

Economic Geography

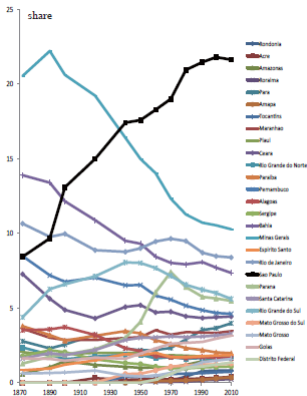
F. Candau

A Brief Introduction to the Theory

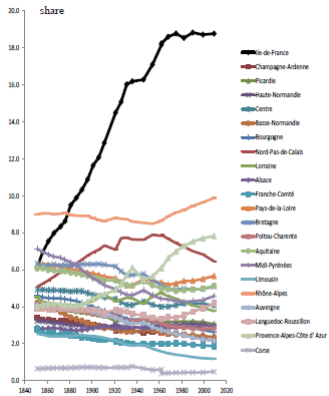
- ① Economic geography: a field between urban and international economics
- ② Aim: to analyze how spatial frictions (trade costs, mobility costs etc) impact on location choice
- ③ Subject: mobility of goods, people and capital
- ④ Tools: Theoretical and empirical

- Agglomeration is a recent event. Dispersion of activities before the industrial revolution.
- How to explain the unequal distribution of activities across space?

Stylised facts



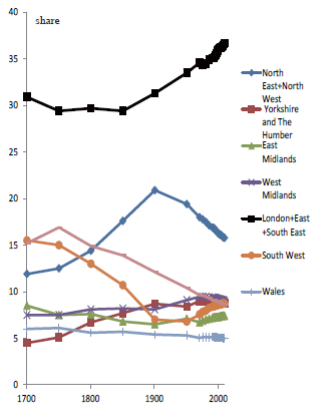
Regional population share in Brazil



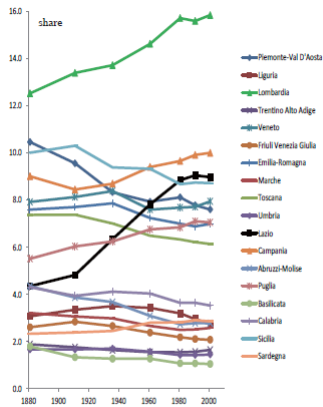
Regional population share in France

source: Tabuchi (2013, RSUE)

Stylised facts

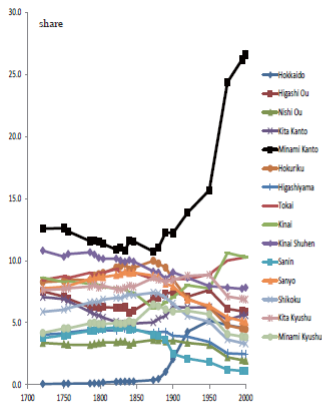


Regional population share in Great Britain

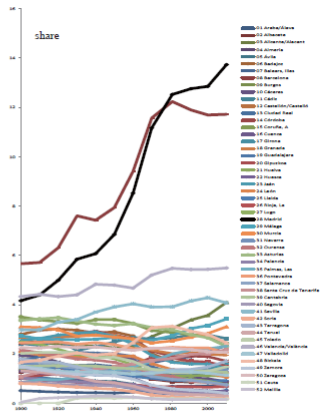


Regional population share in Italy

Stylised facts



Regional population share in Japan



Regional population share in Spain

- Spatial Impossibility Theorem: Starrett (1978) demonstrates that agglomeration of activities cannot arise in a world of pure and perfect competition where space is homogeneous.
- Thus, in order to understand why activities are agglomerated in some places authors have focused on heterogeneity of space (von Thünen (1826), Ricardo (1917), Heckscher (1918), Ohlin (1933), Bartik) and on imperfect competition (Marshall (1890), Hotelling (1929), Krugman (1991)).
- Here we are going to analyse Krugman (1991) and related articles, the so-called New Economic Geography.

All individuals in the Krugman (1991) model share the Dixit and Stiglitz (1977) constant elasticity of substitution utility function:

$$U = M^\mu A^{1-\mu} \quad \text{with} \quad M = \left[\int_0^N c_i^{\frac{\sigma-1}{\sigma}} di \right]^{\frac{\sigma}{\sigma-1}} \quad (1)$$

where M is the consumption of the manufactures aggregate, A that of the agricultural product, N is the large number of potential varieties and where $\sigma > 1$ is the elasticity of substitution among these varieties.

A share μ of nominal income (denoted Y) is spent on manufactures. The budget constraint is then given by $PM + p_A A = Y$, where p_A is the price of the agricultural product and P the price index of industrial varieties:

$$P = \left[\int_0^N p_i^{1-\sigma} di \right]^{\frac{1}{1-\sigma}} \quad (2)$$

which is a decreasing function of the number of varieties N (because $1 - \sigma < 0$). p_i is the price of a typical variety i . The impact of N on the price index depends on the elasticity of substitution. The more differentiated the product varieties, the greater the reduction in the price index.

The maximization problem yields the following uncompensated demand for agriculture and manufactures:

$$M = \mu \frac{Y}{P}, \quad A = (1 - \mu) \frac{Y}{p_a} \quad (3)$$

$$c_i = \mu \frac{Y}{P^{1-\sigma}} p_i^{-\sigma} \quad (4)$$

We can now turn to the firms' behavior.

Supply side from Forslid and Ottaviano (2003), a analytical simplification of Krugman (1991).

Thus the total cost of producing q units of a typical manufactured variety is:

$$TC_{FE} = \alpha w + \beta w_u q \quad (5)$$

When maximizing its profit, a typical firm sets the following price:

$$p = \beta w_u \sigma / (\sigma - 1) \quad (6)$$

Because there is free entry profits are always equal to zero, which, using equations (5) and (6), gives the output level:

$$q = \alpha w (\sigma - 1) / \beta w_u \quad (7)$$

In equilibrium a typical firm employs α units of entrepreneurs, so that the total demand is $n\alpha$. As entrepreneurs' labour supply is S , the equalization gives the following number of varieties:

$$n = \frac{S}{\alpha} \quad (8)$$

The number of varieties produced is then proportional to the number of workers.

Two countries, Trade costs τ in the industrial sector, not in the agricultural one.

Using previous expressions, price index are:

$$P^{1-\sigma} = \frac{S + \phi S^*}{\alpha}, \quad (P^*)^{1-\sigma} = \frac{S + \phi S^*}{\alpha} \quad (9)$$

where ϕ measures the freeness of trade : $\phi = \tau^{1-\sigma}$. At the symmetric equilibrium ($S = 1/2$), an increase in S (and so a decrease in S^*) causes the price index in the South to increase and that of the North to decrease.

By inserting the above prices index in the demand function (4) and by considering the total demand as the sum of local demand and export demand, we get:

$$q = \mu \left(\frac{Y}{p^{1-\sigma}} p^{-\sigma} + \phi \frac{Y^*}{p^{*1-\sigma}} p^{-\sigma} \right) \quad (10)$$

These equations permit us to present the market clearing in a tidy form by equalizing demand (10) and supply given by equation (7) :

$$w = b \left(\frac{Y}{p^{1-\sigma}} + \phi \frac{Y^*}{p^{*1-\sigma}} \right) \quad (11)$$

with $b = \frac{\mu}{\alpha\sigma}$ and where Y depends on w .

- Two opposite forces drive nominal wages.
- Local competition effect: an increase in the number of entrepreneurs in one region exacerbates local competition among firms. Thus new entry triggers a slump in the price index, and thereby in operating profits, too. So that in order to stay in the market, firms need to remunerate their workers less.
- Market access effect: as the income generated by new entrepreneurs are spent locally, sales and operating profits increase and under the 'zero profit condition' this implies a higher nominal wage.
- Local competition effect $<$ Market access effect = Home market effect: a country with a share of world demand for a good that is larger than average will obtain a more than proportional share of world production of that good.

Entrepreneurs do not consider the relative nominal wage when they decide to migrate but the relative real wage. Hence in the long run migration stops when real wages are equalized in case of symmetry ($S = \frac{1}{2}$), or when agglomeration in one city generates a higher relative real wage. We denote this relative real wage Ω and we define it as:

$$\Omega = \frac{V}{V^*} = \frac{w}{w^*} \left(\frac{P^*}{P} \right)^{-\mu} \quad (12)$$

- Additional force appears: the term P^*/P is the *cost of living effect*
- An agglomerative force: goods are cheaper in a central place because imports are lower and thus the burden of transaction costs too. Hence, entrepreneurs' purchasing power is higher in this location, which attracts other entrepreneurs.

- See the Mathematica, wiggle diagram
- Result 1: Trade liberalization leads to agglomeration (Core-Periphery equilibrium).
- Result 2: Multiple equilibria, History matters.
- Result 3: a bell shaped agglomeration rent.

- Tax competition:
- Result 1 allows to analyse why a marginal increase in tax rate can have no effect or a catastrophic one.
- Result 2 implies a race to top and then to the bottom with trade liberalization.
- Welfare: Result 1 implies that in the Core trade liberalization lead to increase welfares, while this policy is detrimental individuals at the Periphery.

The model has been extended to:

- International economics: Martin and Rogers (1995), Krugman and Venables (1995), Fujita and Thisse (2006), Baldwin and Okubo (2006).
- Urban economics: Helpman (1998), Tabuchi (1998), Candau (2011), Redding (2014)
- Development economics: Krugman and Livas (1998).

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