

Why do small countries have higher population densities?

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03-07-2014

Population density in economics

- Keesing, D. B. and D. R. Sherk (1971). Population density in patterns of trade and development. *The American Economic Review* 61 (5), 956-961.
- Kremer, M. (1993). Population growth and technological change: one million B.C. to 1990. *The Quarterly Journal of Economics* 73 (3), 681-716.

The model


- 2 countries;
- 2 overlapping generations;
- Land as a production factor;
- Country-specific goods (Armington 1969; Blonigen, Wilson 1999)

Utilities

$$U_t = u(\Phi(c_t^y, c_t'^y)) + \frac{1}{1 + \rho} u(\Phi(c_{t+1}^o, c_{t+1}'^o)), \quad (1)$$

$$\Phi(c, c') = (\gamma c^{1-1/\theta} + (1 - \gamma) c'^{1-1/\theta})^{\frac{\theta}{\theta-1}}. \quad (2)$$

- u - strictly increasing felicity function;
- Φ - Function, which combines goods in consumption bundles (composite goods);
- $c_t^y, c_t'^y$ - consumption when young (domestic goods and imports);
- $c_{t+1}^o, c_{t+1}'^o$ - consumption when old (domestic goods and imports).

Budget constraint: Expenditures=incomes; 

Firms

- Production: $Y_t = A^{1-\alpha-\beta} K_t^\alpha L_t^\beta$;
- Wages: $w_t = \beta A^{1-\alpha-\beta} K_t^\alpha L_t^{\beta-1}$;
- Interest rate: $1 + r_t = \alpha A^{1-\alpha-\beta} K_t^{\alpha-1} L_t^\beta$;
- Returns on land: $a_t = (1 - \alpha - \beta) A^{-\alpha-\beta} K_t^\alpha L_t^\beta$.
 - A - land endowment;
 - L - labour;
 - K - capital.

Equilibrium

Equilibrium:

- Market clearing: All the goods are consumed or invested;
- Capital mobility: Interest rates in the countries are the same;
- Labour mobility: Utilities in the countries are equal (in case of perfect labour mobility).

Main result:

$$\frac{L_t/A}{\tilde{L}_t/\tilde{A}} = \left(\frac{\gamma}{1-\gamma} \right)^{\frac{\theta}{\alpha+\beta+\theta(1-\alpha-\beta)}} \left(\frac{A}{\tilde{A}} \right)^{-\frac{1}{\alpha+\beta+\theta(1-\alpha-\beta)}}. \quad (3)$$

The underlying idea

- Small country produces less country-specific goods;
- As goods are not the same, people in both countries consume goods produced in both countries;
- Supply for small-country-specific goods is smaller, demand is larger;
- Price of small-country-specific goods is higher;
- Incomes in the small country are higher;
- Small country attracts more migrants;
- Alternatively: Due to higher incomes, agents in the small country may afford more children, or increase investments in health and live longer (not now, but maybe in the past);

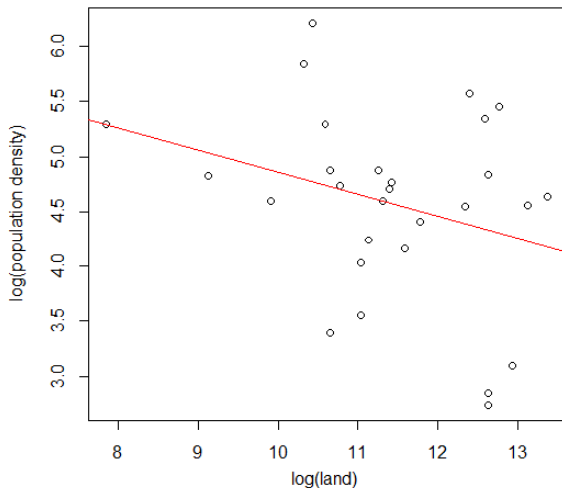
Data

- “Western world” = EU \cup Schengen Area, +-other European Microstates.
- Sources:
 - The World Factbook (2013, 1980);
 - World Bank data (2012, 1980);

Endogenous country-size

- Alesina, A. and E. Spolaore (1997). On the number and size of nations. *The Quarterly Journal of Economics* 112 (4), 1027-1056.
- Alesina, A. (2003). The size of countries: Does it matter? *Journal of the European Economic Association* 1 (2-3), 301-316.

Figure: Population density vs land 2013



The model: public policies

$$\log \text{Density}_i = \beta_0 + \beta_1 \log \text{Land}_i + \beta_2 \text{North} + \varepsilon_i, i = 1, \dots, N. \quad (4)$$

- Density_i - population density (people per square kilometer);
- Land_i - Land size in square kilometers;
- North - Dummy variables for the Northern countries
(Geographic is situated to the north of the 55N latitude)

Regressions

Table: Estimation of regression 4

	large countries	without microst.	with microstates
<i>Intercept</i>	7.471 (1.355)***	6.632 (0.785)***	7.804 (0.616)***
<i>log(Land)</i>	-0.219 (0.113)*	-0.150 (0.067)**	-0.254 (0.055)***
<i>North</i>	-1.405 (0.241)***	-1.375 (0.253)***	-1.632 (0.357)***
<i>Obs</i>	26	28	35
<i>R</i> ²	0.5966	0.5916	0.7161

* $p < 0.1$

** $p < 0.05$

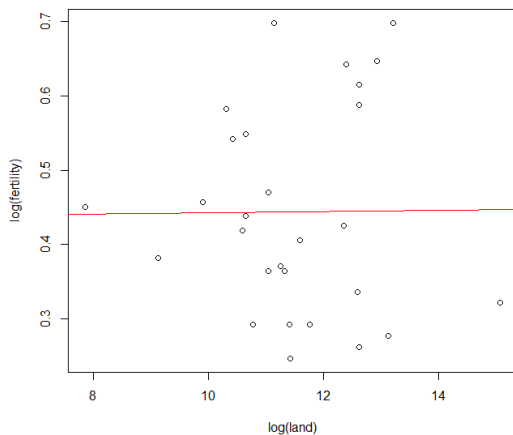
*** $p < 0.01$

Sources of different population densities

- Different fertilities.
- Different longevities.
- Migration.

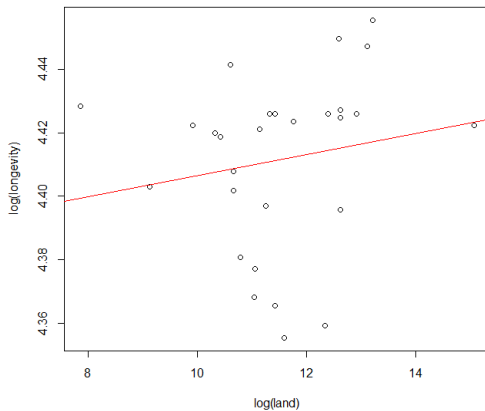
Fertility

Figure: Fertility vs land 2013



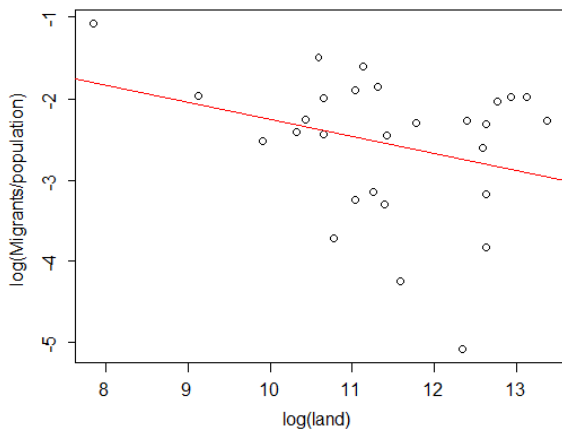
Longevity

Figure: Longevity vs land 2013



Migration

Figure: Migration vs land 2013



Wealth (GDP PPP/capita)

Table: GDP PPP/capita dependence on land

	large countries	without microst.	with microstates
<i>Intercept</i>	4.465 (0.450) ^{***}	4.508 (0.660) ^{***}	4.338 (0.248) ^{***}
<i>log(Land)</i>	-0.071 (0.037) [*]	-0.076 (0.054)	-0.0624 (0.020) ^{***}
<i>Comunism</i>	-0.620 (0.090) ^{***}	-0.612 (0.095) ^{***}	-0.5963 (0.084) ^{***}
<i>Obs</i>	26	28	33
<i>R</i> ²	0.6242	0.5734	0.6

* $p < 0.1$ *** $p < 0.01$

- Thank you for your attention;