

GEOGRAPHICAL ECONOMICS

"B"

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week 9

Krugman (1991) model: extensions

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1 Krugman model – Extensions

Two important extensions

- It is worth extending the model.
- BGM Chapter 4.6. in detail – we only deal with the story
- BGM Chapters 4.7, 4.9
- Krugman-Venables (1995), Venables (1996), Fujita-Krugman-Venables (1999), Chapter 14 in the book

First extension: intermediate inputs

- Intermediate inputs – the output of a firm is the input of another firm
 - e.g. iron tube, production line, truck, computer
 - It creates a new network of linkages – between the producer and the consumer of the intermediate input
 - Modelling – two solutions
1. The product of a firm is the input of another
 2. Each product can be an input and output as well
- We choose the second one now – each firm uses each product (variety on firm level, too)

First extension: intermediate inputs

- *Krugman-Venables (1995)*
- For the analysis we close a working channel. Labor should be immobile between regions.
 - However, labor is mobile between sectors (international vs regional economics)
- We open another channel: the linkages between firms = **Model of vertical linkages**
- Demand for product i = consumers and firms
- **Supplier access effect** – if there are plenty of other firms close to a certain firm, it can purchase its inputs cheaper. [*New*]
 - The cheaper are prices, the higher the wages are. This implies a higher demand as well.

Second extension: Labormarket

- Puga (1999), Fujita-Krugman-Venables (1999, Ch 14)
- **Extended model** – there are vertical linkages and partial labor flow
- Food sector constant or diminishing returns – If diminishing, then the wages across sectors equalize, but differs across regions (lack of mobility)
- Workers are mobile between sectors (in a certain region price-levels are the same, only nominal wages matter)
- Wage in the food sector equals marginal productivity of laborers
- The employment can decrease in the food sector – it raises marginal productivity in the manufacturing sector

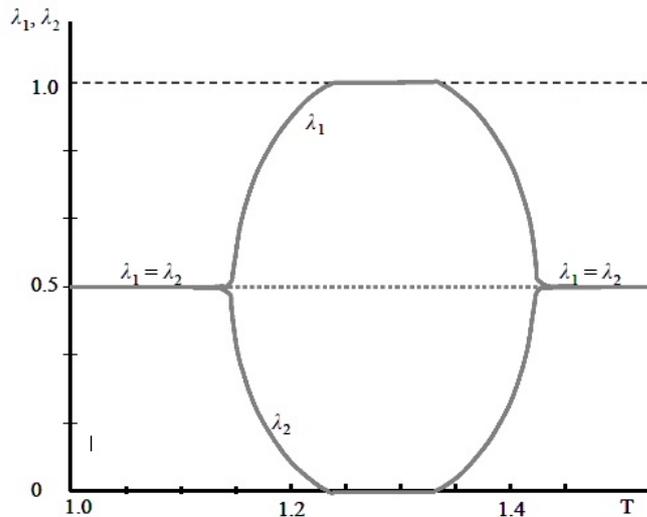
Second extension: Labormarket (2)

- BGM Ch 4.7
- If labor demand does not react intensively to changes in wage, then there is no labor flow across sectors (elasticity is zero)
- If labor demand reacts very intensively to changes in wage, then there is immediate and complete labor flow across sectors – wages equalize in the two sectors (elasticity is infinite)
- If the reaction is between the two end points, then it is possible that the labor flow from the food sector to the manufacturing sector can cause an increase in wages in both sectors
- If labor supply is increasing in wages, migration in the manufacturing sector will stimulate agglomeration in one region and so increase wages, which later decreases the will of agglomeration

Second extension: Labormarket (3)

- Lets consider the extended model, where there are vertical linkages and partial labor flow
- Under high values of T (transportation costs) spreading equilibrium is stable
- In the case of decreasing T agglomeration will evolve
- Under low values of T spreading equilibrium can evolve again [*Surprise*]
 - In this case the agglomeration effect of vertical linkages is dominated by the wage increasing effect of agglomeration – the agglomeration breaks up
- Two consequences:
 1. Spreading equilibrium under low values of T
 2. Incomplete agglomeration distribution can be also stable – “non-catastrophic” distribution

Equilibria in the extended model – the bell-shaped curve



Third extension: more regions

- So far there were only two regions, certainly there can be more – the equilibria, simulation are far more complex
- The location of regions matter as well
- They can be in a circle – “**racetrack model**” – all of the regions are R distance far from each other
 - e.g. 12 cities – we can get equal agglomeration in two cities – opposite to each other
- It’s an interesting question how the configuration influences the results. e.g. four regions – 2x2 vs 1x4

1.1 Results, hypotheses

Testable hypotheses

Five key results of the model

1. **The home market effect.** Regions with a large demand for increasing returns industries have a more than proportional share of their production and are net exporters of these goods.
2. A large **market potential** raises local factor prices. Regions that are close to regions with a high real income will have higher **real wages**.
3. A large **market potential** induces **factor inflows**. Footloose workers move to the region with the highest real wage, and, similarly, firms prefer locations with good market access.
4. **Non-linear reactions** to changes, shock sensitivity.
5. **Changes (reductions) in trade costs** determine the outcome equilibria. (i) Reduction in T (after point $B(T)$) leads to agglomeration. (ii) Reduction in T leads to agglomeration then to the spreading equilibrium.