Fundamental Causes of Growth

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Causes of Growth

Research on income differences can arguably be classified into one or more arrows in the following chain of causality:

$$\begin{aligned}
&\textit{Geography}, \textit{Climate}, \textit{Luck} \Rightarrow \textit{Human Capital}, \textit{Physical Capital}, \textit{TFP} \Rightarrow \textit{Income} \\
&\quad \Downarrow \\
&\textit{Institutions}, \textit{Culture} \Rightarrow \textit{Human Capital}, \textit{Physical Capital}, \textit{TFP} \Rightarrow \textit{Income} \\
&\quad \Downarrow \\
&\textit{Policies}, \textit{Rule of Law}, \textit{Corruption} \Rightarrow \textit{Human Capital}, \textit{Physical Capital}, \textit{TFP} \Rightarrow \textit{Income}
\end{aligned}$$

- Development accounting is about right-most arrows
- In this lecture, we discuss research on the arrows to the left

Source: Hsieh and Klenow (2010)

Cross-Country Growth Regressions

- 1990s saw a flourishing of research on correlates of growth
- Prominent studies by Barro (1991), Sala-i-Martin (1997)
- Some people interpreted these correlations as causal
- This gave “cross-country growth regressions” a bad name

Regressions for per capita growth rate

Independent variable	(1)	(2)
Log(GDP)	−.0254 (.0031)	−.0225 (.0032)
Male secondary and higher schooling	.0118 (.0025)	.0098 (.0025)
Log(life expectancy)	.0423 (.0137)	.0418 (.0139)
Log(GDP) * male schooling	−.0062 (.0017)	−.0052 (.0017)
Log(fertility rate)	−.0161 (.0053)	−.0135 (.0053)
Government consumption ratio	−.136 (.026)	−.115 (.027)
Rule of law index	.0293 (.0054)	.0262 (.0055)
Terms of trade change	.137 (.030)	.127 (.030)
Democracy index	.090 [a] (.027)	.094 (.027)
Democracy index squared	−.088 (.024)	−.091 (.024)
Inflation rate	−.043 (.008)	−.039 (.008)
Sub-Saharan Africa dummy		−.0042 [b] (.0043)
Latin America dummy		−.0054 (.0032)
East Asia dummy		.0050 (.0041)
R^2	.58, .52, .42	.60, .52, .47
Number of observations	80, 87, 84	80, 87, 84

Source: Barro (1998)

Cross-Country Growth Regressions

- Cross-country growth regressions hard to interpret
- Reverse causation: Growth may cause other things like democracy / rule of law / government spending
  - This is called “modernization theory”
- Omitted variables bias: Both growth and variables of interest may be caused by a third factor
- Theory suggests that many factors have level effects as opposed to growth effects (but transition dynamics are slow)

Fundamental Causes of Growth

- Many candidate causes:
  - Geography, trade, institutions
  - Luck (e.g., leaders), culture, religion, etc.
- To provide convincing evidence on fundamental causes of growth, we need exogenous variation in candidate causes
- Subsequent literature includes many creative approaches to this challenging task
- Here we will sample a bit from this (large) literature

Institutions as a Fundamental Cause of Growth

- Long-standing literature arguing that good institutions cause high levels of income
  - Secure property rights, rule of law, constraints on the executive, etc.
- Important work along these lines: North and Thomas (1973), Jones (1981), North and Weingast (1989), North (1990), Engerman and Sokoloff (1997)
- Literature mostly qualitative before late 1990s
- Where can we find exogenous variation in institutions?
  - A few examples: North vs. South Korea, East vs. West Germany
  - But something more systematic?

Colonial Origins

- Acemoglu, Johnson, Robinson (2001) proposed a theory of institutional differences among countries colonized by Europeans
- Conditions in the colonies led colonizers to create different institutions in different colonies
- Where colonizers settled, they set up "good" institutions (secure property rights, rule of law, constrains on the executive)
- Where they didn't settle, they set up "extractive" institutions
- These institutions have persisted and have affected growth in these countries

Settler Mortality as an Instrument

- To test their theory, AJR propose using settler mortality as an instrument for current institutions
- Basic idea:
  - Colonizers didn't settle where settler mortality was high
  - Settler mortality was determined by disease environment (mostly malaria and yellow fever)
  - Places with malaria and yellow fever got worse institutions

ARJ's Theory

(potential) settler mortality $\Rightarrow$ settlements

$\Rightarrow$ early institutions $\Rightarrow$ current institutions

$\Rightarrow$ current performance.

Source: Acemoglu, Johnson, Robinson (2001)

Empirical Specification

- Second stage regression:

$$\log y_i = \mu + \alpha R_i + \mathbf{X}_i'\gamma + \epsilon_i$$

- First state regression:

$$R_i = \zeta + \beta \log M_i + \mathbf{X}_i'\delta + v_i$$

- $\log y_i$ is log GDP per capita in 1995 PPP adjusted
- R_i is protection against expropriation from Political Risk Services
- $\log M_i$ is log settler mortality

Is Settler Mortality a Valid Instrument?

- For settler mortality to be a valid instrument, we must have:
  - Relevance: It must strongly predict current institutions
  - Exclusion: It must not affect current output through any other channel than current institutions (conditional on controls)
- What might be an important threat to the exclusion restriction?

Is Settler Mortality a Valid Instrument?

- For settler mortality to be a valid instrument, we must have:
  - Relevance: It must strongly predict current institutions
  - Exclusion: It must not affect current output through any other channel than current institutions (conditional on controls)
- What might be an important threat to the exclusion restriction?
- Settler mortality likely correlates with current disease environment which may have a direct effect on GDP per capita today (Bloom and Sachs 98, Gallup and Sachs 98, Gallup et al. 98, Sachs and Malaney 02, Alsan 15)

Is Settler Mortality a Valid Instrument?

- AJR argue that native population had developed immunity to malaria and yellow fever
- Settlers died but natives didn't (after early childhood)
- Yellow fever has been largely eradicated since
- AJR argue: "these diseases are therefore unlikely to be the reason why many countries in Africa and Asia are very poor today"
- Counterargument: Even if mortality is not high, morbidity is substantial

Settler Mortality Variable

- Largely from work of Philip Curtin (Curtin 89, 98)
- Not actually mortality of settlers
- Mostly mortality of soldiers
- For Latin American mortality of bishops from Gutierrez (1986) rescaled for comparability with soldiers
- More on this in a few slides

IV as a Ratio

- "Reduced form" regression:

$$\log y_i = \mu + \lambda \log M_i + \mathbf{X}_i'\gamma + \epsilon_i$$

- First state regression:

$$R_i = \zeta + \beta \log M_i + \mathbf{X}_i'\delta + v_i$$

- IV estimate is the ratio of λ and β

First Stage

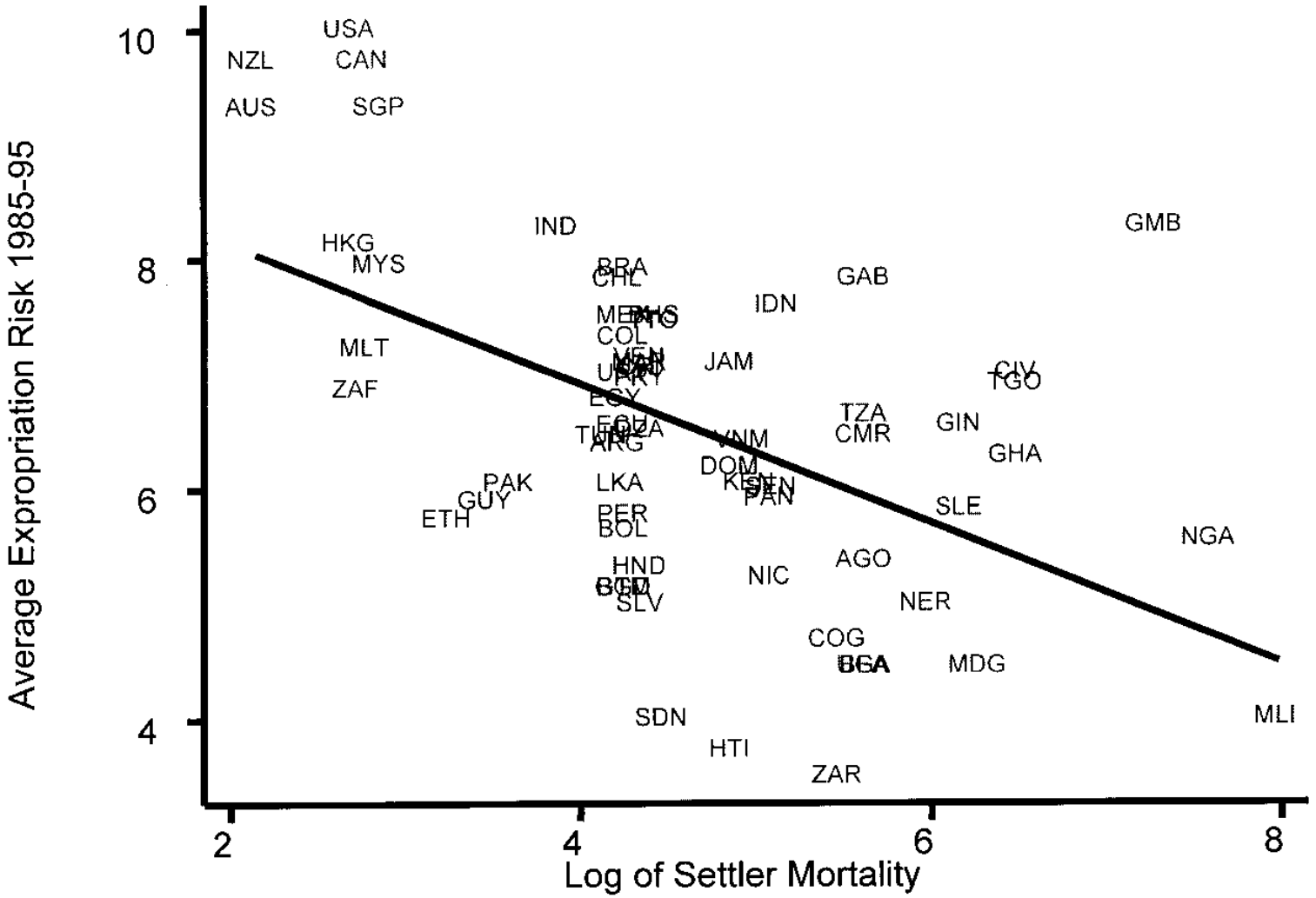


Figure 3. First-Stage Relationship Between Settler Mortality and Expropriation Risk

Source: Acemoglu, Johnson, Robinson (2001)

Reduced Form

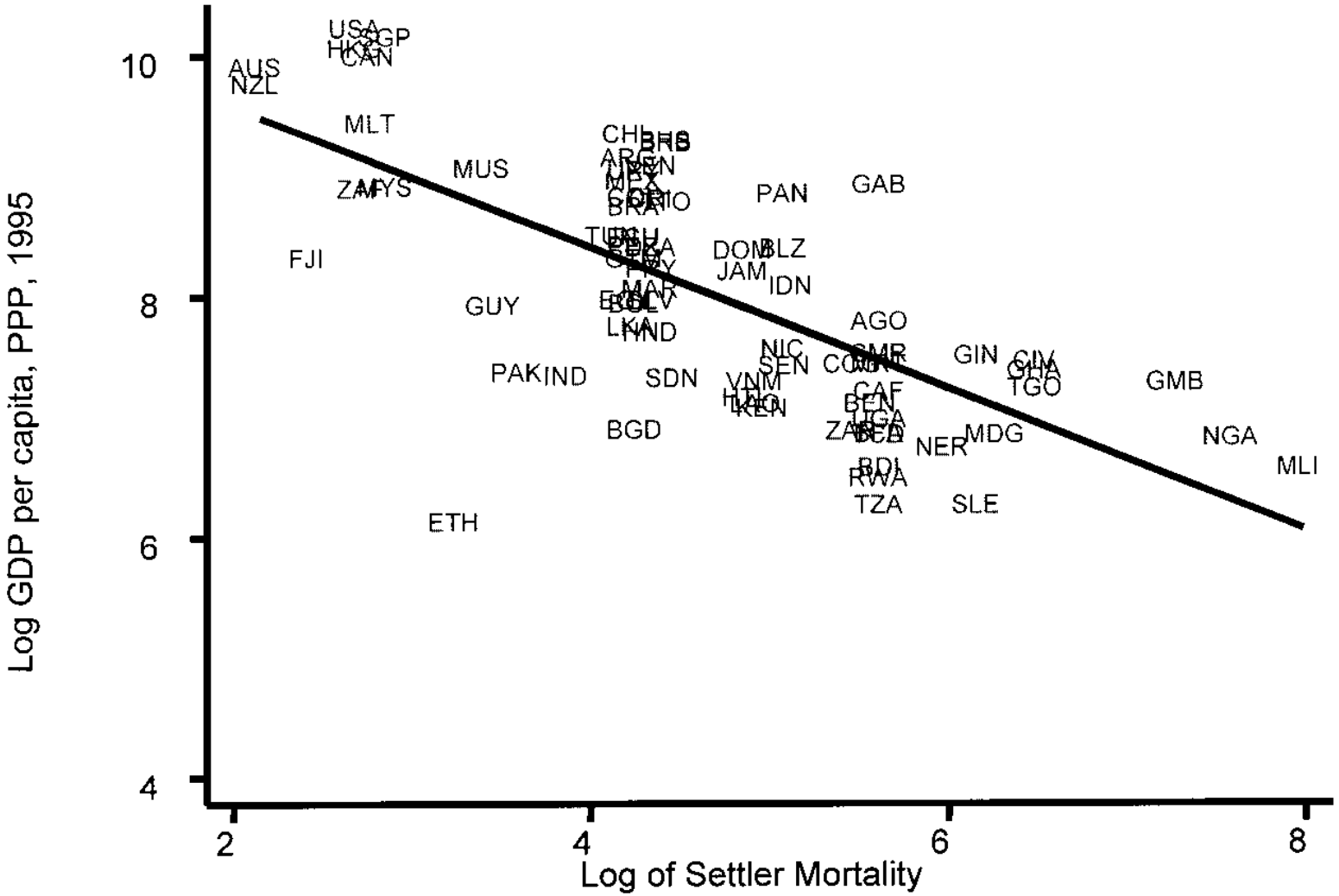


Figure 1. Reduced-Form Relationship Between Income and Settler Mortality

Source: Acemoglu, Johnson, Robinson (2001)

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	1.00	1.28	1.21	0.58	0.58	0.98	1.10	0.98
	(0.16)	(0.22)	(0.36)	(0.35)	(0.10)	(0.12)	(0.30)	(0.46)	(0.17)
Latitude		−0.65		0.94		0.04		−1.20	
		(1.34)		(1.46)		(0.84)		(1.8)	
Asia dummy							−0.92	−1.10	
							(0.40)	(0.52)	
Africa dummy							−0.46	−0.44	
							(0.36)	(0.42)	
"Other" continent dummy							−0.94	−0.99	
							(0.85)	(1.0)	
Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995									
Log European settler mortality	−0.61	−0.51	−0.39	−0.39	−1.20	−1.10	−0.43	−0.34	−0.63
	(0.13)	(0.14)	(0.13)	(0.14)	(0.22)	(0.24)	(0.17)	(0.18)	(0.13)
Latitude		2.00		−0.11		0.99		2.00	
		(1.34)		(1.50)		(1.43)		(1.40)	
Asia dummy							0.33	0.47	
							(0.49)	(0.50)	
Africa dummy							−0.27	−0.26	
							(0.41)	(0.41)	
"Other" continent dummy							1.24	1.1	
							(0.84)	(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	0.47	0.49	0.47	0.48	0.47	0.42	0.40	0.46
	(0.06)	(0.06)	(0.08)	(0.07)	(0.07)	(0.07)	(0.06)	(0.06)	(0.06)
Number of observations	64	64	60	60	37	37	64	64	61

Source: Acemoglu, Johnson, Robinson (2001)

Quantitatively Large

- Consider two "typical countries": Nigeria and Chile
  (typical in that they are virtually on the regression line)
- Differ by 2.24 in expropriation risk
- Fitted difference in $0.94 \times 2.24 = 2.06$ in logs or 7-fold in levels
- Actual difference: 11-fold in levels

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 (0.22)	1.16 (0.34)	1.07 (0.24)	1.00 (0.22)	1.10 (0.19)	1.20 (0.29)	0.92 (0.15)	1.00 (0.25)	1.10 (0.29)
Latitude		−0.75 (1.70)				−1.10 (1.56)		−0.94 (1.50)	−1.70 (1.6)
British colonial dummy	−0.78 (0.35)	−0.80 (0.39)							
French colonial dummy	−0.12 (0.35)	−0.06 (0.42)							0.02 (0.69)
French legal origin dummy					0.89 (0.32)	0.96 (0.39)			0.51 (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 (0.14)	−0.43 (0.16)	−0.59 (0.19)	−0.51 (0.14)	−0.54 (0.13)	−0.44 (0.14)	−0.58 (0.13)	−0.44 (0.15)	−0.48 (0.18)
Latitude		1.97 (1.40)				2.10 (1.30)		2.50 (1.50)	2.30 (1.60)
British colonial dummy	0.63 (0.37)	0.55 (0.37)							
French colonial dummy	0.05 (0.43)	−0.12 (0.44)							−0.25 (0.89)
French legal origin					−0.67 (0.33)	−0.7 (0.32)			−0.05 (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 (0.19)	0.47 (0.07)	0.61 (0.09)	0.47 (0.06)	0.56 (0.06)	0.56 (0.06)	0.53 (0.06)	0.47 (0.06)	0.47 (0.06)
Number of observations	64	64	25	25	64	64	64	64	64

Source: Acemoglu, Johnson, Robinson (2001)

Albouy (2012) Critique

- Mortality rates for only 28 out of 64 countries from within country
  - Lots of choices as to which neighboring country to use
- Seven countries (all over Africa) get (different) rates from campaigns that occurred in Mali ▸ Map
- Bishop rates for 16 Latin American countries based on 4, 5, and 10 deaths out of at-risk populations of 24, 28.5, and 30.5 bishops in three regions
  - Rates for three regions not statistically significantly different from each other or different from similar rates in Europe
  - Multiplied by 4.25 to benchmark with mortality of French soldiers in Mexico in 1862-3
- Use campaign rates rather than barracks rates in some cases

Campaign Rates vs. Barracks Rates

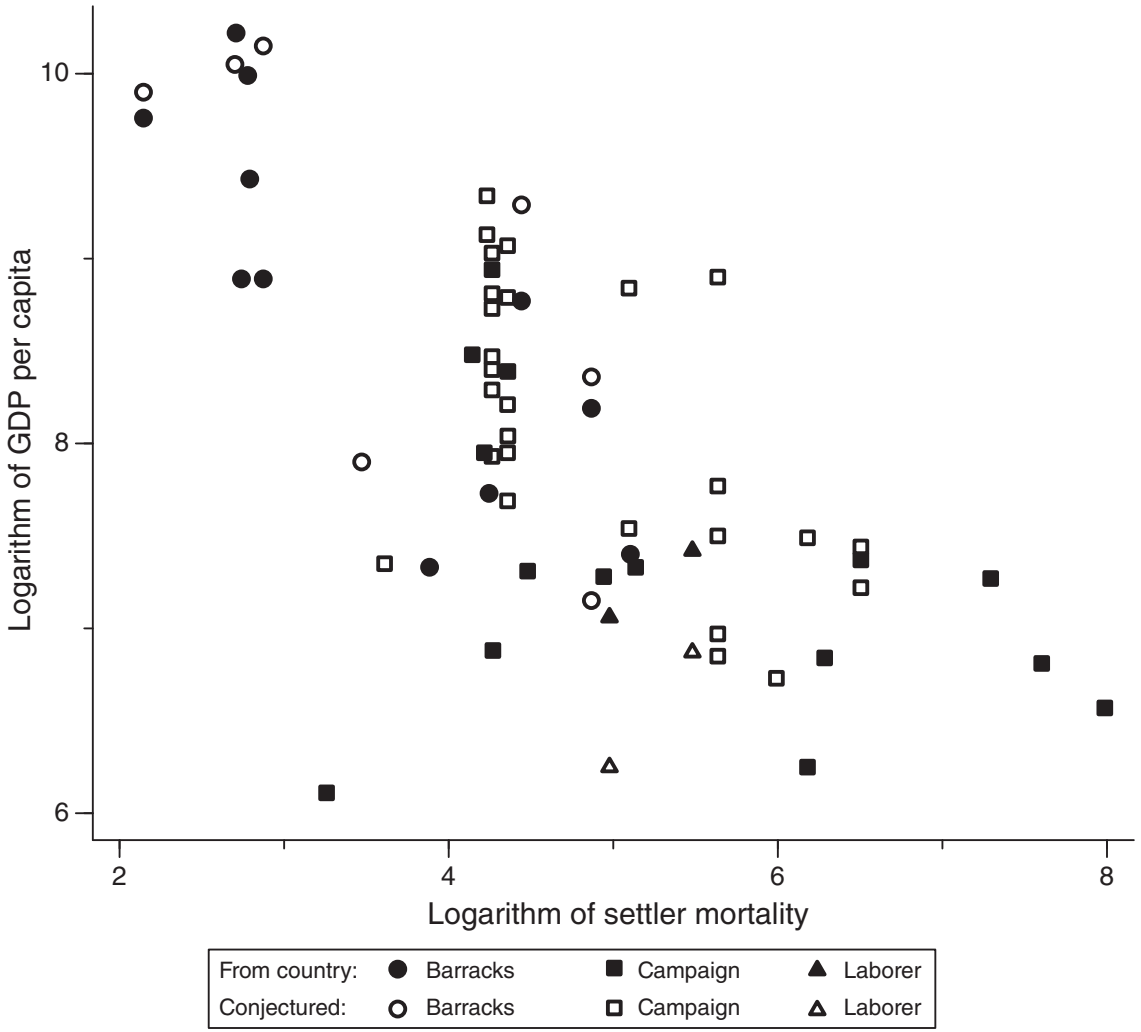


Figure 2B. Income per Capita and Settler Mortality According to Mortality Rate Characteristics

Source: Albouy (2012)

Acemoglu, Johnson, Robinson Reply

- Results robust to lots of variation in choices made
- Can cap all mortality rates at 250
- Results robust to various ways of benchmarking bishop data
- Albouy's preferred results largely driven by Gambia
- Little difference between activities of soldiers on campaign and in barracks

Does Trade Cause Growth?

- Various theoretical reasons why trade may cause growth
- Trade is correlated with growth
- But reverse causality and omitted variable bias plausible
- Frankel and Romer (1999): Propose to use geographical characteristics to instrument for trade
- Identifying assumption: Geographical characteristics in question do not have important effects on income except through their impact on trade

International vs. Within-Country Trade

- Just as trade with foreigners may affect income, within-country trade may affect income
- Larger countries trade more within-country and less internationally (e.g., Germany vs. Belgium)
- If within-country trade is correlated with international trade (perhaps negatively) and affects income it will bias estimates of effect of international trade unless controlled for
- Frankel and Romer propose to control for country size as a proxy for within-country trade

Gravity Instrument

- Simple "gravity" model of trade between countries i and j:

$$\log\left(\frac{\tau_{ij}}{Y_i}\right) = a_0 + a_1 \log D_{ij} + a_2 \log S_i + a_3 \log S_j + e_{ij}$$

  where

  - τ_{ij} is trade between i and j (e.g., exports plus imports)
  - Y_i is GDP per person in i
  - D_{ij} is distance between i and j
  - S_i is size of i
- Often includes other variables (e.g., colonial relation, language, etc.)
- Frankel and Romer only want geographical variables

More Complex Gravity Instrument

$$
\begin{aligned}
(6)\ \ln(\tau_{ij}/\mathrm{GDP}_i) &= a_0 + a_1 \ln D_{ij} + a_2 \ln N_i + a_3 \ln A_i \\
&+ a_4 \ln N_j + a_5 \ln A_j + a_6 (L_i + L_j) \\
&+ a_7 B_{ij} + a_8 B_{ij} \ln D_{ij} + a_9 B_{ij} \ln N_i \\
&+ a_{10} B_{ij} \ln A_i + a_{11} B_{ij} \ln N_j \\
&+ a_{12} B_{ij} \ln A_j + a_{13} B_{ij} (L_i + L_j) + e_{ij},
\end{aligned}
$$

where N is population, A is area, L is a dummy for landlocked countries, and B is a dummy for a common border between two countries.

Source: Frankel and Romer (1999)

Gravity Instrument

Table 1—The Bilateral Trade Equation

	Variable	Interaction
Constant	−6.38	5.10
	(0.42)	(1.78)
Ln distance	−0.85	0.15
	(0.04)	(0.30)
Ln population	−0.24	−0.29
(country *i*)	(0.03)	(0.18)
Ln area	−0.12	−0.06
(country *i*)	(0.02)	(0.15)
Ln population	0.61	−0.14
(country *j*)	(0.03)	(0.18)
Ln area	−0.19	−0.07
(country *j*)	(0.02)	(0.15)
Landlocked	−0.36	0.33
	(0.08)	(0.33)
Sample size	3220	
R^2	0.36	
SE of regression	1.64	

Notes: The dependent variable is $\ln(\tau_{ij}/\text{GDP}_i)$. The first column reports the coefficient on the variable listed, and the second column reports the coefficient on the variable's interaction with the common-border dummy. Standard errors are in parentheses.

Source: Frankel and Romer (1999)

Gravity Instrument

- Frankel and Romer aggregate this bilateral gravity relationship to the country level
- Let's rewrite gravity equation as

$$\log\left(\frac{\tau_{ij}}{Y_i}\right) = \mathbf{a}'\mathbf{X}_{ij} + e_{ij}$$

- Geographic component of overall trade for country i:

$$\hat{T}_i = \sum_{j \neq i} e^{\hat{\mathbf{a}}'\mathbf{X}_{ij}}$$

- $\hat{T}_i$ is the instrument Frankel and Romer use

First Stage

Table 2—The Relation Between Actual and Constructed Overall Trade

	(1)	(2)	(3)
Constant	46.41	218.58	166.97
	(4.10)	(12.89)	(18.88)
Constructed trade share	0.99		0.45
	(0.10)		(0.12)
Ln population		−6.36	−4.72
		(2.09)	(2.06)
Ln area		−8.93	−6.45
		(1.70)	(1.77)
Sample size	150	150	150
R^2	0.38	0.48	0.52
SE of regression	36.33	33.49	32.19

Notes: The dependent variable is the actual trade share. Standard errors are in parentheses.

Source: Frankel and Romer (1999)

Empirical Specification

$$\log Y_i = a + bT_i + c_1 \log N_i + c_2 \log A_i + u_i$$

- Y_i is GDP per person, T_i is exports plus imports over GDP, N_i is population, A_i is area
- IV regression with gravity instrument ($\hat{T}_i$) instrumenting for T_i
- Data from 1985

Trade and Income

Table 3—Trade and Income

	(1)	(2)	(3)	(4)
Estimation	OLS	IV	OLS	IV
Constant	7.40	4.96	6.95	1.62
	(0.66)	(2.20)	(1.12)	(3.85)
Trade share	0.85	1.97	0.82	2.96
	(0.25)	(0.99)	(0.32)	(1.49)
Ln population	0.12	0.19	0.21	0.35
	(0.06)	(0.09)	(0.10)	(0.15)
Ln area	−0.01	0.09	−0.05	0.20
	(0.06)	(0.10)	(0.08)	(0.19)
Sample size	150	150	98	98
R^2	0.09	0.09	0.11	0.09
SE of regression	1.00	1.06	1.04	1.27
First-stage F on excluded instrument		13.13		8.45

Notes: The dependent variable is log income per person in 1985. The 150-country sample includes all countries for which the data are available; the 98-country sample includes only the countries considered by Mankiw et al. (1992). Standard errors are in parentheses.

Source: Frankel and Romer (1999)

Correlated Causes

- Three potential "deep" determinants of growth:
  - Geography
  - Trade
  - Institutions
- Geography clearly exogenous

  (but may affect income through trade or institutions)
- Main instruments for trade and institutions based on geography
- Seems tricky to tell these apart!

Geography, Trade, and Institutions

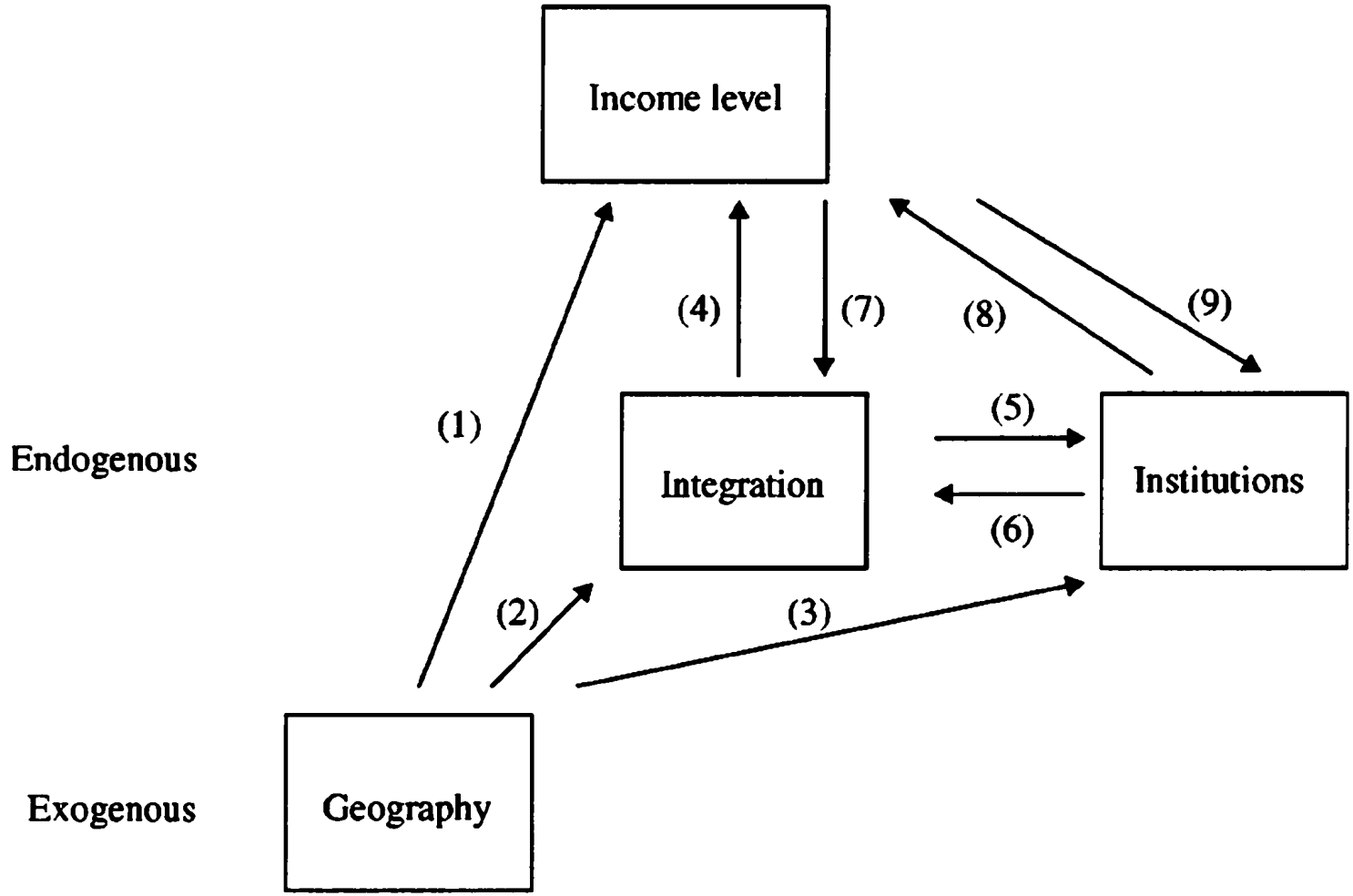


Figure 1. The "deep" determinants of income.

Source: Rodrik, Subramanian, Trebbi (2004)

Institutions Rule?

- Rodrik, Subramanian, Trebbi (2004):
  - AJR 01 control for geography but not trade
  - FR 99 control for geography but not institutions
- They consider all three together
- Conclude that institutions trump other deep determinants

Empirical Specification

$$\log y_i = \mu + \alpha \text{INS}_i + \beta \text{INT}_i + \gamma \text{GEO}_i + \epsilon_i$$

- $\log y_i$ is GDP per capita on PPP basis
- INS_i is rule of law measure from Kaufman, Kraay, Zoido-Lobaton 02 (different from expropriation risk measure used by AJR 01)
- INT_i is ratio of trade to GDP
- GEO_i is distance to the equator
- all regressors are standardized (unit standard deviation)
- Use settler mortality and gravity instrument for INS_i and INT_i

Table 3. Determinants of development: Core specifications, instrumental variables estimates.

	Acemoglu et al. Sample			Extended Acemoglu et al. Sample			Large Sample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Second-stage: Dependent variable = Log GDP per capita									
Geography (DISTEQ)	0.74	−0.42	−0.56	0.80	−0.45	−0.72	0.76	−0.06	−0.14
	(4.48)*	(−1.19)	(−1.23)	(5.22)*	(−1.26)	(−1.38)	(10.62)*	(−0.5)	(−0.93)
Institutions (RULE)		1.68	1.78		1.75	1.98		1.19	1.30
		(4.29)*	(3.78)*		(4.42)*	(3.56)*		(8.02)*	(7.09)*
Integration (LCOPEN)			−0.18			−0.31			−0.15
			(−0.71)			(−1.10)			(−1.09)
No. of observations	64	64	64	79	79	79	137	137	137
R-square	0.25	0.54	0.56	0.26	0.51	0.52	0.417	0.51	0.56
Test for over-identifying restrictions (*p*-value)								(0.0089)	(0.0354)
Panel B: First Stage for Endogenous Variables (Institutions (RULE) and Integration (LCOPEN))									
Dependent variable	RULE	RULE	LCOPEN	RULE	RULE	LCOPEN	RULE	RULE	LCOPEN
Geography (DISTEQ)	0.41	0.47	−0.25	0.47	0.54	−0.18	0.67	0.66	−0.05
	(2.8)*	(3.21)*	(−2.00)**	(3.34)*	(3.87)*	(−1.37)	(10.81)*	(11.23)*	(−0.84)
Settler mortality	−0.39	−0.40	−0.30	−0.34	−0.34	−0.27			
(LOGEM4)	(−3.87)*	(−4.1)*	(−3.51)*	(−3.69)*	(−3.82)*	(−3.22)*			
Population speaking							0.19	0.18	0.17
English (ENGFRAC)							(2.69)*	(2.69)*	(2.65)*
Population speaking							0.14	0.17	−0.11
other European							(1.94)**	(2.55)**	(−1.67)**
langages									
(EURFRAC)									
Constructed openness	na	0.20	0.90	na	0.19	0.80	na	0.23	0.70
(LOGFRANKROM)		(1.95)**	(10.32)*		(2.16)**	(9.67)*		(3.99)*	(12.33)*
F-statistic	22.9	17.2	41.7	24	18.5	36.9	50.09	45.79	41.39
R-square	0.41	0.44	0.66	0.37	0.40	0.58	0.52	0.57	0.54
Partial *R*-square		0.16	0.58		0.12	0.51		0.18	0.52
corr(RULEFIT,			0.14			0.21			0.27
LCOPENFIT)									

Source: Rodrik, Subramanian, Trebbi (2004). T-stats in parentheses.

▶ OLS ▶ Market Size Controls

Telling Geography Apart

- Since instruments for INS_i and INT_i are based on geography, it is tricky to tell the effects of these variables apart from direct effects of geography
- This depends crucially on the GEO_i variable (distance to the equator) being different from settler mortality (in the case of INS_t).
- But both are imperfect proxies and not clear that current effects of geography flow through a very different variable than settler mortality (both plausibly about malaria)

Table 6. Determinants of development: Robustness to "influential" observations, neoeuropes, legal systems, origin of colonizer, a

	Baseline 1	(1)*	(1)**	(1)***	(1)****	Baseline 2	(2)*	(2)**	(2)***
Two-stage Least Squares: Dependent Variable is log GDP per Capita in 1995									
Geography (DISTEQ)	−0.72	−1.37	−0.71	−0.92	−0.62	−0.14	−0.14	0.02	−0.34
	(−1.38)	(−1.71)***	(−1.42)	(−1.18)	(−0.82)	(−0.93)	(−0.94)	(0.20)	(−1.48)
Institutions (RULE)	1.98	2.66	1.86	2.77	1.99	1.30	1.30	0.90	1.64
	(3.56)*	(3.06)*	(3.26)*	(2.45)**	(1.64)	(7.09)*	(7.14)*	(8.54)*	(5.15)*
Integration (LCOPEN)	−0.31	−0.45	−0.33	−0.74	−0.44	−0.15	−0.15	0.02	−0.31
	(−1.10)	(−1.12)	(−1.26)	(−1.31)	(−0.80)	(−1.09)	(−1.02)	(0.18)	(−1.92)**
Regional Dummies			0.42		0.15			0.25	
Latin America (LAAM)			(1.18)		(0.28)			(1.65)***	
Sub-Saharan Africa			−0.17		−0.41			−0.62	
(SAFRICA)			(−0.43)		(−1.05)			(−3.70)*	
East Asia (ASIAE)			0.22		0.05			0.13	
			(0.50)		(0.10)			(0.65)	
Legal origin									
Identity of colonizer									
Religion									
R-square	0.52	0.56	0.65	0.44	0.63	0.56	0.59	0.68	0.55
No. of observations	79	77	78	75	75	137	136	134	133
Omitted observations	None	Singapore Ethiopia	Ethiopia	Australia Canada NewZealand USA	Australia Canada NewZealand USA	None	Singapore	Cuba Czech Rep. Germany	Australia Canada NewZealand USA

Source: Rodrik, Subramanian, Trebbi (2004). T-stats in parentheses.

Not Robust to Everything

Table 1
Income regressions with institutions and trade

Dependent variable: Ln(per capita GDP at PPP) in 1995												
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) IV	(8) OLS	(9) IV	(10) IV	(11) IV	(12) IV
Rule of law	1.01	1.30			0.79	1.26	3.52	0.66	1.03	2.64	1.53	2.14
	(24.61)	(9.57)			(10.40)	(3.65)	(1.18)	(7.98)	(2.87)	(1.23)	(8.42)	(0.79)
Ln(trade/GDP)			1.09	1.67	0.41	0.18	−3.40	0.39	0.79	−1.67		−1.37
			(12.40)	(4.41)	(3.91)	(0.31)	(0.71)	(3.73)	(1.05)	(0.47)		(0.23)
Landlock								−0.45	−0.19	0.14		
								(4.30)	(1.09)	(0.25)		
Distance from equator								0.0082	−0.01	−0.01		
								(2.34)	(1.47)	(0.58)		
Ln(population)			0.23	0.35	0.16	0.13	−0.53	0.12	0.26	−0.18		−0.25
			(5.84)	(4.04)	(4.61)	(1.09)	(0.56)	(3.51)	(1.53)	(0.26)		(0.17)
R^2	0.69		0.48		0.73			0.76				
No. of observations	154	153	144	144	134	134	130	134	134	130	68	63
Instruments												
Engfrac		X				X	X		X	X		
Eurfrac		X				X	X		X	X		
Predicted trade				X		X	X		X	X		X
Settler mortality											X	X
Omitted observations							USA CAN AUS NZL			USA CAN AUS NZL		

Note: All regressions include a constant (not reported). Absolute value of *t*-statistics calculated with White-corrected standard errors is in parentheses.

Source: Dollar and Kraay (2003).

Not Robust to Everything

- Dollar and Kraay (2003) make institutions statistically insignificant by:
  - Using the large sample
  - Dropping USA, CAN, AUS, NZL
  - Adding controls for landlocked and population
  - Using “real openness”
    (i.e., defining openness somewhat differently from Frankel-Romer)

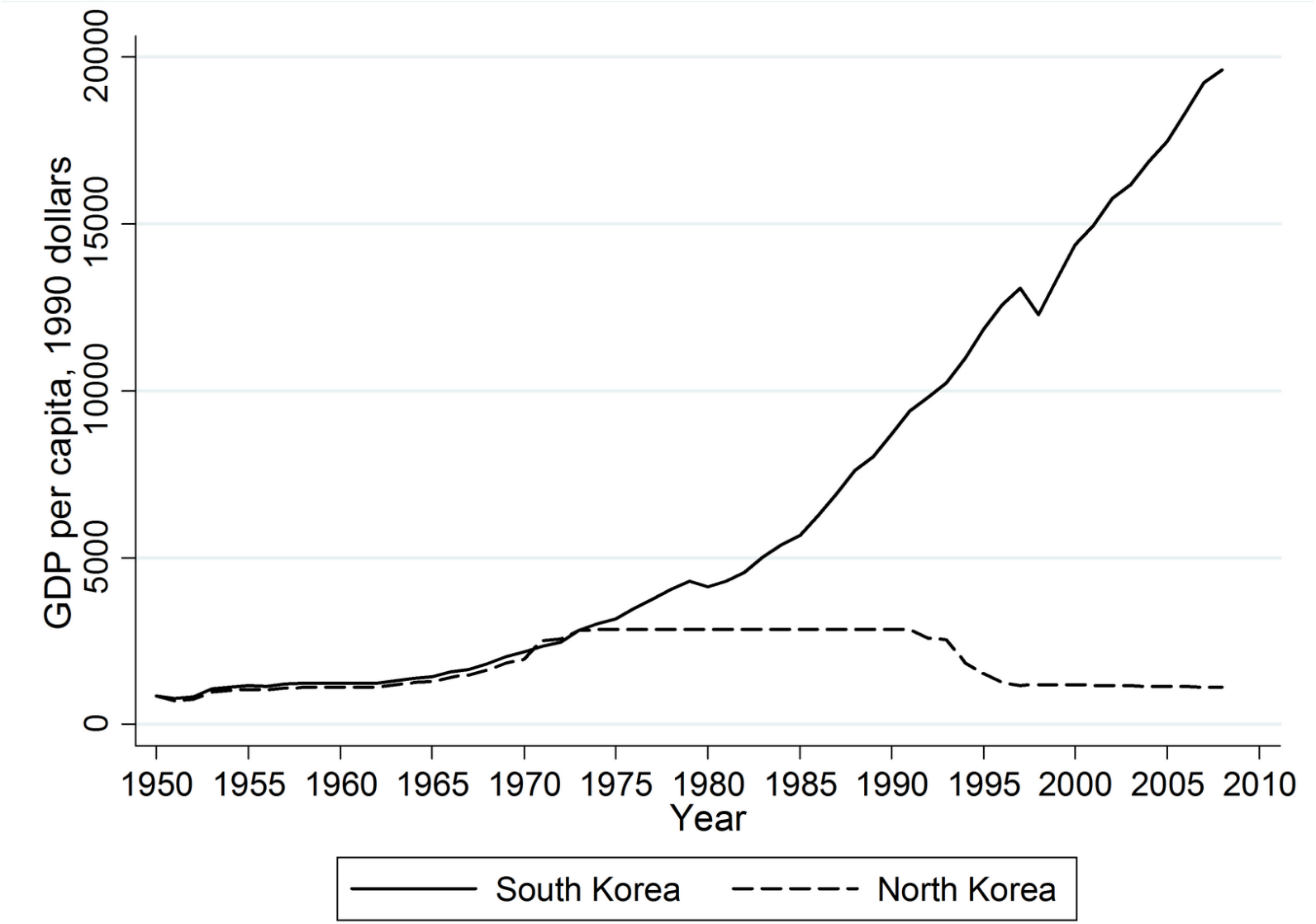
More Recent Evidence on Trade and Growth

- Pascali (AER 2017):
  - Uses introduction of steam ships as asymmetric shock to trade (wind patters less important after introduction of steam)
- Feyrer (AEJ: Applied 2019):
  - Improvement in air travel is time-varying / asymmetric shock to trade
- Feyrer (JDE 2021):
  - Exploits closing of the Suez canal between 1967 and 1975

Institutions or Just Luck?

- Much work on institutions and growth
- Prominent example: South Korea vs. North Korea
- How convincing is this?
- Might this be luck?

South Korea vs. North Korea



Source: Daron Acemoglu.

South Korea vs. North Korea

Source: National Geographic

South Korea vs. North Korea

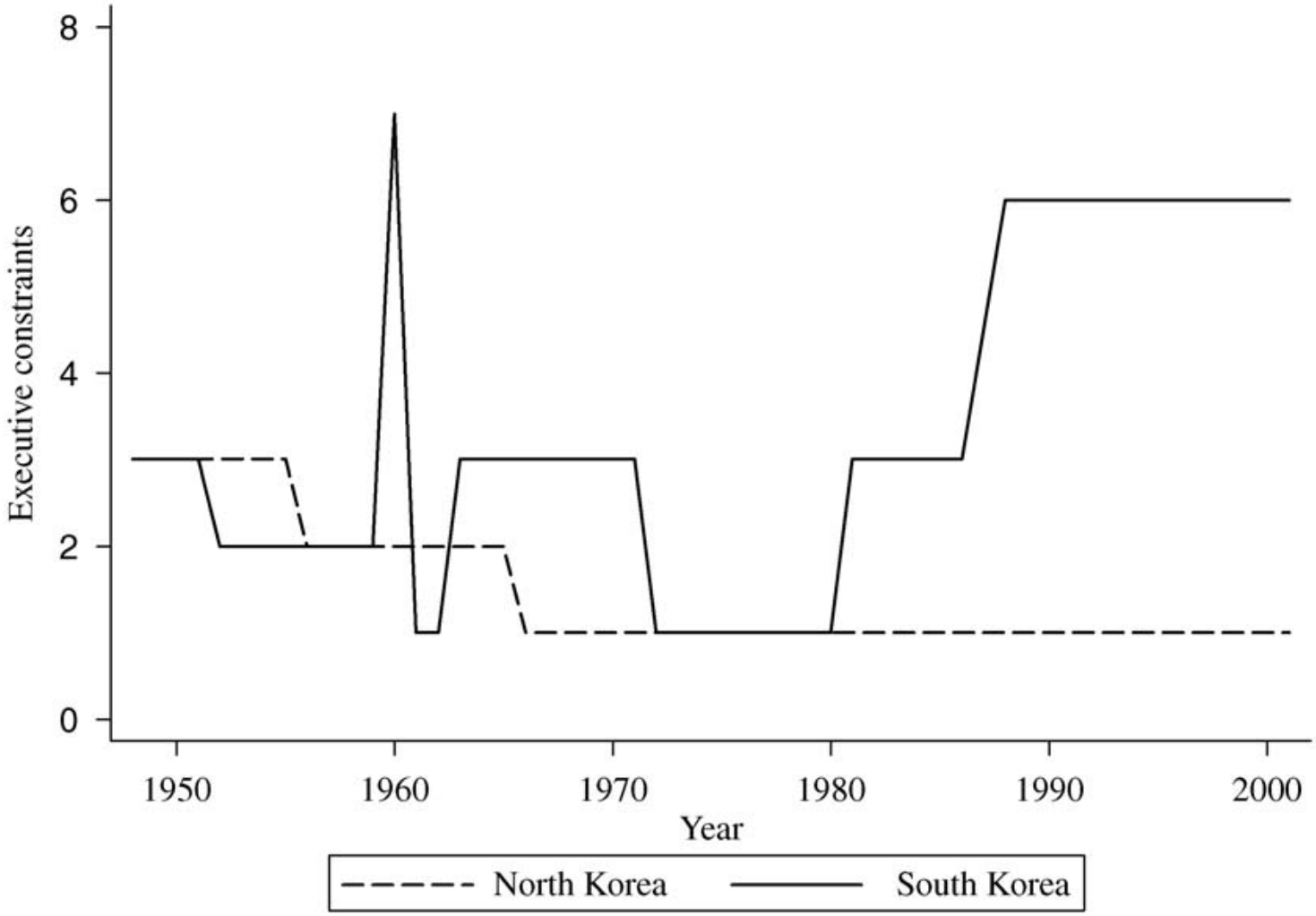


Figure 1. Executive constraints 1948–2001 North versus South Korea.

Source: Glaeser, La Porta, Lopez-de-Silanes, Shleifer (2004)

Institutions or Luck?

- Gleaser et al. (2004) argue that institutions view doesn't work for Korea
  - South Korea grew rapidly under one-party dictatorship
  - Only improved institutions (constraints on executive) **after** long period of high growth
- Alternative: South Korea was lucky to have a "good" leader
  - Growth took off under leadership of Park Chung-hee (1961-1979)
  - He was not constrained by "good institutions"
- Perhaps which countries develop and which don't comes down to luck regarding leaders

Do Leaders Matter?

- Views differ sharply! Tolstoy: Historical figures mere ex post justifications for events out of any individual's influence
- Marxists: "Materialist dialectic" holds that social and economic forces trump individuals
- John Keegan: The political history of the twentieth century can be found in the biographies of six men: Lenin, Stalin, Hitler, Mao, Roosevelt and Churchill.

Do Leaders Matter?

- Claim: National leaders cause changes in growth
- Simple minded evidence: Look at changes in growth when leaders change

Do Leaders Matter?

- Claim: National leaders cause changes in growth
- Simple minded evidence: Look at changes in growth when leaders change
- But leadership transitions are non-random
  - Bad shocks may cause leaders to lose power
  - Good shocks may shield leaders

Jones and Olken (2005)

- Look at leadership transition due to leaders dying in office
- Consider cases when leaders die of natural causes or due to accidents (not assassinations)
- **Timing** of transition is random

Leader Transitions

TABLE I
How Leaders Leave Power

130 Countries
All Leaders from 1945 or National Independence Date through 2000
Number of Observations, by Type

Lost election	Term limits	Voluntary retirement	Deposed	Death[a]	Other	Total
310	178	131	222	105	225	1184[b]

Assassination	Natural	Accidental	
28	65	12	105

Heart disease	Cancer	Stroke	Other disease	Surgical complications	Other	Air crash	Other	
29	12	6	6	3	9	8	4	77[c]

a. There are 21 further cases (not included here) where leaders are killed during a coup.
b. There are 1294 distinct terms in which leaders are in power in the data set, but only 1184 counted in this table, as we do not witness the exit of leaders who are still in power at the end of the year 2000.
c. There are 77 cases of leaders who die in office by natural causes or accidents, but only 57 who die during periods where there are available growth data before and after the leader's death.

Source: Jones and Olken (2005)

Dramatic Cases

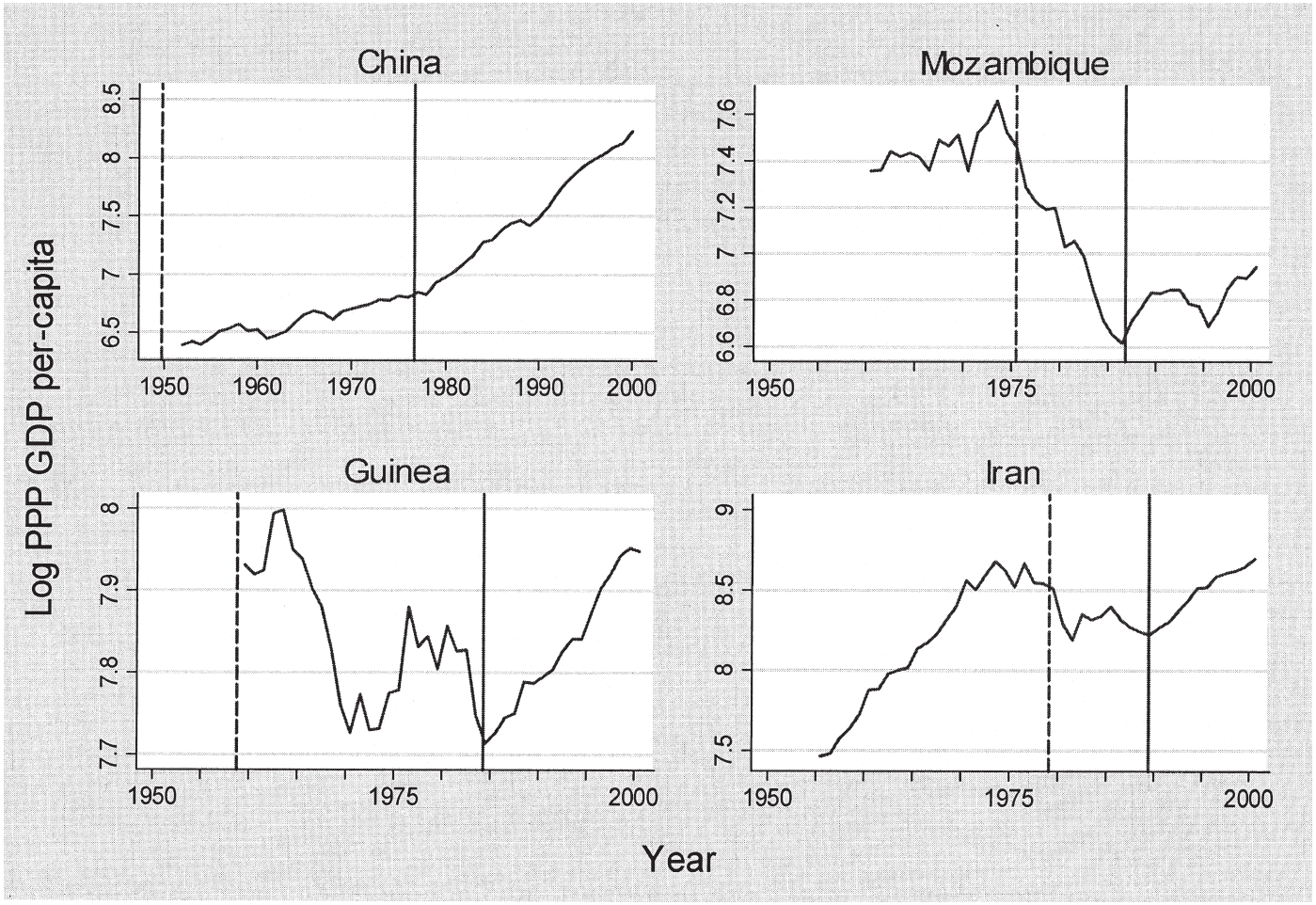


Figure I
Growth and Leader Deaths

Source: Jones and Olken (2005). China: Mao. Mozambique: Samora Machel (nationalized private land). Guinea: Sekou Toure (totalitarianism/violent purges). Iran: Ayatollah Khomeini (Iran-Iraq war).

How to Measure Effect?

- Timing of death is random, but timing of accession to power is not
- Can't use growth during leader's reign
- Calculate growth in T years before and after random transition

Model of Growth

$$g_{it} = \alpha_z \text{PRE}_z + \beta_z \text{POST}_z + v_i + v_t + \epsilon_{it}$$

- z denotes particular leader death
- PRE_z: dummy for T years prior to death
- POST_z: dummy for T years after death
  (they exclude year of death)
- v_i, v_t: country and year fixed effects
- ϵ_{it}: Other influences on growth

Test Statistics

- Wald test:

$$J = \frac{1}{Z}\sum_{z=1}^{Z}\frac{(\widehat{\text{POST} - \text{PRE}_z})^2}{2\hat{\sigma}^2_{\epsilon z}/T}$$

  - Compares change in growth pre and post leader death to usual variation in growth
  - Under null of no effect, $Z \times J$ will be distributed $\chi^2(Z)$
  - $\widehat{\text{POST} - \text{PRE}_z} = \alpha_z - \beta_z$ from regression on previous page

- Rank test:

$$K = \frac{\sum(y_z - 1/4)}{\sqrt{Z/48}}$$

  - $y_z = |r_z - 1/2|$ where r_z is rank of $\widehat{\text{POST} - \text{PRE}_z}$ among all $\widehat{\text{POST} - \text{PRE}_{it}}$
  - r_z is U[0,1] under null that leaders don't matter.
    So, $E[y_z] = 1/4$ and $\text{var}[y_z] = 1/48$

Do Leaders Matter?

TABLE III
Do Leaders Matter?

	All leaders			Leaders with tenure ≥ 2 years		
	J-statistic	Wald P-value	Rank P-value	J-statistic	Wald P-value	Rank P-value
Treatment timings						
t	1.312	.0573*	0.017**	1.392	.0390**	0.004***
$t + 1$	1.272	.0845*	0.075*	1.361	.0537*	0.052*
$t + 2$	1.308	.0669*	0.172	1.443	.0314**	0.121
Control timings						
$t - 5$	0.841	.7953	0.446	0.918	.6269	0.357
$t - 6$	0.986	.5026	0.806	0.962	.5409	0.905
Number of leaders (t)	57	57	57	47	47	47
Number of observations (t)	5567	5567	5567	5567	5567	5567

Source: Jones and Olken (2005).

Magnitude of Effect

- POST-PRE is 31 percent higher around leader deaths
- A few more assumptions imply that a one standard deviation increase in leader quality increases growth by 1.47 percentage points per year
- Huge effect!!

Magnitude of Effect

- POST-PRE is 31 percent higher around leader deaths
- A few more assumptions imply that a one standard deviation increase in leader quality increases growth by 1.47 percentage points per year
- Huge effect!!
- For autocracies, effect is 2.1 percentage points per year
- For democracies, effect is zero

When Do Leaders Matter?

TABLE V
INTERACTIONS WITH TYPE OF POLITICAL REGIME IN YEAR PRIOR TO DEATH

	J-statistic	Wald P-value	Rank P-value	J-statistic	Wald P-value	Rank P-value
	Autocrats (Polity IV)			Democrats (Polity IV)		
Treatment timings						
t	1.621	0.019**	0.040**	1.000	0.460	0.106
$t + 1$	1.672	0.016**	0.017**	0.932	0.552	0.712
$t + 2$	1.592	0.028**	0.051*	1.021	0.432	0.636
Control timings						
$t - 5$	0.849	0.698	0.837	0.866	0.632	0.075*
$t - 6$	1.094	0.334	0.977	0.647	0.873	0.191
Number of leaders (t)	29	29	29	22	22	22

Source: Jones and Olken (2005). One standard deviation increase in autocratic leader quality increases growth by 2.1 percentage points per year.

Macro Development Policy

- Very little consensus on how to achieve growth
- One view: “Washington Consensus”

  (Williamson, 1990)

Washington Consensus

Table 2
Rules of good behavior for promoting economic growth

Original Washington Consensus:	"Augmented" Washington Consensus: … the previous 10 items, plus:
1. Fiscal discipline	11. Corporate governance
2. Reorientation of public expenditures	12. Anti-corruption
3. Tax reform	13. Flexible labor markets
4. Interest rate liberalization	14. Adherence to WTO disciplines
5. Unified and competitive exchange rates	15. Adherence to international financial codes and standards
6. Trade liberalization	16. "Prudent" capital-account opening
7. Openness to DFI	17. Non-intermediate exchange rate regimes
8. Privatization	18. Independent central banks/inflation targeting
9. Deregulation	19. Social safety nets
10. Secure property rights	20. Targeted poverty reduction

Source: Rodrik (2005).

One Economics, Many Recipes

- West didn't follow Washington Consensus when it developed
- Asian Tiger's deviated substantially from Washington Consensus
  - Highly state directed development
  - Directed credit, trade protections, export subsidies
  - Closed capital accounts until 1980s
- Rodrik (2005): "There is no unique correspondence between the *function* that good institutions perform and the *form* that such institutions take."
  - China's liberalization of agriculture *only at the margin* (Lau, Qian, Roland, 2000)
  - China's township and village enterprises (municipal rather than private property rights)
- Local political economy crucial. One recipe does not fit all.

Appendix

Assignments from Mali

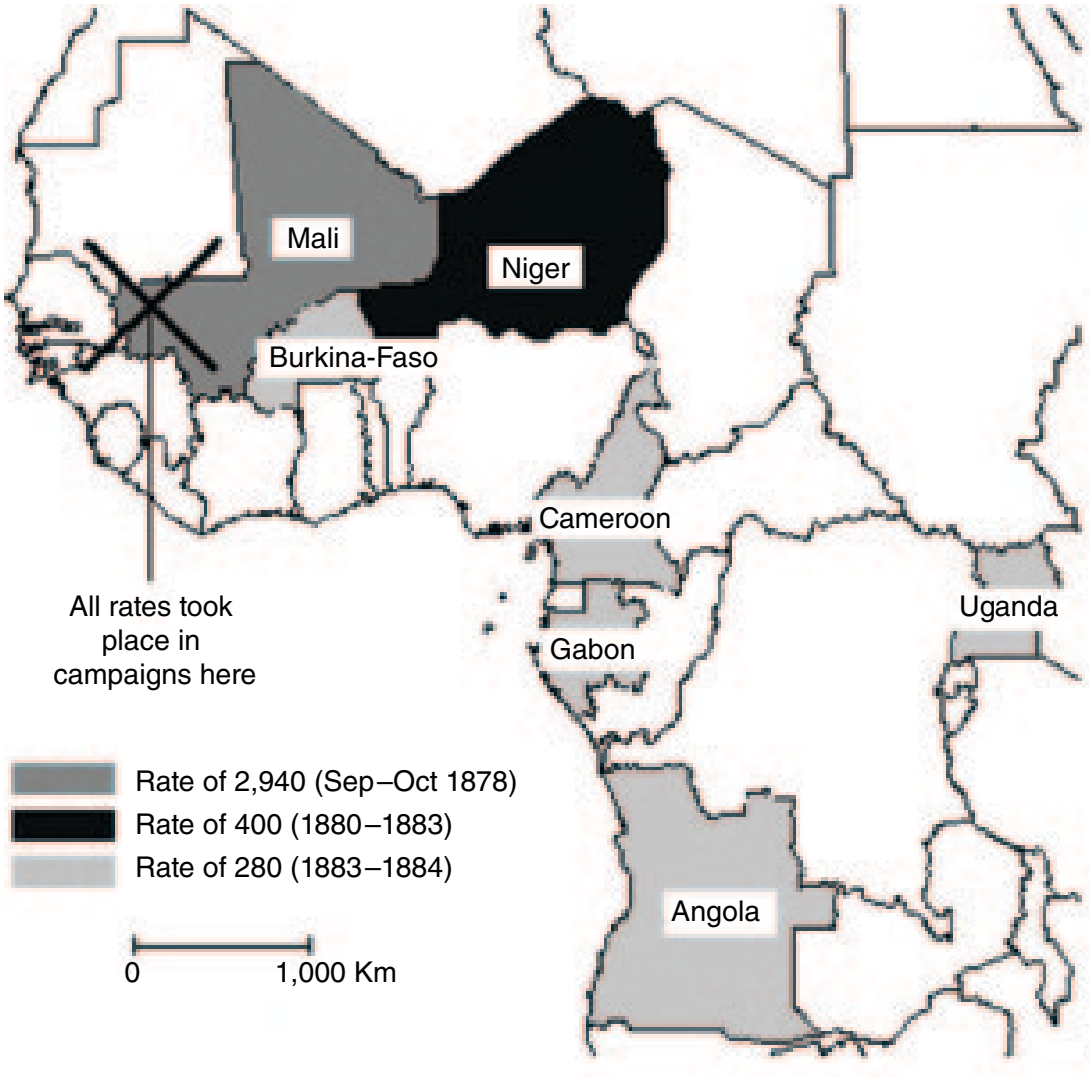


Figure 1. Assignment of Mortality Rates from Mali

Source: Albouy (2012)

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Table 2. Determinants of development: Core specifications, ordinary least squares estimates.

	Log GDP per capita								
	Acemoglu et al. Sample			Extended Acemoglu et al. Sample			Large Sample		
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Geography (DISTEQ)	0.74 (4.48)*	0.20 (1.34)	0.32 (1.85)**	0.80 (5.22)*	0.22 (1.63)	0.33 (2.11)**	0.76 (10.62)*	0.20 (2.48)**	0.23 (2.63)*
Institutions (RULE)		0.78 (7.56)*	0.69 (6.07)*		0.81 (9.35)*	0.72 (6.98)*		0.81 (12.12)*	0.78 (10.49)*
Integration (LCOPEN)			0.16 (1.48)			0.15 (1.53)			0.08 (1.24)
Observations	64	64	64	79	79	79	137	137	137
R-square	0.25	0.57	0.59	0.26	0.61	0.62	0.42	0.71	0.71

Notes: The dependent variable is per capita GDP in 1995, PPP basis. There are three samples for which the core regressions are run: (i) the first three columns correspond to the sample of 64 countries in Acemoglu et al. (2001); (ii) columns (4)–(6) use a sample of 79 countries for which data on settler mortality (LOGEM4) have been compiled by Acemoglu et al.; and (iii) columns (7)–(9) use a larger sample of 137 countries. The regressors are: (i) DISTEQ, the variable for geography, which is measured as the absolute value of latitude of a country; (ii) Rule of law (RULE), which is the measure for institutions; and (iii) LCOPEN, the variable for integration, which is measured as the ratio of nominal trade to nominal GDP. All regressors are scaled in the sense that they represent deviations from the mean divided by the standard deviation. All regressors, except DISTEQ and RULE, in the three panels are in logs. See the Appendix for more detailed variable definitions and sources. *t*-statistics are reported under coefficient estimates. Significance at the 1, 5, and 10 percent levels are denoted respectively by *, **, and ***.

Source: Rodrik, Subramanian, Trebbi (2004). T-stats in parentheses.

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Table 8. Determinants of development: Robustness to alternative measures and instruments for integration.

	Baseline	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Two-Stage Least Squares: Dependent Variable is log GDP per Capita in 1995								
Geography (DISTEQ))	−0.72	−0.56	−0.63	0.13	0.12	−1.16	−1.24	−0.86
	(−1.38)	(−0.83)	(−0.88)	(0.38)	(0.35)	(−1.25)	(−1.14)	(−1.17)
Institutions (RULE)	1.98	1.83	1.90	0.97	0.99	2.70	2.84	2.55
	(3.56)*	(2.64)**	(2.58)**	(2.39)**	(2.46)**	(2.14)**	(1.82)**	(2.11)**
Integration (LCOPEN)	−0.31	0.12	−0.01	−0.87	−0.85			
	(−1.38)	(0.10)	(−0.01)	(−0.90)	(−0.94)			
Land area (AREA)		0.27	0.24	−0.40	−0.39			
		(0.77)	(0.67)	(−0.97)	(−0.99)			
Population (POP)		0.11	0.39	−0.43	−0.42			
		(0.16)	(0.05)	(−0.63)	(−0.65)			
"Real openness" (LNOPEN)						−0.77	−0.94	
						(−0.83)	(−0.70)	
"Policy openness" (SW)								−2.04
								(−1.07)
R-square	0.52	0.61	0.61	0.60	0.60	0.55	0.55	0.61
No. of observations	79	79	79	136	136	71	71	69

Notes: The dependent variable is per capita GDP in 1995, PPP basis. All regressors, except DISTEQ, RULE, and SW, are expressed in logs. Baseline corresponds to the specification in column (6) of Table 3. In columns (1), (3) and (5) the instrument for openness (LOGFRANKROM) is from Frankel and Romer (1999). In columns (2), (4) and (6), the instrument for openness (LOGFRANKROMR) is derived by re-estimating the gravity equation in Frankel and Romer (1999) with the left-hand side variable defined as nominal bilateral trade to nominal GDP. In Frankel and Romer, the left hand side variable was defined as nominal trade divided by PPP GDP. Standard errors are corrected, using the procedure described in Frankel and Romer (1999), to take into account the fact that the openness instrument is estimated. *t*-statistics are reported under coefficient estimates. Significance at the 1, 5, and 10 percent levels are denoted respectively by *, **, and ***. All regressors are scaled as described in the notes to Tables 2–4.

Source: Rodrik, Subramanian, Trebbi (2004). T-stats in parentheses.

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