.00
Absolute Value of Latitude	80	15.66	7.71	0.50	51.92
Island Area (1000s sq km)	80	5.92	20.5	0.003	110.0
Island Population	70	302,720	1,394,832	102	11,000,000
Island is in Pacific	80	0.49	0.50	0.00	1.00
Island is in Atlantic	80	0.44	0.50	0.00	1.00
Island is in Indian	80	0.07	0.27	0.00	1.00

Table II
Outcomes Regressed on Years of Colonization

We regress Log GDP per capita and infant mortality on the number of years the island spent as a colony of a European power. Columns (1), (2), (4), (6) and (7) are OLS. Columns (3), (5) and (8) are two stage least squares where we instrument for centuries of colonial rule or the first year as a colony using the 12 month average and standard deviation of the east-west wind speed for each island.

	(1) Log GDP Capita	(2) Log GDP Capita	(3) Log GDP Capita - IV	(4) Log GDP Capita	(5) Log GDP Capita- IV	(6) Infant Mortality Per 1000	(7) Infant Mortality Per 1000	(8) Infant Mortality Per 1000 - IV
Number of Centuries a Colony	0.413	0.450	0.441			-2.801	-2.611	-10.244
	(0.065)**	(0.083)**	(0.157)**			(1.156)*	(1.259)*	(4.344)*
First Year a Colony				-0.396	-0.545			
				(0.101)**	(0.232)*			
Final Year A Colony				0.014	0.007			
				(0.014)	(0.017)			
Remained A Colony in 2000				0.800	0.732			
				(0.149)**	(0.206)**			
Abs(Latitude)		0.048	0.048	0.039	0.042		-0.763	-0.771
		(0.011)**	(0.011)**	(0.011)**	(0.013)**		(0.211)**	(0.221)**
Area in millions of sq km		-21.046	-20.984	-20.429	-23.791		263.524	321.185
		(3.937)**	(3.961)**	(4.707)**	(6.169)**		(149.986)+	(143.722)*
Island is in Pacific		0.779	0.767	0.747	0.944		-7.427	-18.724
		(0.457)+	(0.522)	(0.470)	(0.569)		(9.498)	(13.608)
Island is in Atlantic		0.615	0.622	0.427	0.298		-7.349	-1.117
		(0.400)	(0.410)	(0.367)	(0.403)		(8.581)	(8.555)
Constant	7.524	6.172	6.192	13.673	16.356	24.771	41.579	60.751
	(0.166)**	(0.526)**	(0.659)**	(1.942)**	(4.173)**	(3.677)**	(10.898)**	(18.551)**
Observations	80	80	80	80	80	80	80	80
R-squared	0.320	0.578	0.578	0.642	0.630	0.080	0.353	0.082

Robust standard errors in parentheses. We cluster at the island group level since several of the islands (e.g. the Cook Islands and the Federated States of Micronesia) are used as separate observations from a cluster of politically related yet geographically distinct islands.

+ significant at 10%; * significant at 5%; ** significant at 1%

Table III
Comparison of different Samples

Column (1) is the base sample used in the rest of the paper. Column (2) uses only GDP figures obtained from the UN, but includes disaggregation of islands that are part of a group. Column (3) uses only the raw UN GDP data. Columns (4) and (5) limit the sample to the Pacific and Atlantic Oceans. Columns (6) and (7) are two stage least squares for each ocean where we instrument for centuries of colonial rule using the 12 month average and standard deviation of the east-west wind vector for each island.

	(1) Log GDP per Capita	(2) Log GDP per Capita	(3) Log GDP per Capita	(4) Log GDP per Capita	(5) Log GDP per Capita	(6) Log GDP per Capita	(7) Log GDP per Capita
Sample	Base	UN data - disaggregated groups	UN data	Pacific	Atlantic	Pacific - IV	Atlantic-IV
Number of centuries a colony	0.450	0.557	0.426	0.522	0.293	0.470	0.600
	(0.083)**	(0.112)**	(0.110)**	(0.084)**	(0.146)+	(0.192)*	(0.235)*
Abs(Latitude)	0.048	0.058	0.064	0.063	0.040	0.064	0.045
	(0.011)**	(0.013)**	(0.017)**	(0.015)**	(0.017)*	(0.015)**	(0.015)**
Area in millions of sq km	-21.046	-21.621	-22.265	-20.698	-21.685	-19.806	-22.192
	(3.937)**	(3.902)**	(3.802)**	(1.802)**	(6.647)**	(4.016)**	(6.292)**
Island is in Pacific	0.779	0.995	1.090				
	(0.457)+	(0.690)	(0.576)+				
Island is in Atlantic	0.615	0.499	0.415				
	(0.400)	(0.581)	(0.527)				
Constant	6.172	5.701	5.708	6.670	7.465	6.710	6.337
	(0.526)**	(0.755)**	(0.630)**	(0.284)**	(0.501)**	(0.300)**	(0.924)**
Observations	80	61	61	39	35	39	35
R-squared	0.578	0.625	0.538	0.553	0.431	0.549	0.332

Robust standard errors in parentheses. Standard errors are clustered at the island group level.
+ significant at 10%; * significant at 5%; ** significant at 1%

Table IV
Possible Mechanisms for GDP – Colonialism Relationship

	(1) Log GDP Per Capita	(2) Log GDP Per Capita	(3) Log GDP Per Capita	(4) Log GDP Per Capita
Number Of Centuries A Colony	0.393	0.387	0.378	0.313
	(0.100)**	(0.104)**	(0.103)**	(0.091)**
No Complex Trade Goods During Colonial Period	-0.435		-0.464	-0.497
	(0.279)		(0.282)	(0.291)+
Mining During Colonial Period		0.492		
		(0.323)		
Organized Agriculture During Colonial Period		0.298		
		(0.295)		
Livestock During Colonial Period		0.094		
		(0.398)		
Agriculture Used Imported Slaves	0.115		0.218	
	(0.369)		(0.388)	
Year Of First Elected Legislature	0.000			0.000
	(0.001)			(0.001)
Had Elected Legislature By 1800			0.288	
			(0.462)	
Had Elected Legislature By 1900			-0.470	
			(0.399)	
Percent White				0.016
				(0.008)*
Percent Black				0.008
				(0.007)
Percent Mixed				0.018
				(0.005)**
Abs(Latitude)	0.044	0.047	0.045	0.042
	(0.011)**	(0.014)**	(0.011)**	(0.013)**
Area in millions of sq km	-22.389	-23.420	-22.125	-25.058
	(3.985)**	(4.658)**	(3.154)**	(3.755)**
Island is in Pacific	0.921	0.792	0.820	1.286
	(0.430)*	(0.470)+	(0.455)+	(0.412)**
Island is in Atlantic	0.578	0.635	0.425	0.306
	(0.404)	(0.384)	(0.410)	(0.400)
Constant	5.549	6.145	6.621	5.696
	(2.351)*	(0.517)**	(0.583)**	(2.214)*
Observations	80	80	80	77
R-Squared	0.600	0.598	0.608	0.686

Robust standard errors in parentheses. Standard errors are clustered at the island group level.
+ significant at 10%; * significant at 5%; ** significant at 1%

Table V
The Effect of Colonialism by Colonizing Countries

	(1) Log GDP per Capita	(2) Log GDP per Capita
Centuries US	1.498	
	(0.346)**	
Centuries Dutch	0.516	
	(0.083)**	
Centuries British	0.411	
	(0.112)**	
Centuries French	0.410	
	(0.124)**	
Centuries Spanish	0.274	
	(0.089)**	
Centuries Portuguese	-0.894	
	(0.157)**	
Centuries German	0.734	
	(1.036)	
Centuries Japanese	-1.097	
	(0.743)	
Centuries British Legal		0.319
		(0.145)*
Centuries French Legal		0.391
		(0.108)**
Centuries German Legal		0.276
		(0.544)
Abs(Latitude)	0.048	0.048
	(0.014)**	(0.014)**
Area in millions of sq km	-18.410	-21.985
	(4.957)**	(3.983)**
Island is in Pacific	0.672	0.695
	(0.543)	(0.515)
Island is in Atlantic	0.643	0.797
	(0.473)	(0.458)+
Constant	6.264	6.369
	(0.609)**	(0.586)**
Observations	80	80
R-squared	0.629	0.544

Robust standard errors in parentheses. Standard errors are clustered at the island group level.
+ significant at 10%; * significant at 5%; ** significant at 1%

Table VI
The Timing of Colonialism

	(1) Log GDP per Capita	(2) Log GDP per Capita	(3) Log GDP per Capita
Centuries a Colony before 1700	0.110	-0.001	-0.032
	(0.169)	(0.201)	(0.207)
Centuries a Colony after 1700	0.640		
	(0.112)**		
Centuries a Colony 1700-1900		0.930	0.854
		(0.221)**	(0.198)**
Centuries a Colony after 1900		0.208	-0.454
		(0.317)	(0.452)
Remained a Colony in 2000			0.839
			(0.251)**
Abs(Latitude)	0.049	0.047	0.030
	(0.012)**	(0.011)**	(0.013)*
Area in millions of sq km	-19.691	-22.493	-20.067
	(4.886)**	(5.086)**	(4.692)**
Island is in Pacific	0.946	1.086	0.915
	(0.436)*	(0.422)*	(0.382)*
Island is in Atlantic	0.622	0.580	0.493
	(0.363)+	(0.351)	(0.317)
Constant	5.842	5.881	6.456
	(0.528)**	(0.500)**	(0.529)**
Observations	80	80	80
R-squared	0.605	0.623	0.670

Robust standard errors in parentheses. Standard errors are clustered at the island group level.
+ significant at 10%; * significant at 5%; ** significant at 1%

Table VII
GDP and Colonialism within Non-island Developing Countries

We started with the Acemoglu-Robinson-Johnson [2001] database and added our own measure of length of colonial period. We dropped the three island countries that were in AJR and our islands database.

	(1) Log GDP Per Capita	(2) Log GDP Per Capita	(3) Log GDP Per Capita	(4) Log GDP Per Capita
Number of Centuries a Colony	0.401	0.358	0.287	0.232
	[0.097]**	[0.090]**	[0.072]**	[0.084]**
Abs(Latitude)		2.952	1.406	1.825
		[0.883]**	[0.746]+	[0.822]*
Mean Temperature		-0.023	-0.013	0.005
		[0.023]	[0.019]	[0.021]
Expropriation Risk			0.404	
			[0.067]**	
Log Settler Mortality (AJR)				-0.403
				[0.093]**
Constant	7.276	7.344	4.873	9.034
	[0.215]**	[0.686]**	[0.682]**	[0.728]**
Observations	64	64	64	60
R-squared	0.22	0.40	0.63	0.56

Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%

Appendix I
IV First Stage Regression and Reduced Form Regression

Columns (1) and (2) are OLS. Column (1) is the first stage regression using our preferred set of instruments. We regress the islands' number of centuries as a colony on the northerly and easterly vectors of the island's prevailing wind. Column (2) is a reduced form in which we show the direct effect of wind on modern day GDP.

	(1) Number Of Centuries A Colony	(3) Log GDP Per Capita
East-West Vector Of Wind	-0.265	-0.139
	(0.081)**	(0.066)*
Monthly StDev of East-West Vector	0.885	0.260
	(0.302)**	(0.255)
Area in millions of sq km	10.983	-16.278
	(4.417)*	(4.810)**
Abs(Latitude)	0.020	0.060
	(0.016)	(0.014)**
Island is in Pacific	-1.684	-0.059
	(0.387)**	(0.514)
Island is in Atlantic	0.760	0.768
	(0.379)*	(0.544)
Constant	-0.013	6.342
	(0.964)	(0.892)**
Observations	80	80
R-Squared	0.624	0.440
F Statistic for Instruments	5.96	
Prob > F =	.005	

Robust standard errors in parentheses. Standard errors are clustered at the island group level.
+ significant at 10%; * significant at 5%; ** significant at 1%

Appendix II
IV Results Using Alternative Sets of Wind Based Instruments

In addition to specifying the prevailing wind as two vectors per island, we also tried several other measures of wind speed and direction and used these to instrument for an islands' years of colonization. Below are the second stage results and F-statistics for three different types of wind related instruments. Column (1) takes eight compass headings and measures the knots of prevailing wind along each heading and each month. The instrument is the sum of knots*months that the prevailing wind blew on that heading. We use knot*months along headings 2,4,6,8 as the set of instruments. In column (2) we use simply the knot*months of wind of blowing towards the South West. Wind on this compass heading is the single strongest predictor of an island being discovered and colonized early. In column (3) we perform a similar exercise but limit ourselves to four compass headings and measure the wind as negative if it blew away from a compass heading instead of towards it. In other words, we have only 4 headings but the wind speed can be positive or negative. We use all four points as instruments.

	(1) Log GDP Capita (2SLS)	(2) Log GDP Capita (2SLS)	(3) Log GDP Capita (2SLS)
Number Centuries a Colony	1.038	0.827	0.703
	(0.309)**	(0.499)	(0.302)*
Area in 1000s Sq	-25.488	-23.900	-22.959
Miles	(4.886)**	(5.220)**	(4.153)**
Abs(Latitude)	0.048	0.048	0.048
	(0.013)**	(0.011)**	(0.011)**
Island is in Pacific	1.649	1.338	1.154
	(0.715)*	(0.876)	(0.650)+
Island is in Atlantic	0.135	0.307	0.408
	(0.532)	(0.612)	(0.467)
Constant	4.695	5.223	5.536
	(0.998)**	(1.375)**	(0.918)**
Observations	80	80	80
R-squared	0.282	0.456	0.523
F Statistic for Instruments in	4.48	2.52	1.81
First Stage	0.0032	0.118	0.139
Prob > F =			

Robust standard errors in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

Appendix III
List of Islands in Our Dataset

Island	Group/Country	Other Country	Year First Sighted	Number of Years Colonized	GDP per Capita
Aitutaki	Cook Islands		1789	13	2,814
Andros, North	Bahamas		1492	479	14,296
Anguilla	Anguilla		1493	354	9,617
Antigua	Antigua and Barbuda		1493	349	7,653
Ascension	Ascension	United Kingdom	1501	82	24,514
Atiu	Cook Islands		1777	13	1,930
Barbados	Barbados		1510	384	9,739
Bermuda	Bermuda		1503	395	53,735
Bonaire	Netherlands Antilles	Netherlands	1499	478	15,931
Cuba	Cuba		1492	389	2,535
Curacao	Netherlands Antilles	Netherlands	1499	492	15,931
Dominica	Dominica		1493	246	3,484
East Falkland	East Falkland	United Kingdom	1592	231	24,514
Efate	Vanuatu		1606	186	1,164
Fefan	Federated States of Micronesia		1687	101	1,335
Funafuti	Tuvalu		1819	62	1,204
Futuna	Futuna	France	1616	117	21,776
Grand Cayman	Grand Cayman		1503	369	34,173
Grande Comore	Comoros		1505	88	264
Grande Terre	Guadeloupe		1493	376	7,900
Grenada	Grenada		1498	344	3,440
Guam	Guam	United States	1521	443	34,364
Hispaniola DOM	Dominican Republic		1492	313	3,029
Hispaniola HTI	Haiti		1492	331	485
Huvadu	Huvadu		1558	335	2,151
Jamaica	Jamaica		1494	168	3,056
Kadavu	Fiji		1789	95	2,031
Kosrae	Federated States of Micronesia		1688	101	2,751
Lifou	Loyalty Islands	New Caldonia	1774	231	12,455
Luzon	Philippines		1521	297	1,002
Mahe	Seychelles		1502	220	7,764
Majuro	Marshall Islands		1526	100	1,896
Malaita	Solomon Islands		1568	86	791
Mangaia	Cook Islands		1777	13	2,171
Mangareva	Gambier Is	French Polynesia	1687	124	13,955
Manihiki	Cook Islands		1822	13	2,895
Martinique	Martinique	France	1502	226	21,776
Mauke	Cook Islands		1823	13	2,493
Mauritius	Mauritius		1507	359	3,839
Mayotte	Mayotte	France	1529	161	21,776

Appendix III
List of Islands in Our Dataset (continued)

Island	Group	Other Country	Year First Sighted	Number of Years Colonized	GDP per Capita
Mitiaro	Cook Islands		1823	13	2,734
Moen	Federated States of Micronesia		1528	87	1,335
Montserrat	Montserrat		1493	372	8,919
Nauru	Nauru		1798	78	2,702
New Britain	Bismarck Archipelago	Papua New Guinea	1616	61	729
New Caledonia	New Caledonia		1774	231	12,455
Niue	Niue		1774	1	3,600
North Caicos	Turks and Caicos Islands	United Kingdom	1512	238	24,514
Oreor	Palau		1710	120	6,076
Palmerston	Cook Islands		1774	13	2,493
Penrhyn	Cook Islands		1788	13	989
Pohnpei	Federated States of Micronesia		1689	101	2,711
Puerto Rico	Puerto Rico		1493	511	18,047
Pukapuka	Cook Islands		1595	13	724
Rakahanga	Cook Islands		1606	13	1,528
Rarotonga	Cook Islands		1789	13	6,433
Reunion	Reunion		1513	341	6,200
Rurutu	Austral Islands	French Polynesia	1769	236	13,955
Saba	Netherlands Antilles	Netherlands	1493	372	15,931
Saipan	Northern Mariana Islands	United States	1521	440	12,500
Sint Maartin	Netherlands Antilles	France	1493	356	16,000
St Croix	US Virgin Islands	United States	1493	250	11,868
St Eustatius	Netherlands Antilles	Netherlands	1493	375	15,931
St Helena	St Helena	United Kingdom	1502	494	24,514
St John	US Virgin Islands	United States	1493	250	18,012
St Kitts	St. Kitts and Nevis		1493	360	8,132
St Lucia	St Lucia		1500	481	4,424
St Martin	Netherlands Antilles	Netherlands	1493	356	21,776
St Thomas	US Virgin Islands	United States	1493	250	14,061
St Vincent	St Vincent and the Grenadines		1498	299	2,891
Tahiti	Society Islands	French Polynesia	1767	208	13,955
Tahuata	Marquesas	French Polynesia	1595	5	13,955
Tarawa	Kiribati - Line Islands		1788	66	538
Tol	Federated States of Micronesia		1528	101	1,335
Tongatapu	Tonga		1643	0	1,430
Tortola	British Virgin Islands	United Kingdom	1493	356	33,671
Trinidad	Trinidad and Tobago		1498	289	6,347
Tristan da Cunha	Tristan da Cunha & Gouh	United Kingdom	1506	188	24,514
Tutuila	American Samoa	United States	1787	175	34,364
Yap	Federated States of Micronesia		1686	101	2,751

Appendix IV
GDP by Sector

This is for a subsample of islands in the database. Source is CIA World Factbook 2002, which in turn uses both UN Data and national government statistics from the relevant countries.

island	ocean	GDP	Agriculture	Industry	Services
Bermuda	Atlantic	36 B	1%	10%	89%
Grand Cayman	Atlantic	1.27 B.	1%	3%	95%
Jamaica	Atlantic	10.21 B.	6%	24%	70%
Anguilla	Atlantic	104 Mill	4%	18%	78%
New Britain	Pacific	11.4 B.	32%	36%	32%
Majuro	Pacific	115 Mill	14%	16%	70%
Mauritius	Indian	13.85 B.	6%	33%	61%
US Virgin Islands	Atlantic	2.4 B.	1%	19%	80%
Tongatapu	Pacific	236 Mill	26%	12%	62%
Pohnpei	Pacific	277 Mill	50%	4%	46%
Montserrat	Atlantic	29 Mill	5%	14%	81%
New Caledonia	Pacific	3.158 B.	5%	30%	65%
Guam	Pacific	3.2 B.	7%	15%	78%
Cuba	Atlantic	31.59 B.	8%	35%	58%
British Virgin Islands	Atlantic	320 Mill	2%	6%	92%
St Vincent	Atlantic	339 Mill	10%	26%	64%
Dominica	Atlantic	380 Mill	18%	24%	58%
Barbados	Atlantic	4.496 B.	6%	16%	78%
Grenada	Atlantic	440 Mill	8%	24%	68%
Kadavu	Pacific	5.007 B.	17%	22%	61%
Martinique	Atlantic	6.117 B.	6%	11%	83%
Puerto Rico	Atlantic	65.28 B.	1%	42%	57%
Antigua	Atlantic	750 Mill	4%	19%	77%
Tarawa	Pacific	79 Mill	30%	7%	63%
Malaita	Pacific	800 Mill	42%	11%	47%
St Lucia	Atlantic	866 Mill	7%	20%	73%
Reunion	Indian	9.387 B.	8%	19%	73%

Figure 1
GDP Per Capita versus Years of Colonialism

Circles represent islands in the Atlantic, triangles are islands in the Pacific and squares are islands in the Indian Ocean.

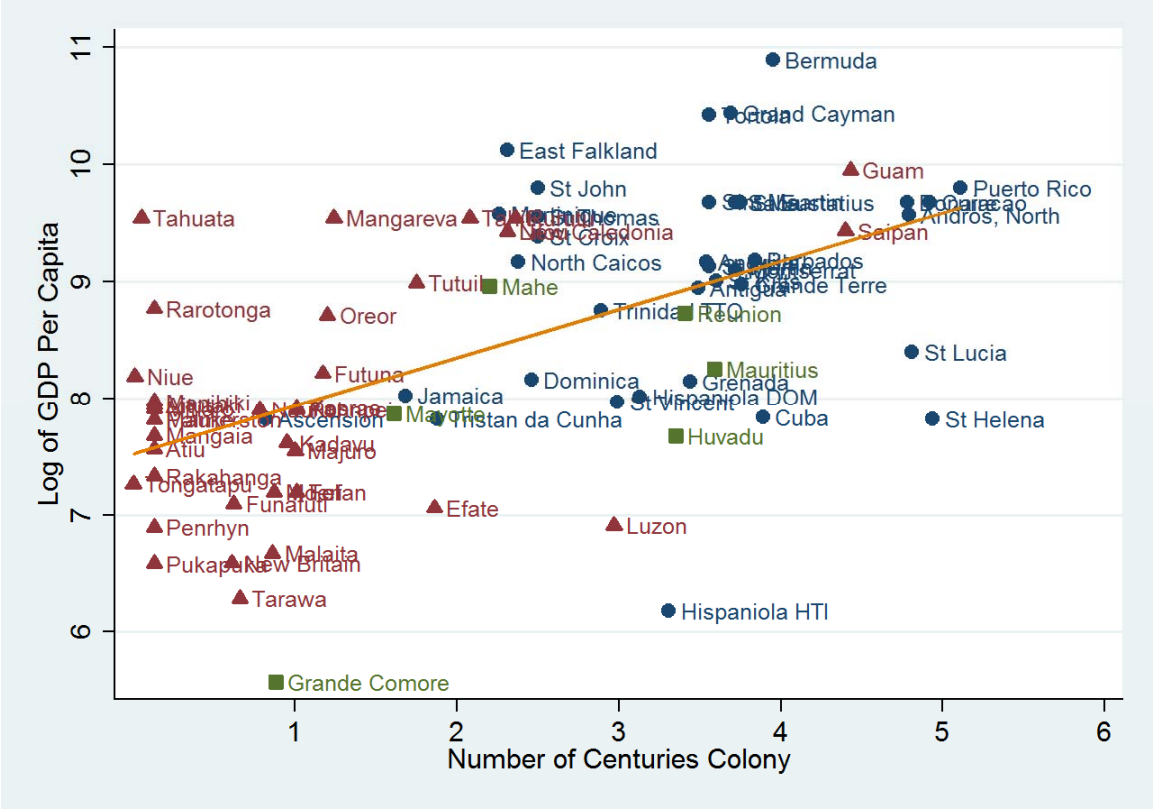

Figure 2
Years of Colonialism Versus Easterly Vector of Wind

Circles represent islands in the Atlantic, triangles are islands in the Pacific and squares are islands in the Indian Ocean.