Size Really Doesn't Matter: In Search of a National Scale Effect

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Motivation

- Wide variation in country size
  - 11 countries with >100 million
  - 11 countries with <100,000
- No optimal country size, no convergence
- *Does country-size variation matter?*

Reasons why Size Might Matter

Much Economics: *Bigger is Better*

"Scale Effects" an intrinsic part of many literatures:

1. "New Wave" trade theory relies on increasing returns
   - offshoots in economic geography, urban economics
2. Scale effects key in endogenous growth theory

   (growth rates or levels of income)
3. Provision of Public Goods

Increasing Returns may be internal/external to firm

- Plant-runs, dynamic scale economies
- Specialization, variety rise with size
- Effect on market structure (competition)
- Information spillovers, IRS in research

Public Goods may be cheaper to provide

- Fixed cost component to monetary institutions, judicial system, communication infrastructure, crime prevention, public health, …
- Defense?
- Scale effects in providing regional insurance
- Ditto in income distribution
- Border effects more generally

But Tradeoffs May Exist!

Potential Cost

- Effect of scale on diversity/hetereogeneity

The Alesina-Spolaore tradeoff:

"on balance, heterogeneity of preferences tends to bring about political and economic *costs* that are traded off against the *benefits* of size."

Drazen

- Match public goods to tastes of community
  - but leads to clubs, not countries?

Political Philosophy: *Small is Beautiful*

- Plato: optimal state has 5,040 families

> *"In our opinion, nothing can be more right than the selection of the number 5040, which may be divided by all numbers from one to twelve with the single exception of eleven, and that admits of a very easy correction; for if, turning to the dividend (5040), we deduct two families, the defect in the division is cured."*
>
> *The Laws*

- 5,040 "colossally abundant"

- 5,040 has factorization = 2^2*3^2*5*7

- Aristotle: countries small enough for everyone to know/hear each other, visible from a hilltop
- Rousseau: small is better
- Montesquieu: republics are necessarily small
- But: Hume and Madison (big => irrelevant factions)

Previous Empirics

- Robinson (1960)
- Much work on size effects *and growth*:
  - Positive but weak: Alesina, Spolaore and Wacziarg (2003); Alcalá and Ciccone (2003)
  - Negative: Barro and Sala-i-Martin (1995); Sala-i-Martin (1997)

My Strategy

- Focus on levels of economic well-being
- Investigate wide range of variables suggested by literature

Data Set

- 208 “countries”, Decadal intervals, 1960-2000
- *WDI* for population, many other variables
- Issue: are small “countries” really countries?
  - Ex: Tuvalu (population 11,636 in July 2005): no army, money or US embassy (but UN member)
  - My default: consider all *WDI* entities “countries”
  - Results robust though

Afghanistan
Albania
Algeria
American Samoa
Andorra
Angola
Antigua and Barbuda
Argentina
Armenia
Aruba
Australia
Austria
Azerbaijan
Bahamas, The
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Belize
Benin
Bermuda
Bhutan
Bolivia
Bosnia-Herzegovina
Botswana
Brazil
Brunei
Bulgaria
Burkina Faso
Burundi
Cambodia
Cameroon
Canada
Cape Verde
Cayman Islands
Central African Rep.

Chad
Channel Islands
Chile
China
Colombia
Comoros
Congo, Dem. Rep.
Congo, Rep.
Costa Rica
Cote d'Ivoire
Croatia
Cuba
Cyprus
Czech Republic
Denmark
Djibouti
Dominica
Dominican Republic
Ecuador
Egypt, Arab Rep.
El Salvador
Equatorial Guinea
Eritrea
Estonia
Ethiopia
Faeroe Islands
Fiji
Finland
France
French Polynesia
Gabon
Gambia, The
Georgia
Germany
Ghana
Greece
Greenland

Grenada
Guam
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hong Kong, China
Hungary
Iceland
India
Indonesia
Iran, Islamic Rep.
Iraq
Ireland
Isle of Man
Israel
Italy
Jamaica
Japan
Jordan
Kazakhstan
Kenya
Kiribati
Korea, Dem. Rep.
Korea, Rep.
Kuwait
Kyrgyz Republic
Lao PDR
Latvia
Lebanon
Lesotho
Liberia
Libya
Liechtenstein
Lithuania

Luxembourg
Macao, China
Macedonia, FYR
Madagascar
Malawi
Malaysia
Maldives
Mali
Malta
Marshall Islands
Mauritania
Mauritius
Mayotte
Mexico
Micronesia, Fed. Sts.
Moldova
Monaco
Mongolia
Morocco
Mozambique
Myanmar
Namibia
Nepal
Netherlands
Netherlands Antilles
New Caledonia
New Zealand
Nicaragua
Niger
Nigeria
Northern Mariana Isl.
Norway
Oman
Pakistan
Palau
Panama

Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Puerto Rico
Qatar
Romania
Russian Federation
Rwanda
Samoa
San Marino
Sao Tome & Principe
Saudi Arabia
Senegal
Serbia & Montenegro
Seychelles
Sierra Leone
Singapore
Slovak Republic
Slovenia
Solomon Islands
Somalia
South Africa
Spain
Sri Lanka
St. Kitts and Nevis
St. Lucia
St. Vincent & Gren.
Sudan
Suriname
Swaziland
Sweden
Switzerland

Syrian Arab Republic
Tajikistan
Tanzania
Thailand
Timor-Leste
Togo
Tonga
Trinidad and Tobago
Tunisia
Turkey
Turkmenistan
Uganda
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
Uzbekistan
Vanuatu
Venezuela, RB
Vietnam
Virgin Islands (U.S.)
West Bank and Gaza
Yemen, Rep.
Zambia
Zimbabwe

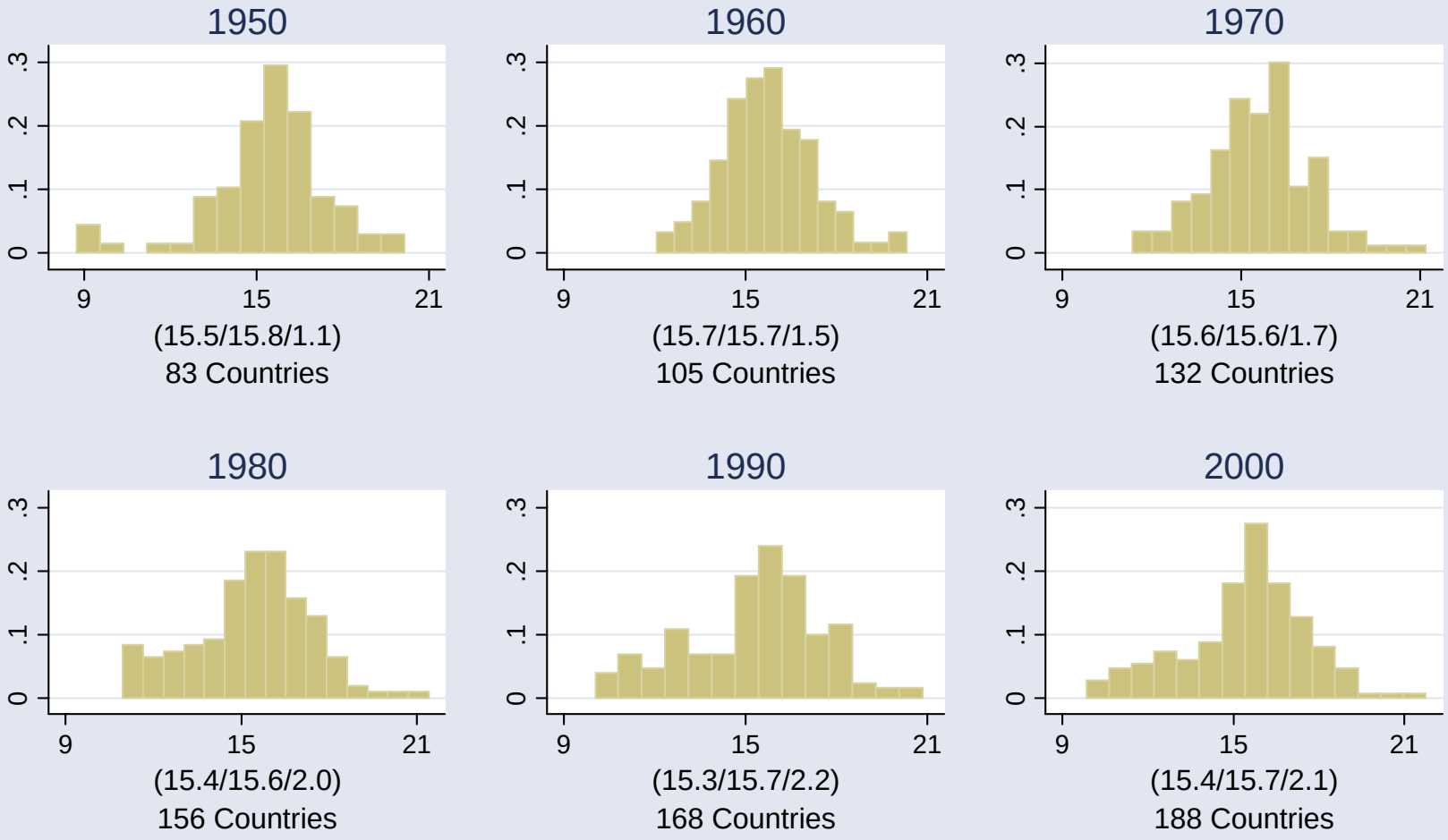
Minor Data Issues (skip)

- Some countries disappear (East Germany)
- Some appear (Eritrea)
- Some split (USSR)
- Few, unimportant to results, missing data
- Also, Ricardian definition of country

Mean and Median Population of Country Stable over time

- Cross-sectional variation slowly rising

Are Countries Changing Size?

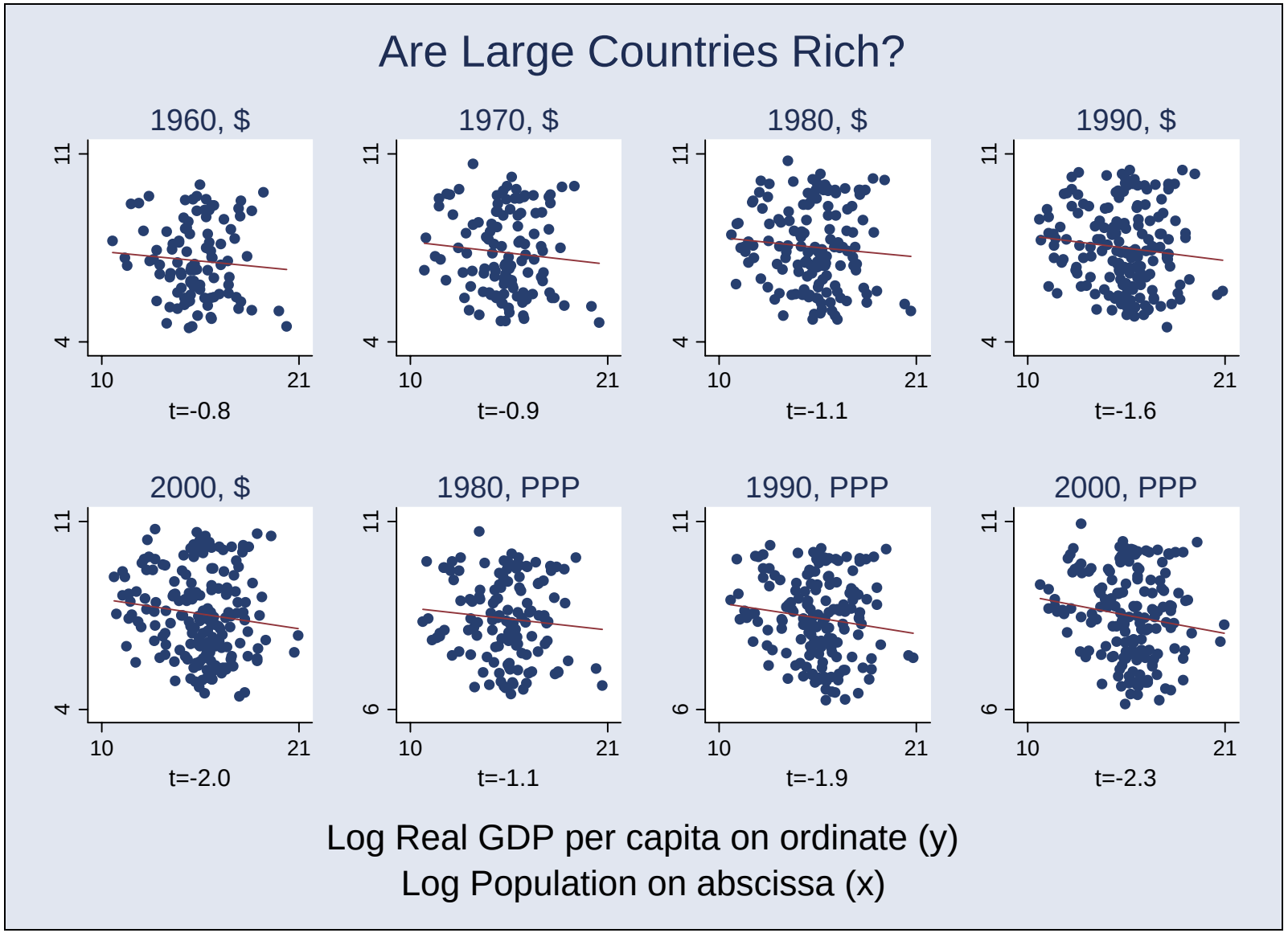


(Mean/Median/Standard Deviation)

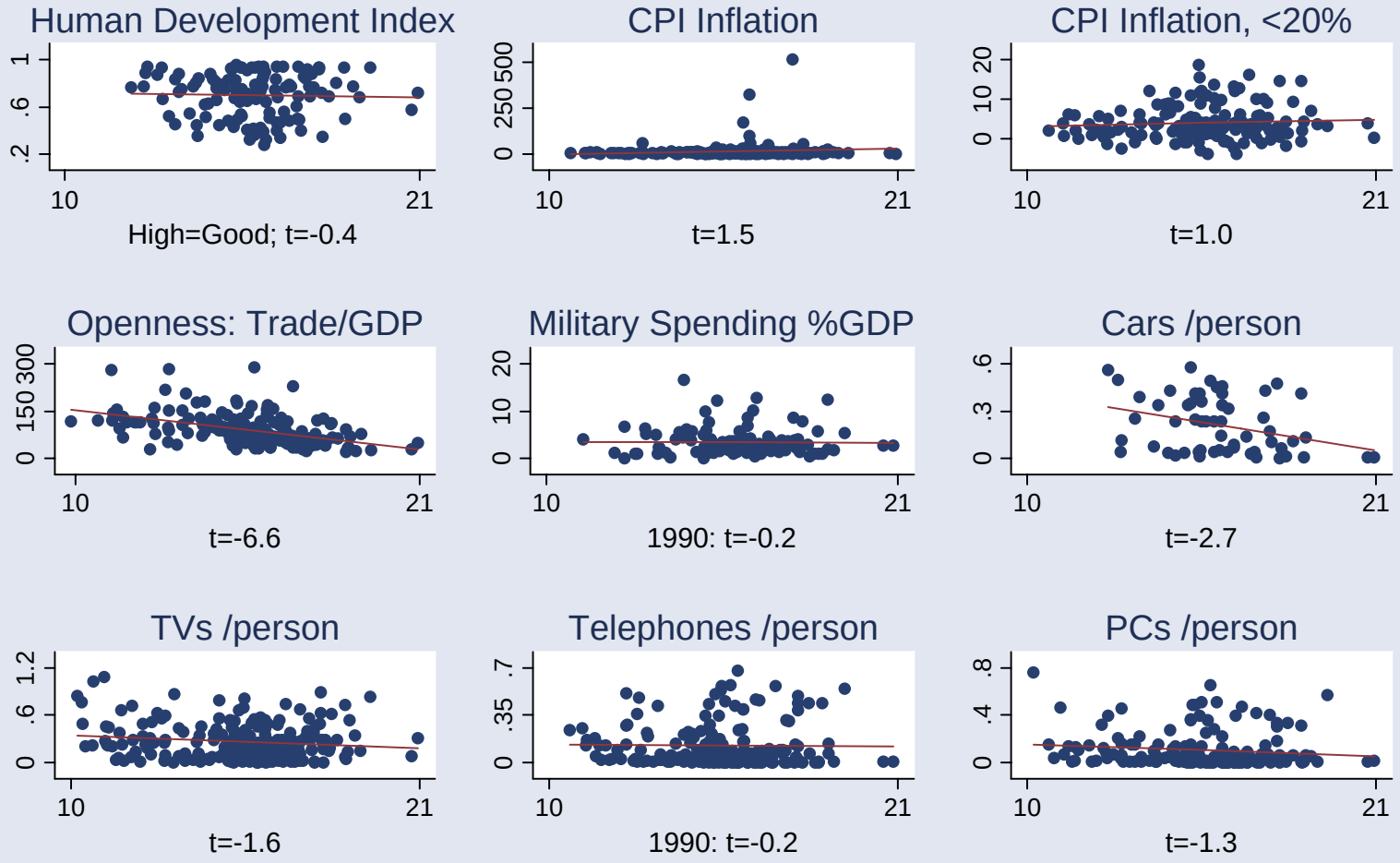
Log Population of Independent Sovereign Countries on abscissa (x)

Graphical Approach

- Start with attributes graphed against log(population)
- Cross-section approach (most recent data)
- Each point a country
- Linear regression provided (robust t-statistic tabulated)

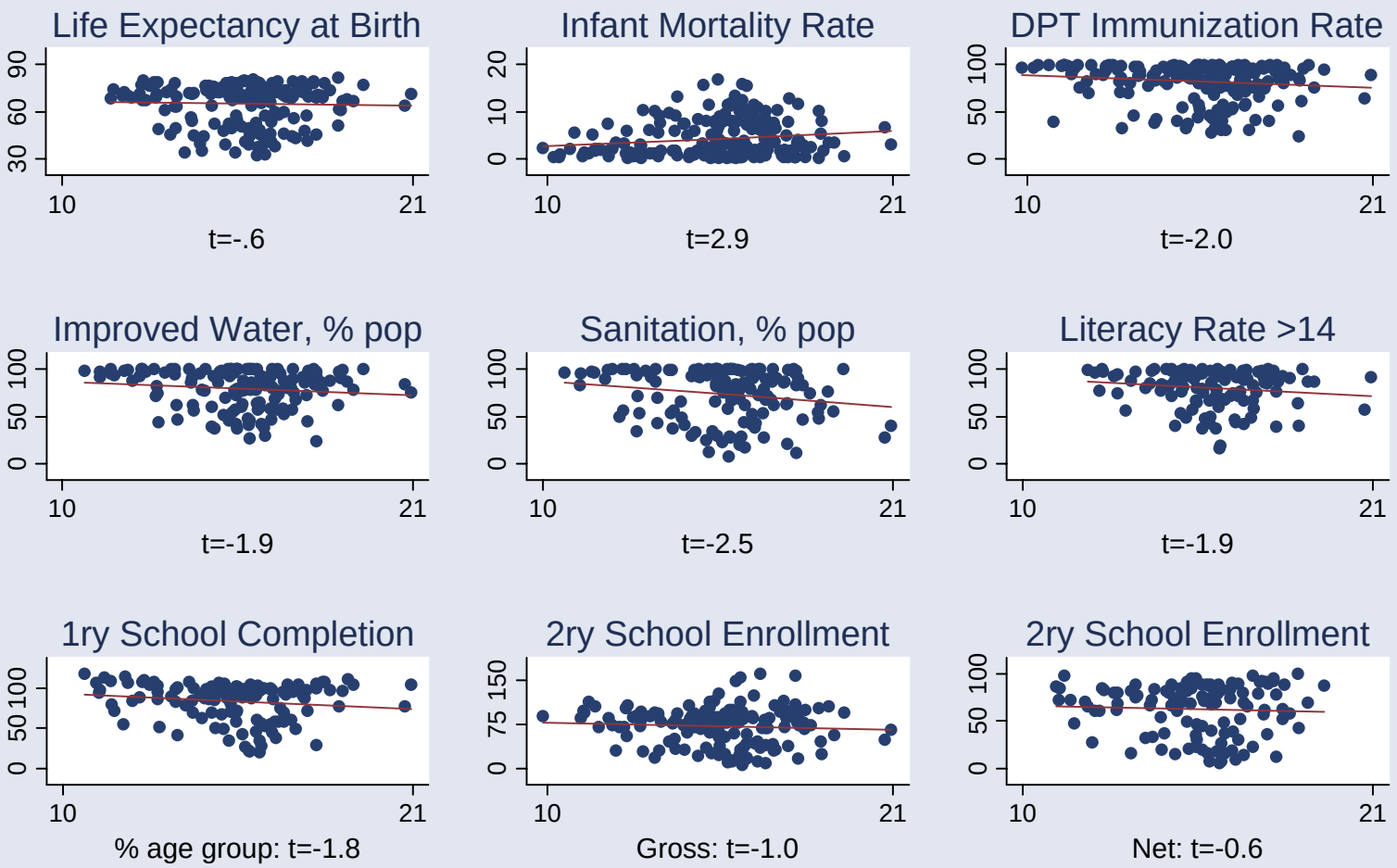

Are Large Countries Rich?
1960, $
1970, $
1980, $
1990, $
2000, $
1980, PPP
1990, PPP
2000, PPP
11
4
6
10
21
t=-0.8
t=-0.9
t=-1.1
t=-1.6
t=-2.0
t=-1.1
t=-1.9
t=-2.3
Log Real GDP per capita on ordinate (y)
Log Population on abscissa (x)

Are Large Countries Better Off?



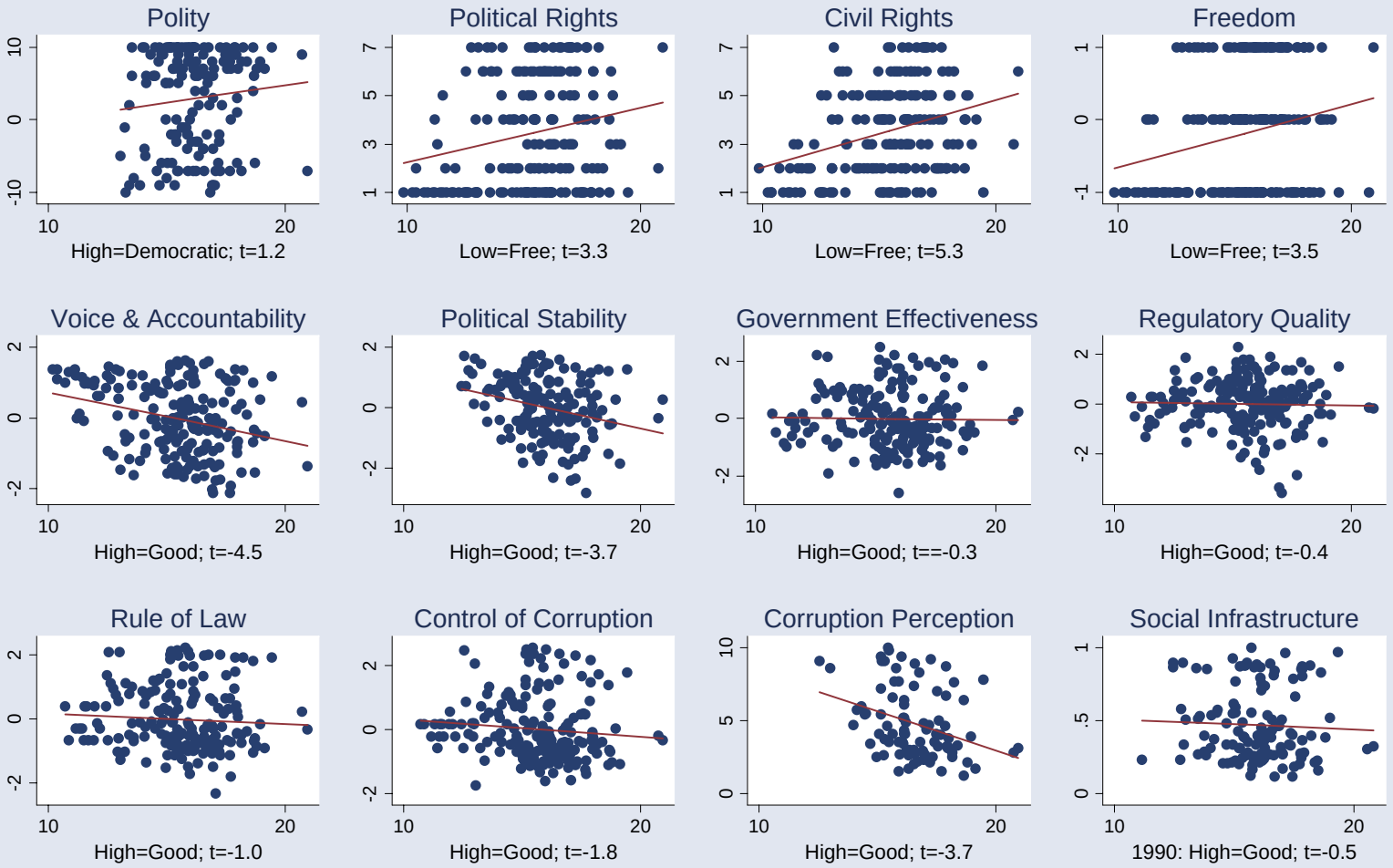
Log Population in 2000 on abscissa (x) unless noted

Are Large Countries Healthy and Educated?



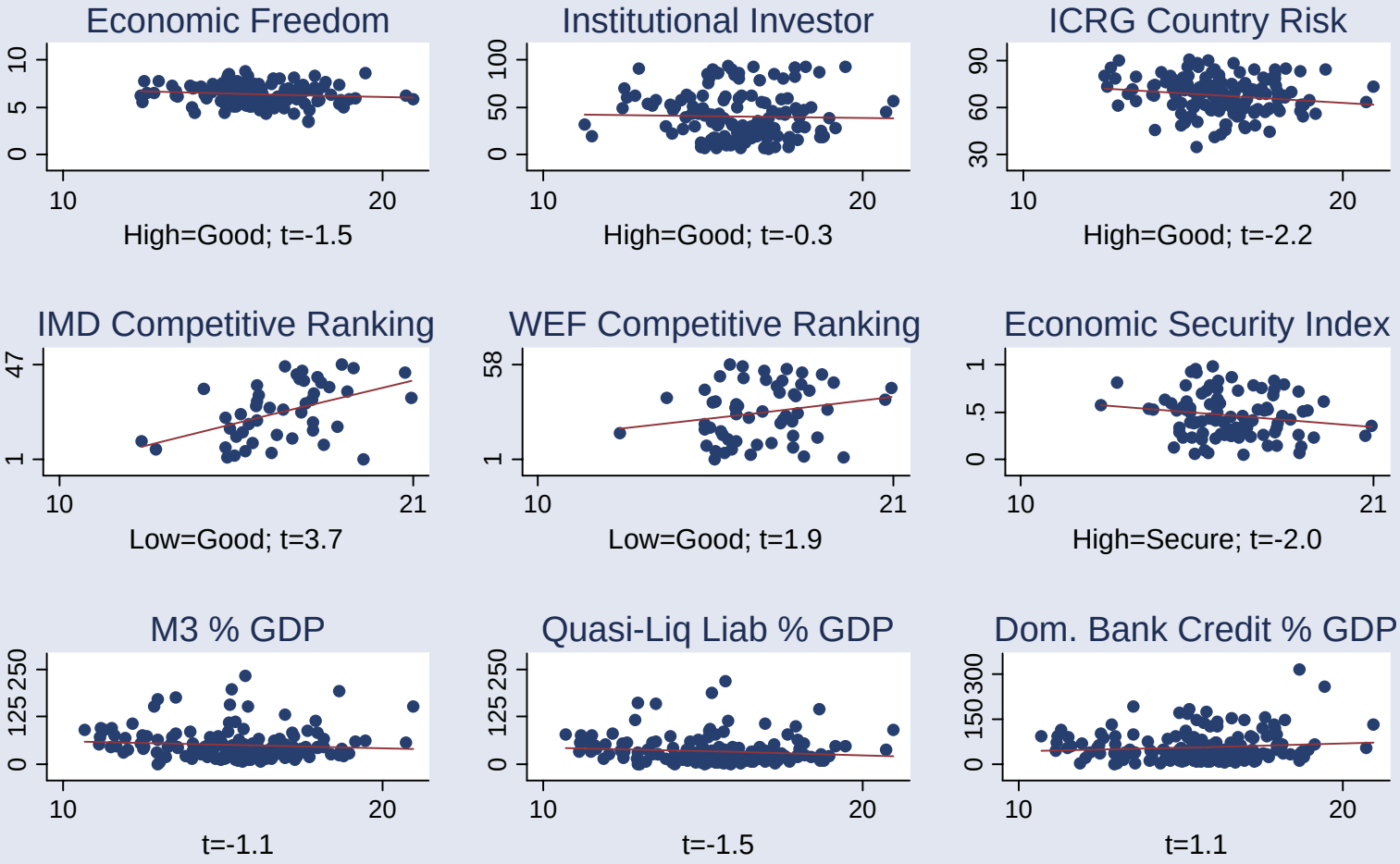
Log Population in 2000 on abscissa (x)

Do Large Countries Have Good Institutions?



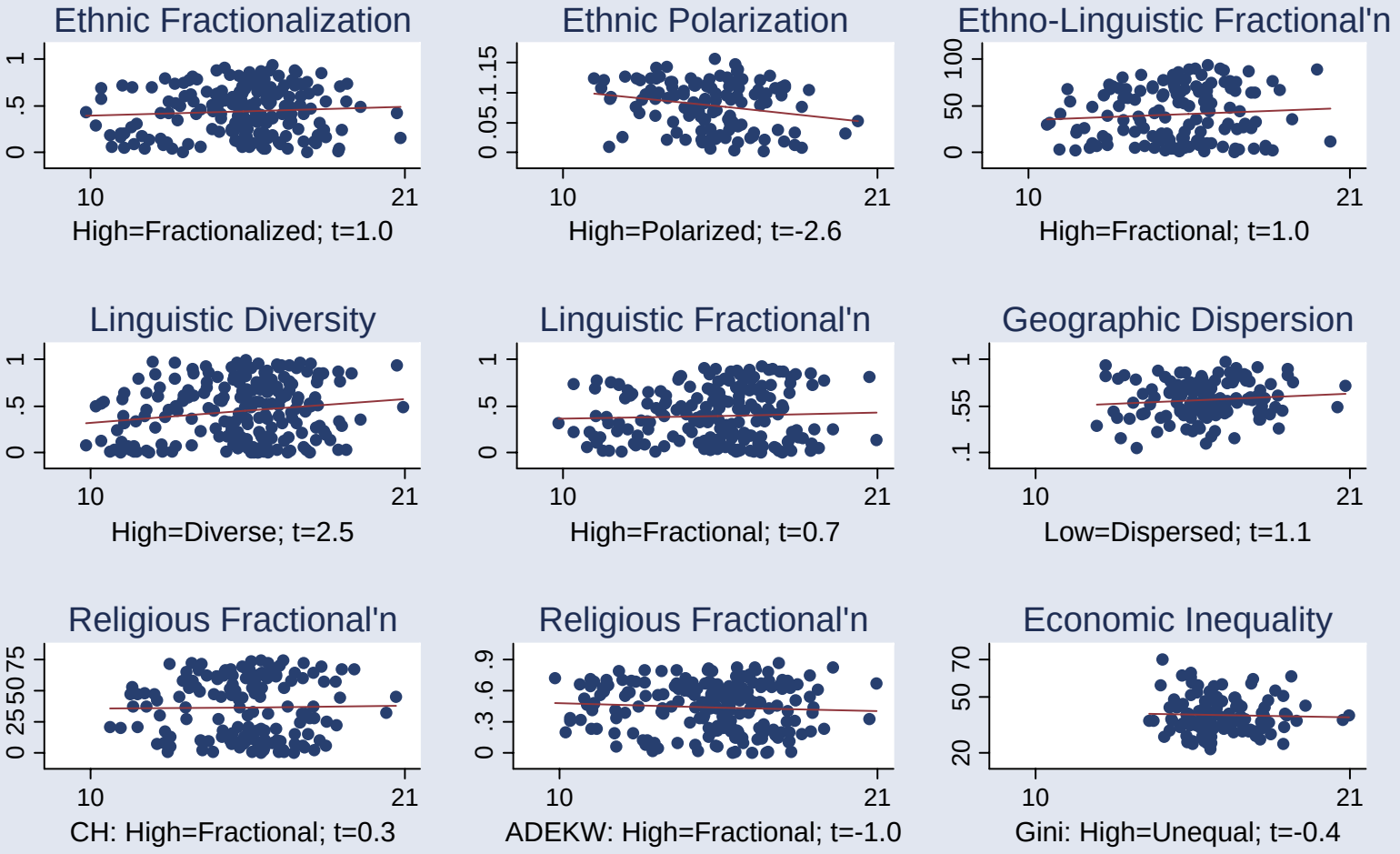
Log Population in 2000 on abscissa (x)

How do Large Countries Compare?



Log Population in 2000 on abscissa (x) unless noted

Are Large Countries Heterogeneous?



Log Population on abscissa (x-axis)

Summary

- Output per capita *negatively* associated with size
- Inflation *positively associated*
- Openness *strong negative* association (good!)
- Material well-being: insignificant *negative* effects
- Health, well-being (insignificantly) worse in large
- Large countries have worse/similar institutions
- Ditto rankings, financial depth

Heterogeneity

- Six/nine slopes: heterogeneity rises with size (only one significant); three show opposite (one significant)

Succinctly

- No strong visual relationship between size and much anything
  - Of course, this all simple bivariate plots

Statistical Analysis

- Want to condition out other effects
- Simultaneity?
- Hence use controls, different estimators

- 3 estimators: OLS; fixed effects; IV
  - Drazen: little reason for endogeneity empirically
  - Log area as IV for log population (works well)

Control Set #1 (20):

- urbanization rate, population density, log of absolute latitude (kilometers from equator), binary dummy variable for landlocked country, island-nation dummy, High Income country dummy, regional dummies for developing countries, language dummies

Control Set #2 adds 5 more:

- dummy for countries created post-WW2, dummy for countries created after 1800 but before 1945, dependency dummy, OPEC dummy, and COMECON dummy

Control Set #3 adds 2 more:

- log real GDP per capita ($); proportion of land within 100km of ice-free coast/navigable river

Regressions take form:

$$y_{it} = \beta \ln(Pop_{it}) + \alpha + \{\gamma_t T_t\} + \Sigma_j \delta_j X_{ijt} + \{\zeta_i I_i\} + \varepsilon_{it}$$

- robust standard errors
- time effects included

Panel A: Income

Dependent Variable	Bivariate	Controls, Set 1	Controls, Set 2	Controls, Set 3	Fixed Effects	IV	IV with Controls
Log $ Real GDP Per capita Pooled	-.08 (.06)	-.08** (.03)	-.12** (.03)	-.12** (.04)	-.62** (.16)	-.21** (.07)	-.06 (.05)
Log $ Real GDP per capita 1960	-.07 (.09)	-.07 (.05)	-.10 (.05)	-.07 (.06)		-.26* (.11)	.05 (.08)
Log $ Real GDP per capita 1970	-.07 (.08)	-.08 (.04)	-.12* (.05)	-.13* (.06)		-.21* (.10)	-.09 (.08)
Log $ Real GDP per capita 1980	-.07 (.06)	-.08* (.04)	-.11** (.04)	-.15** (.05)		-.17* (.08)	-.14* (.07)
Log $ Real GDP per capita 1990	-.09 (.05)	-.08* (.03)	-.11** (.03)	-.09* (.04)		-.20** (.07)	-.07 (.06)
Log $ Real GDP per capita 2000	-.10 (.05)	-.09* (.04)	-.13** (.04)	-.10* (.05)		-.22** (.07)	-.05 (.07)
Log PPP Real GDP per capita pooled	-.07 (.04)	-.06* (.03)	-.08** (.03)	-.08* (.03)	-.54** (.20)	-.16** (.05)	-.04 (.05)
Log PPP Real GDP per capita 1980	-.05 (.05)	-.05 (.03)	-.06 (.03)	-.10* (.04)		-.12* (.06)	-.11 (.07)
Log PPP Real GDP per capita 1990	-.07 (.04)	-.05* (.02)	-.07* (.03)	-.06 (.03)		-.17** (.05)	-.03 (.05)
Log PPP Real GDP per capita 2000	-.09* (.04)	-.08* (.04)	-.11** (.04)	-.07 (.05)		-.19** (.06)	-.02 (.06)

- No positive significant coefficients (size seems to hurt!)

Panel B: Economic Indicators

Dependent Variable	Bivariate	Controls, Set 1	Controls, Set 2	Controls, Set 3	Fixed Effects	IV	IV with Controls
Human Dev't Index	-.01 (.01)	-.003 (.004)	-.006 (.004)	.003 (.003)	.03 (.03)	-.03* (.01)	-.00 (.01)
CPI Inflation	13.2 (7.8)	11.9 (10.8)	14.7 (12.1)	3.9 (22.4)	54. (54)	23.2 (12.0)	-1.1 (24.1)
Trade Openness (% GDP)	-13.3** (1.1)	-14.4** (1.5)	-13.5** (1.5)	-13.2** (1.7)	-15.7 (9.4)	-17.6** (2.3)	-15.3** (2.7)
Military (% GDP)	-.2 (.2)	-.3 (.3)	-.6 (.3)	-.4 (.2)		-.2 (.4)	-.3 (.3)
Cars per capita	-3.7 (9.2)	-1.2 (5.5)	-2.5 (5.2)	2.1 (5.9)	-242.** (55.)	-7.9 (12.3)	14.5 (9.7)
TVs per capita	-9.3 (7.2)	8.0 (4.9)	5.2 (4.4)	18.2** (5.0)	-190.** (67.)	-24.5** (9.5)	28.4** (7.8)
Telephones per capita	-.9 (6.1)	.5 (3.6)	-3.9 (3.4)	-3.9 (3.6)		-14.1 (8.2)	-1.7 (5.9)
PCs per capita	-6.6 (5.9)	-1.2 (5.4)	-4.4 (5.5)	3.4 (4.3)	-442 (312)	-13.8 (7.9)	10.1 (6.5)

- Smaller Countries more open; little else systematic

Panel C: Health and Education

Dependent Variable	Bivariate	Controls, Set 1	Controls, Set 2	Controls, Set 3	Fixed Effects	IV	IV with Controls
Life Expectancy at Birth	.1 (.4)	.16 (.22)	-.1 (.2)	.2 (.3)	2.9 (1.7)	-1.7** (.6)	-.4 (.5)
Infant Mortality Rate	1.1 (1.5)	-1.3 (.9)	-.9 (1.0)	-3.0* (1.2)	- 33.8** (5.2)	7.8** (2.1)	.0 (2.3)
DPT Immunization Rate	-1.5** (.5)	-1.2* (.6)	-1.6** (.6)	-.0 (.9)	24.3 (13.3)	-3.1** (.7)	-2.4 (1.5)
Improved Water (% pop)	-1.2 (.8)	-.3 (1.0)	-.2 (1.0)	2.1 (1.3)	23.2 (12.8)	-3.7** (1.1)	-.6 (1.8)
Sanitation Access (% pop)	-2.9* (1.1)	-.6 (1.2)	-.8 (1.2)	.1 (1.4)	16.0 (10.1)	-5.1** (1.5)	-3.2 (3.2)
Literacy Rate (>14)	-1.8 (1.0)	-.5 (.9)	-.1 (.8)	1.5 (.9)	20.8** (5.9)	-4.8** (1.4)	.4 (1.4)
Primary School Completion Rate	-1.2 (1.1)	.8 (1.0)	.4 (1.0)	2.4* (1.1)	-17.3 (46.8)	-4.4** (1.4)	1.2 (1.8)
Gross Secondary School Enrollment Rate	-.4 (1.0)	1.0 (.8)	.8 (.8)	1.1 (.9)	-.6 (17.7)	-2.7* (1.4)	1.5 (1.3)
Net Secondary School Enrollment Rate	-.8 (1.1)	.2 (1.1)	-.7 (1.2)	.8 (1.1)	6.1 (28.4)	-3.6* (1.4)	.5 (1.5)

- Weak, inconsistent results (basically nothing)

Panel D: Institutions

Dependent Variable	Bivariate	Controls Set 1	Controls Set 2	Controls Set 3	Fixed Effects	IV	IV with Controls
Polity	.5	.3	.4	.6*	-2.4	-.5	.8*
(High=Democratic)	(.4)	(.3)	(.3)	(.3)	(2.0)	(.6)	(.4)
Political Rights	.13	-.04	-.03	-.16*	2.37**	.26**	-.30*
(Low=Free)	(.07)	(.06)	(.06)	(.07)	(.83)	(.09)	(.13)
Civil Rights	.18**	.02	.02	-.08	1.15	.29**	-.21*
(Low=Free)	(.06)	(.05)	(.05)	(.06)	(.63)	(.08)	(.10)
Freedom	.05*	-.01	-.01	-.07*	.91**	.10**	-.10*
(Low=Free)	(.03)	(.02)	(.02)	(.03)	(.34)	(.03)	(.05)
Voice&Accountability	-.14**	-.04	-.05	.01		-.17**	.05
(Higher=Better)	(.03)	(.03)	(.03)	(.04)		(.04)	(.07)
Political Stability	-.17**	-.14**	-.15**	-.10*		-.28**	-.05
(Higher=Better)	(.05)	(.04)	(.04)	(.04)		(.07)	(.06)
Gov't Effectiveness	-.01	-.01	-.02	.00		-.08	-.00
(Higher=Better)	(.03)	(.03)	(.03)	(.04)		(.05)	(.05)
Regulatory Quality	-.01	.02	.01	-.00		-.09	-.12
(Higher=Better)	(.03)	(.03)	(.03)	(.05)		(.05)	(.07)
Rule of Law	-.03	-.02	-.04	-.03		-.10*	-.03
(Higher=Better)	(.03)	(.02)	(.02)	(.03)		(.05)	(.04)
Control of Corruption	-.06	-.06	-.08**	-.07*		-.11*	-.04
(Higher=Better)	(.03)	(.03)	(.03)	(.04)		(.05)	(.05)
Perceived Corruption	-.66**	-.39**	-.45**	-.39**	-1.07	-.76**	-.08
(Higher=Better)	(.11)	(.08)	(.08)	(.08)	(1.06)	(.29)	(.14)
Social Infrastructure	-.01	-.01	-.01	-.01		-.05*	-.03
(Higher=Better)	(.01)	(.01	(.01)	(.01)		(.02)	(.03)

Panel E: Ratings and Financial Depth

Dependent Variable	Bivariate	Controls, Set 1	Controls, Set 2	Controls, Set 3	Fixed Effects	IV	IV with Controls
Economic Freedom Index (Higher=Better)	-.10 (.06)	-.05 (.04)	-.08 (.04)	-.05 (.04)	-.75 (.39)	-.25* (.12)	-.04 (.07)
Institutional Invest. Credit Rating (Higher=Better)	-.4 (1.2)	1.2 (.8)	.9 (.8)	2.5** (.6)		-2.8 (1.7)	2.3* (.9)
ICRG Country Risk (Higher=Better)	-1.2* (.6)	-.3 (.4)	-.4 (.5)	-.0 (.4)		-2.7** (.9)	.08 (.5)
IMD Competitiveness (Lower=Better)	3.8** (1.0)	.9 (1.4)	1.6 (1.5)	1.2 (1.1)		4.8** (1.7)	-.2 (1.6)
WEF Competitiveness (Lower=Better)	2.3 (1.2)	.3 (1.1)	.9 (1.0)	.0 (.8)		3.7 (2.1)	-.2 (1.1)
Economic Security Index (Higher=More Secure)	-.03* (.01)	-.02* (.01)	-.02* (.01)	-.00 (.01)		-.03 (.02)	-.00 (.01)
Domestic Bank Credit, %GDP	3.79** (.96)	4.75** (1.32)	3.61** (1.20)	6.15** (1.81)	-38.7** (13.1)	.11 (1.79)	6.0 (3.2)
Quasi-Liquid Liabilities, %GDP	-1.44* (.62)	.62 (.74)	.24 (.70)	1.86 (1.00)	-15.9 (9.5)	-5.9** (1.6)	-2.2 (2.4)
M3, % GDP	-.67 (.74)	.81 (.85)	.61 (.80)	2.55* (1.12)	-10.7 (8.9)	-6.1** (2.0)	-1.6 (2.6)

- More weak, inconsistent results (basically nothing)

Panel F: Heterogeneity

Dependent Variable	Bivariate	Controls, Set 1	Controls, Set 2	Controls, Set 3	IV	IV with Controls
Ethnic Fractionalization (High=Fractionalized)	.01 (.01)	-.00 (.01)	.00 (.01)	-.02 (.01)	.03** (.01)	.01 (.03)
Ethnic Polarization (High=Polarized)	-.005** (.002)	-.005* (.002)	-.004 (.003)	-.01 (.01)	-.002 (.003)	-.002 (.008)
Ethno-Linguistic Fractional'n (High=Fractional)	1.2 (1.2)	1.4 (1.2)	2.2 (1.4)	-.8 (1.8)	6.4** (1.6)	1.4 (3.6)
Linguistic Diversity (High=Diverse)	.02** (.01)	.01 (.01)	.02 (.01)	-.01 (.02)	.04** (.01)	.02 (.03)
Linguistic Fractionalization (High=Fractional)	.01 (.01)	.00 (.01)	.01 (.01)	-.01 (.01)	.018 (.011)	.01 (.03)
Geographic Dispersion (High=Dispersed)	.01 (.01)	.01 (.01)	.02 (.01)	-.00 (.01)	.078** (.015)	.08** (.02)
Religious Fractional'n (CH) (High=Fractional)	.25 (.88)	2.4* (1.2)	2.4 (1.3)	.8 (1.8)	.65 (1.25)	2.6 (3.0)
Religious Fractionalization (ADEKW) (High=Fractional)	-.01 (.01)	.02 (.01)	.02* (.01)	.02 (.01)	-.01 (.01)	.02 (.02)
Gini Coefficient (High=Unequal)	-.29 (.68)	.36 (.60)	.70 (.65)	.38 (.74)	2.53* (1.04)	1.42 (1.10)

- Fragile, weak results

Summary

- Statistical analysis broadly confirms graphical impression
- Little evidence that countries with more people perform measurably better
- Strong, well-known exception: smaller countries are consistently and significantly more open to international trade

Future Work

- Crime?
- Wars (external/civil)?

Conclusion

- Country size just doesn't seem to matter much
- Consistent with received wisdom in Political Science (Dahl and Tufte), and lack of street wisdom on country size
- Mystery of wide size distribution of countries may have little economic importance