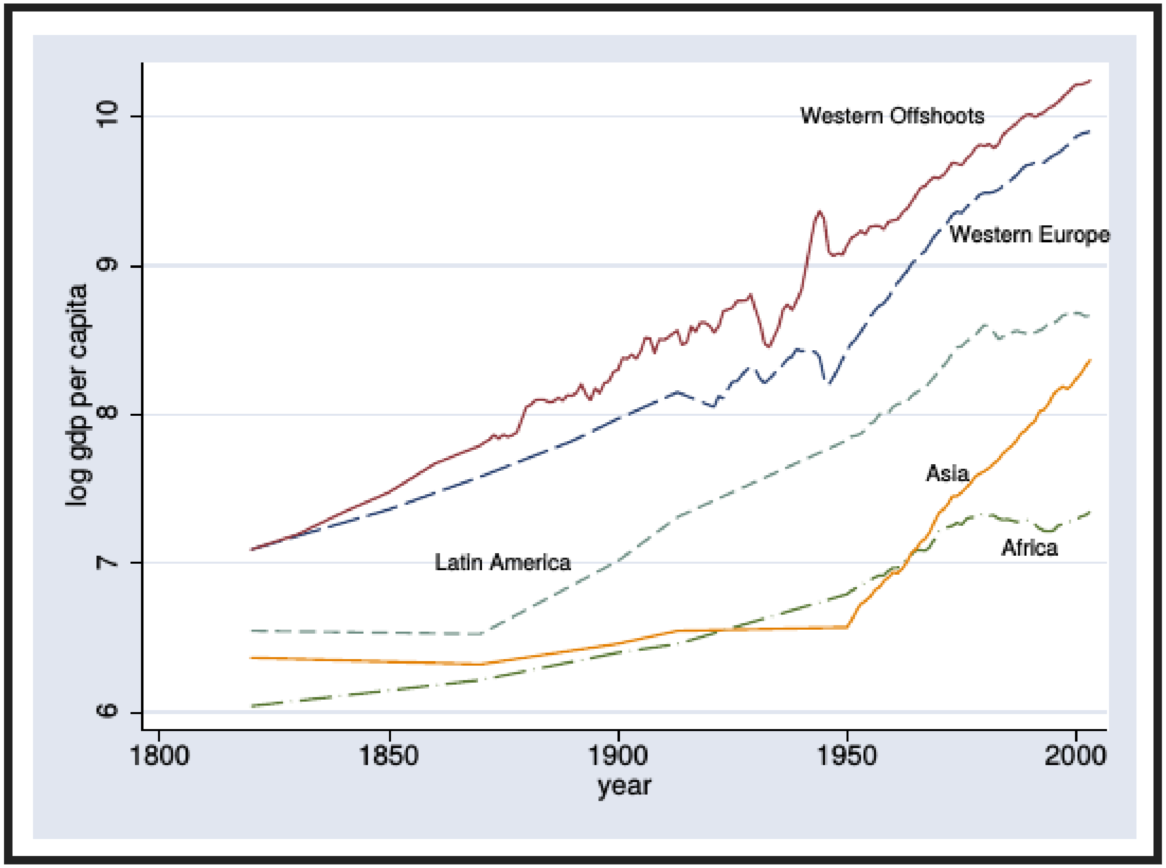
Economic Growth

ECON 499: Economics of Inequality

Winter 2018

Global inequality

- Most international inequality is *between* country, not *within* country
- Some countries/regions grow at different rates than others
- If poor countries grow slower than rich countries, global inequality will increase
- Rule of 70: Small changes in growth can have large consequences on the global distribution of income



Western Offshoots
Western Europe
Latin America
Asia
Africa
log gdp per capita
6
7
8
9
10
1800
1850
1900
1950
2000
year

Growth theory

- Why do countries grow? What determines their growth rate?
- Standard economic growth model: Solow-Swan model
- Growth is determined by *factor accumulation* and *technology*
- All else equal, countries will reach a *steady state growth path*, where they grow at a constant rate

Solow model

Setup:

- Output Y_t (GDP) is produced with capital K_t
- Assume constant labor (no population growth)
- Capital transformed into output by a *production function*
- $Y_t = f(K_t), f''(K_t) < 0$ (diminishing marginal returns)
- Existing capital depreciates at a rate δ every period t
- Each period, output is either saved (as new capital) at rate s or consumed: $Y_t = I_t + C_t = K_t + C_t$

Capital accumulation

Primitive Technology: Cord drill and Pump drill

Convergence

- The steady-state level of capital is determined by the shape of the production function and the savings rate
- Countries with different production processes and different savings rates will have different steady-states
- This explains why we don't observe absolute convergence

Adding steady-state growth

- In the simple model there is no growth in the steady state
- Data suggests that most countries have positive growth in the steady state
- We might think that our production process $f(K)$ gets better over time
- We can add an **exogenous** technology process A that increases productivity
- $Y_t = A_t f(K_t)$

Technological change

- Suppose A grows at some constant rate g
- Then at the steady state, Y is growing at the same rate
- $Y_t = A_t f(\bar{K})$
- $\bar{K}$ constant, A grows at g, $\rightarrow Y$ grows at rate g
- Capital accumulation happens as before
- Long-run (steady-state) growth determined by technology growth

Poverty traps

- Suppose capital has diminishing marginal returns when it is abundant, increasing marginal returns when it is scarce
- Simple machines/tools less marginally productive than advanced machines/tools
- This can give rise to *multiple steady-states*
- Countries can get "stuck" at lower steady-state, unable to get to higher income level

Proximate causes

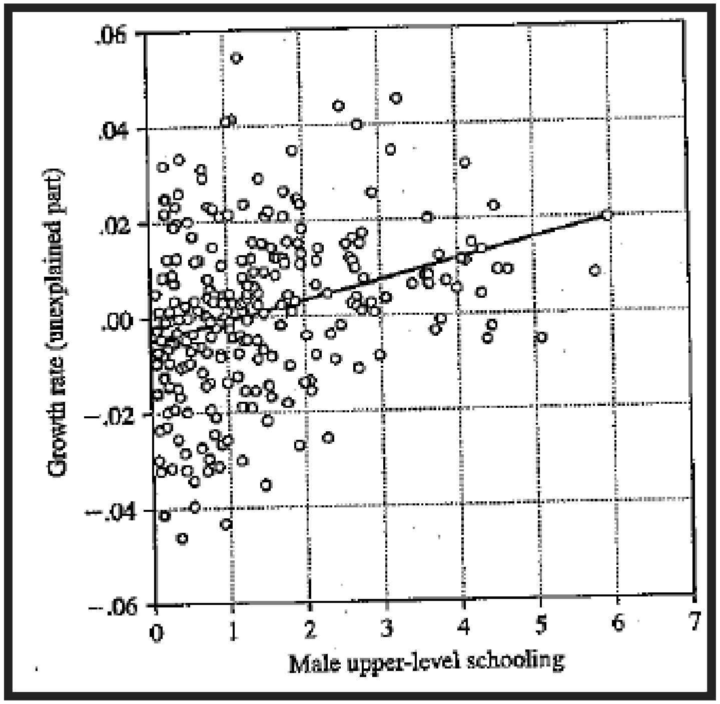
- In the simple model, steady states determined by technology, productivity, savings
- What determines these things?
- Are there other things that matter?

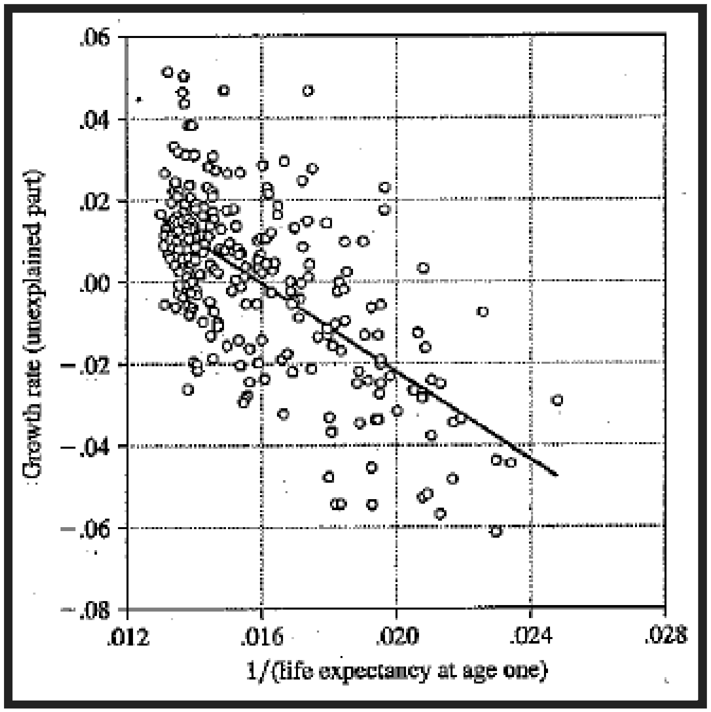
Human capital

- So far we've only considered physical capital (K)
- The ability to efficiently use capital and technology a function of worker ability or skills (human capital)
- Countries with more human capital (education) have a higher steady state, will grow faster than countries with lower human capital from the same initial level of wealth

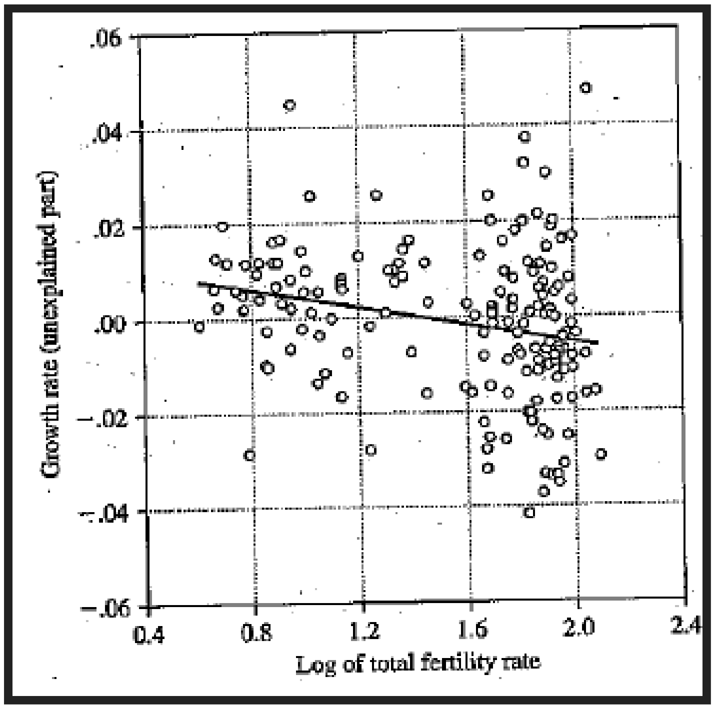
Other possibilities

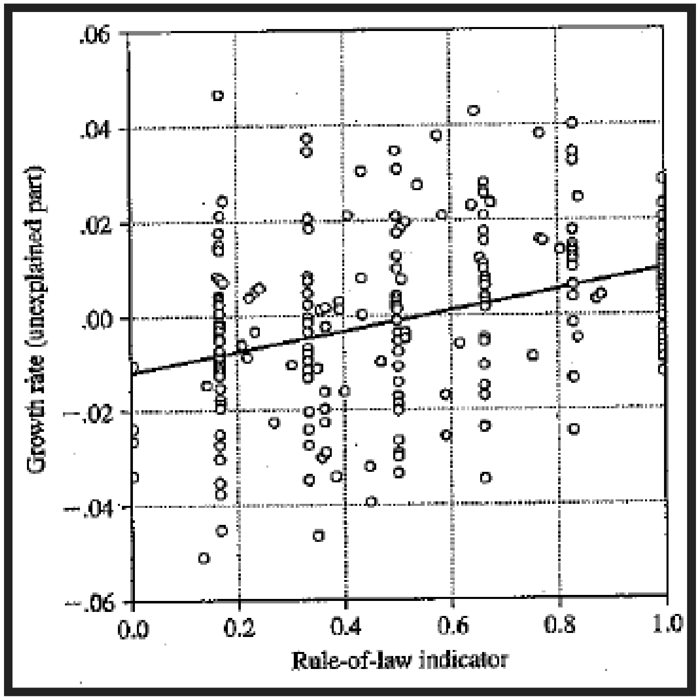
- Rule of law
- Openness to trade
- Democracy
- Fertility rate
- Government spending
- Health


.06
.04
.02
.00
−.02
−.04
−.06
Growth rate (unexplained part)
0
1
2
3
4
5
6
7
Male upper-level schooling

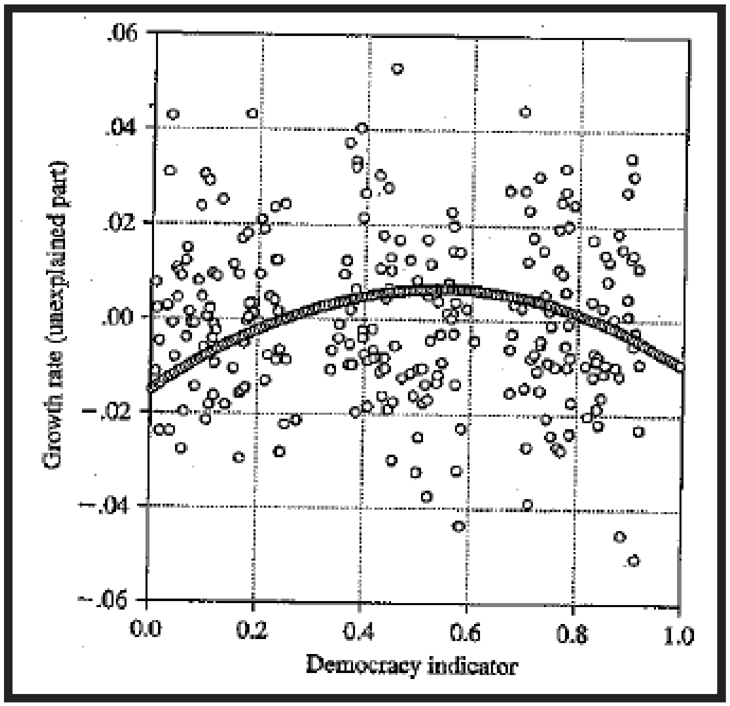


.06
.04
.02
.00
-.02
-.04
-.06
-.08
Growth rate (unexplained part)
.012
.016
.020
.024
.028
1/(life expectancy at age one)


.06
.04
.02
.00
−.02
−.04
−.06
Growth rate (unexplained part)
0.4
0.8
1.2
1.6
2.0
2.4
Log of total fertility rate



.06
.04
.02
.00
-.02
-.04
-.06
0.0
0.2
0.4
0.6
0.8
1.0
Growth rate (unexplained part)
Rule-of-law indicator


.06
.04
.02
.00
−.02
−.04
−.06
0.0
0.2
0.4
0.6
0.8
1.0
Growth rate (unexplained part)
Democracy indicator

Fundamental causes of growth

- Many factors that correlate strongly with growth seem to be related
- There are likely some underlying factors that are causing everything
- If human capital creates growth, why don't all countries improve human capital? (Fertility, health outcomes, etc.)
- North and Thomas (1973):

> *The factors we have listed … are not causes of growth, they are growth*

Fundamental causes?

1. Luck
2. Geography
3. Culture
4. Institutions

Luck

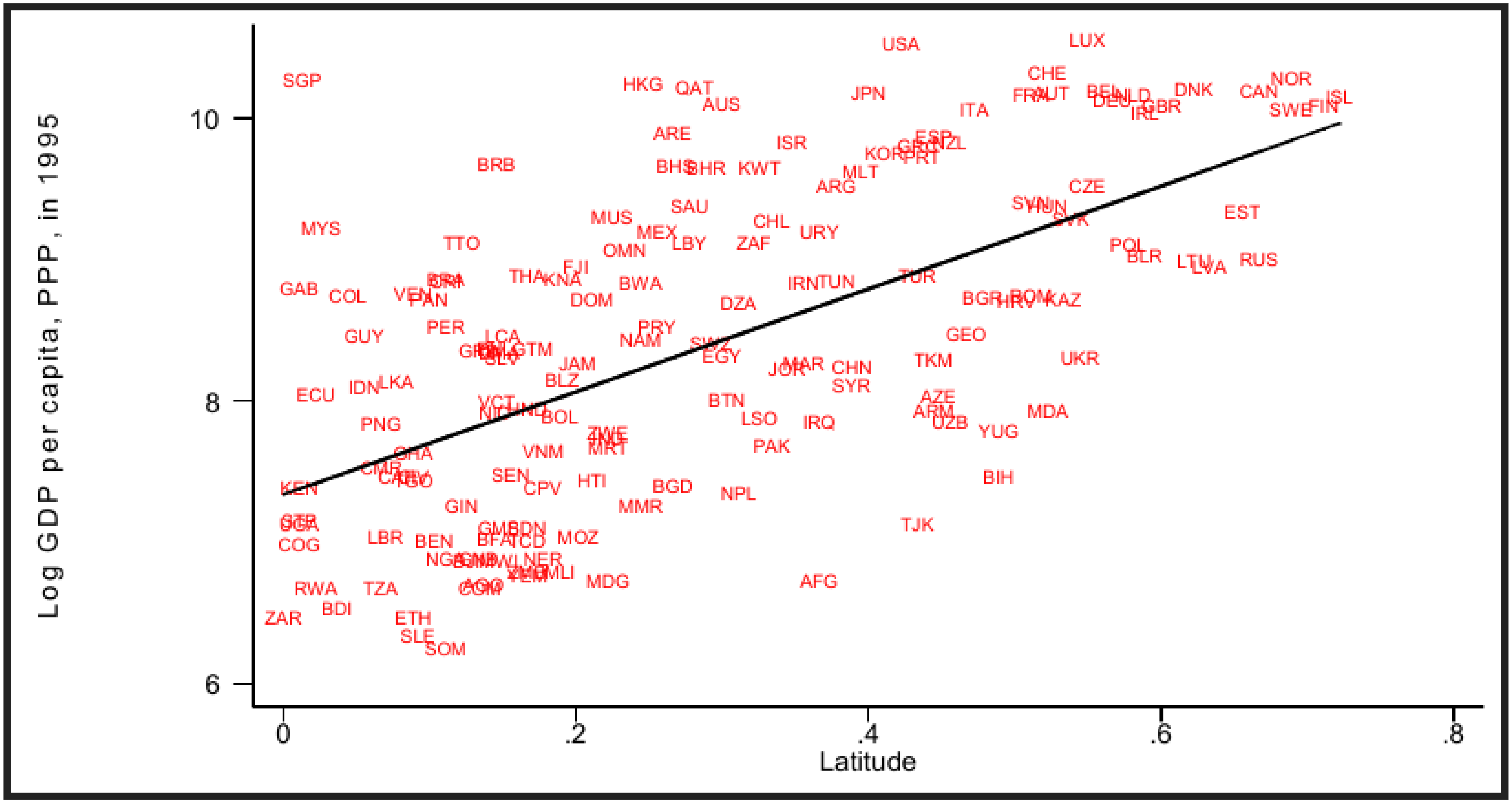
- Poverty trap model: Steady state income depends on initial level of capital
- What determines initial capital?
- Some countries may be lucky or unlucky
- Natural disasters can push countries to a low steady-state path early in development process

Arguments against luck

- It seems unlikely that the vast differences between the United States and Nigeria can be explained only by small, random occurrences
- Are we stuck with randomness?
    - If yes, then there's nothing we can do about growth!
    - If no, then why don't poor countries do something about it?

Geography

- Jared Diamond: **Guns, Germs, and Steel** (1997)
- Some climates more conducive to agriculture
- Tropical diseases
- Natural resources
- Strong correlation between latitude and wealth


Log GDP per capita, PPP, in 1995
10
8
6
0
.2
.4
.6
.8
Latitude
USA
LUX
SGP
HKG
QAT
AUS
JPN
CHE
DNK
CAN
NOR
ISL
ITA
SWE
FIN
IRL
GBR
ARE
ISR
BRB
KWT
MLT
ARG
CZE
EST
MYS
MUS
SAU
CHL
URY
TTO
OMN
LBY
ZAF
POL
BLR
RUS
GAB
COL
THA
FJI
KNA
BWA
DOM
DZA
IRN
TUN
TUR
BGR
KAZ
GUY
PER
LCA
GTM
NAM
PRY
EGY
GEO
UKR
JAM
BLZ
CHN
SYR
TKM
ECU
LKA
IDN
BTN
AZE
MDA
PNG
BOL
LSO
IRQ
UZB
YUG
VNM
PAK
GHA
SEN
CPV
HTI
BGD
NPL
BIH
KEN
GIN
MMR
TJK
COG
LBR
BEN
MOZ
MDG
AFG
RWA
TZA
ZAR
BDI
ETH
SOM

Arguments against geography

- Countries diverge after industrialization, not during agricultural times
- Low agricultural prospects should create comparative advantage in industry
- Diseases are caused by wealth: Richer countries can afford to eliminate disease (black plague in Europe, malaria in US South)

Culture

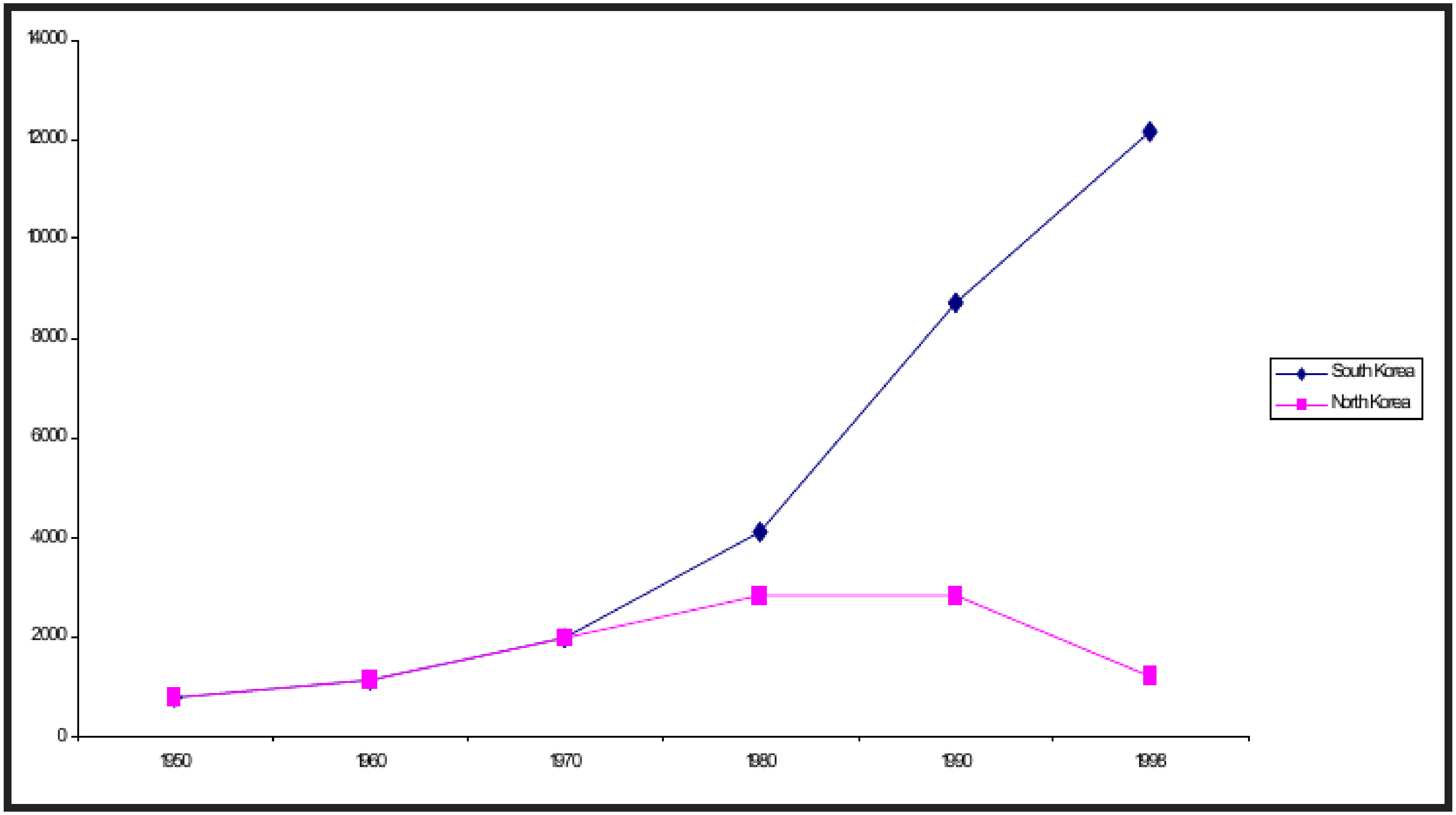
- Max Weber: *The Protestant Ethic and the Spirit of Capitalism* (1905)
- Protestantism values hard work and capital
- Some cultures more trusting, harder working than others (?)

Arguments against culture?

- What is "culture"? How do we measure it?
- How do we account for similar cultures with vastly different growth/wealth? (North and South Korea, Nogales Sonora, Nogales Arizona)

Institutions

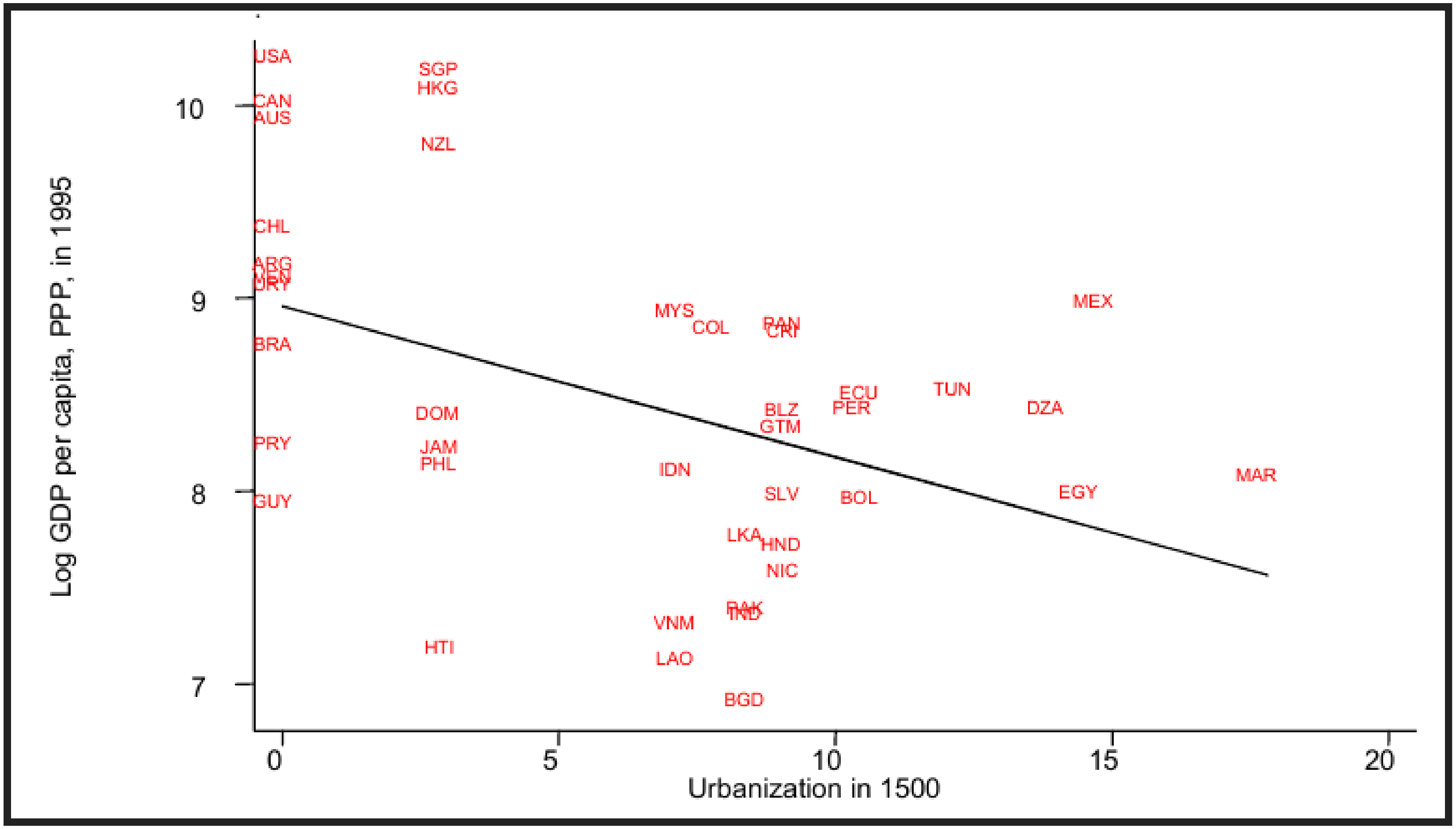
- New-institutional economics (Acemoglu, Johnson, Robinson: **Why Nations Fail** (2012))
- Douglass North (1990): "Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction."
- Institutions explain many facts that other explanations struggle with
- Extreme example: North and South Korea



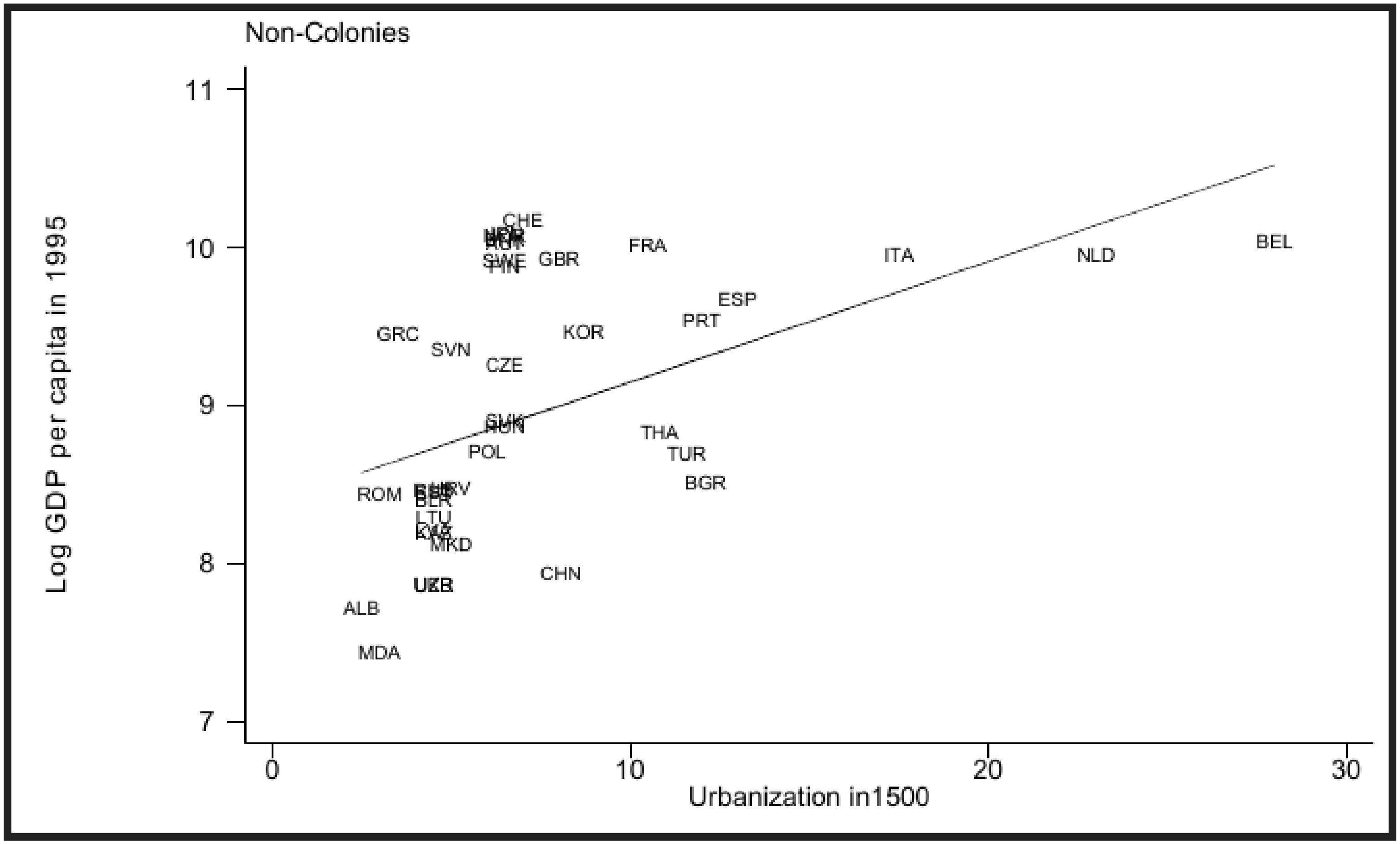
14000
12000
10000
8000
6000
4000
2000
0
1950
1960
1970
1980
1990
1998
South Korea
North Korea

Reversal of fortunes

- Many European colonies that were rich in 1500 are poor today
- Many that were poor in 1500 are rich today
- Opposite is true among non-colonies
- Difficult to explain by geography, luck, or culture

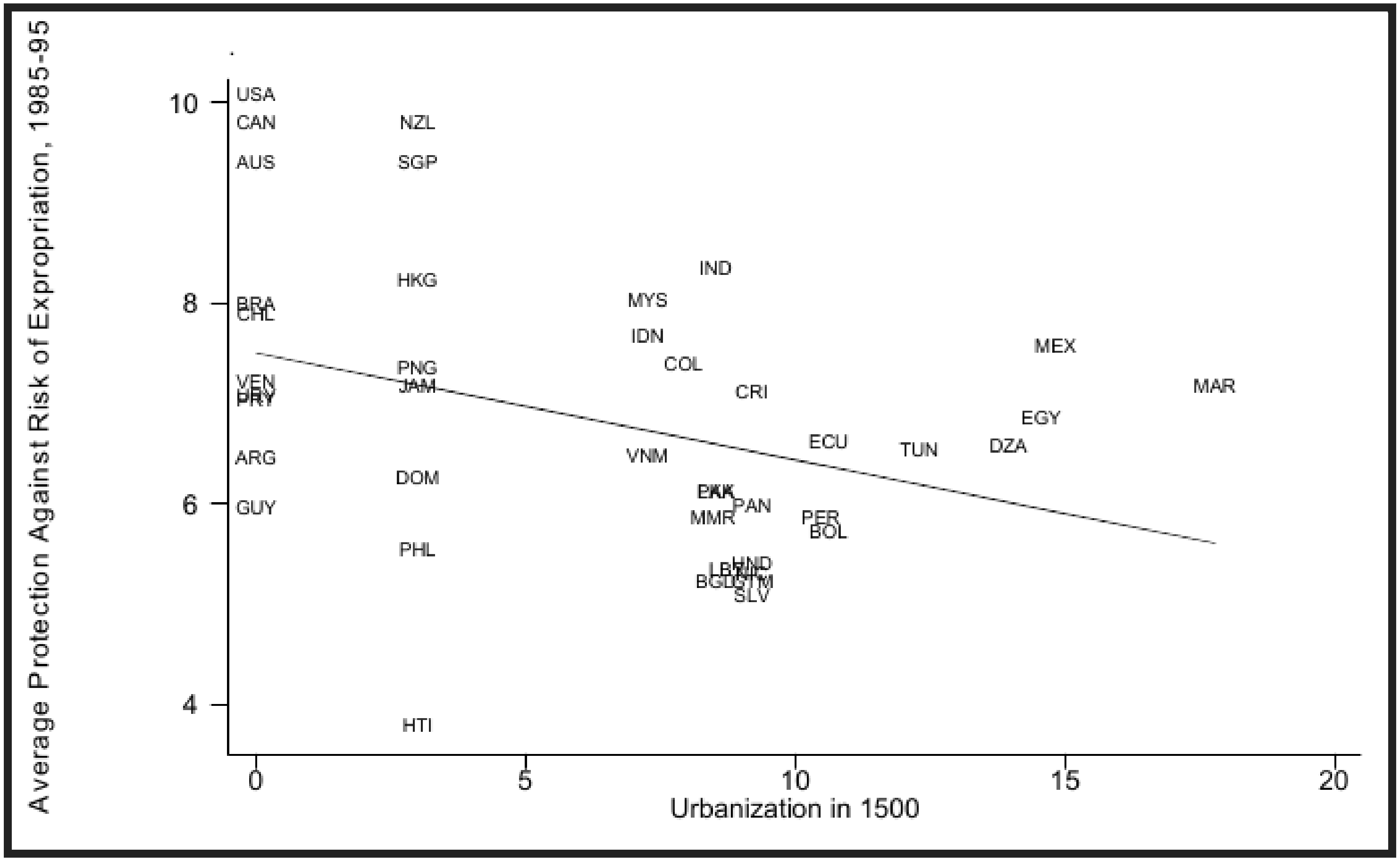


Log GDP per capita, PPP, in 1995
Urbanization in 1500
10
9
8
7
0
5
10
15
20
USA
CAN
AUS
CHL
ARG
VEN
URY
BRA
PRY
GUY
SGP
HKG
NZL
DOM
JAM
PHL
HTI
MYS
COL
IDN
VNM
LAO
PAN
CRI
BLZ
GTM
SLV
LKA
HND
NIC
PAK
IND
BGD
ECU
PER
BOL
TUN
DZA
MEX
EGY
MAR


Non-Colonies
Log GDP per capita in 1995
Urbanization in1500
11
10
9
8
7
0
10
20
30
CHE
FRA
ITA
NLD
BEL
GBR
ESP
PRT
KOR
GRC
SVN
CZE
THA
TUR
BGR
POL
ROM
LTU
MKD
CHN
ALB
MDA

The reversal and institutions

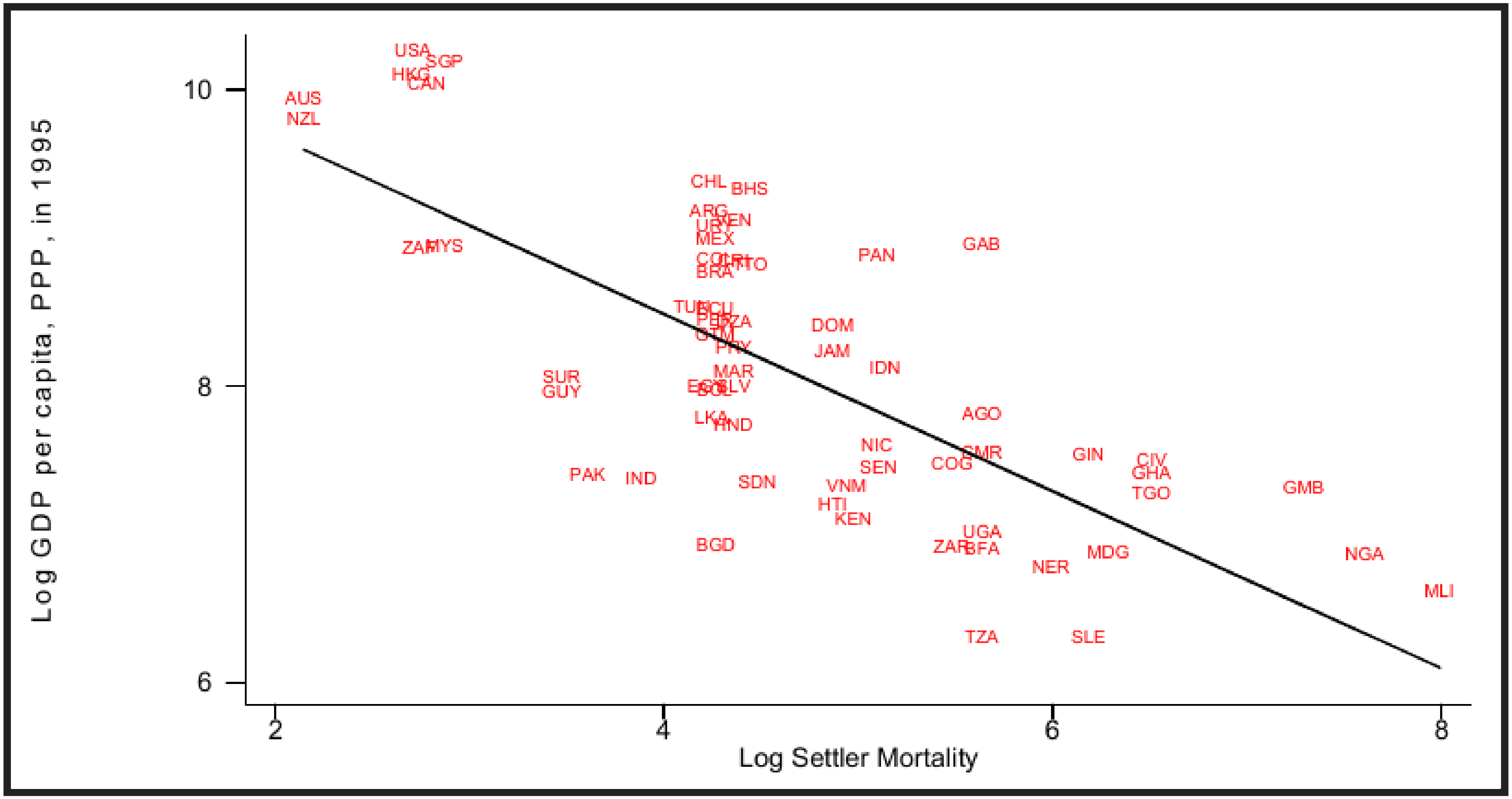
- Institutions can explain the reversal of fortune among former colonies
- Colonies that are rich today have "better" institutions than colonies that are poor today


Average Protection Against Risk of Expropriation, 1985-95
Urbanization in 1500
USA
CAN
AUS
NZL
SGP
HKG
IND
MYS
IDN
COL
BRA
CHL
PNG
JAM
VEN
PRY
CRI
MEX
MAR
EGY
ECU
TUN
DZA
ARG
VNM
DOM
GUY
PAN
MMR
PER
BOL
PHL
HND
SLV
HTI

Colonies and institutions

- All colonies had an institutional change when thy were colonized
- Some colonies got "better" institutions than others
- What decides if a colony got better institutions?
  - Note: "Better" in terms of economic growth only!


Avg. Protect. Against Risk Expropriation
Log Settler Mortality
10
8
6
4
2
4
6
8
USA
NZL
CAN
AUS
SGP
HKG
MYS
IND
GMB
BRA
CHL
GAB
IDN
COL
JAM
ZAF
EGY
TZA
CMR
GIN
VNM
GHA
DOM
PAK
GUY
LKA
PAN
SLE
PER
BOL
NGA
HND
NIC
AGO
SLV
NER
SUR
COG
MDG
SDN
MLI
HTI
ZAR


Log GDP per capita, PPP, in 1995
Log Settler Mortality
10
8
6
2
4
6
8
USA
SGP
HKG
CAN
AUS
NZL
ZAF
MYS
CHL
BHS
ARG
VEN
URY
MEX
COL
CRI
TTO
BRA
PAN
GAB
TUN
ECU
PER
DZA
GTM
PRY
DOM
JAM
IDN
SUR
GUY
MAR
ECU
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CMR
GIN
CIV
GHA
TGO
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PAK
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SLE