Lecture 5: Economic Geography

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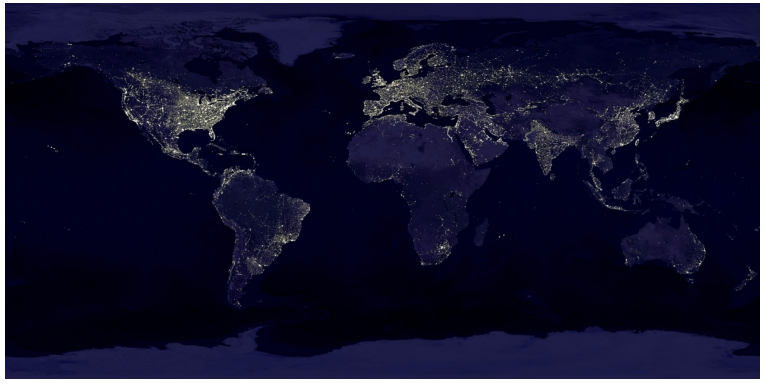


Economic geography

- Definition : Economic geography is the study of the location, distribution and spatial organization of economic activities across the world.
- Covers various topics :
  - Location of industries
  - Agglomeration economies
  - Transportation
  - International trade and development
  - Urban economics
  - Relationship between the environment and the economy
- Here, focus on the geography of economic activity across regions/countries $\Rightarrow$ Impact of globalization on the spatial dispersion of activities

Overview

- Why geography matters
- Spatial economy : the Hotelling model
- The core-periphery model
- Multinational firms : a bird's eye view

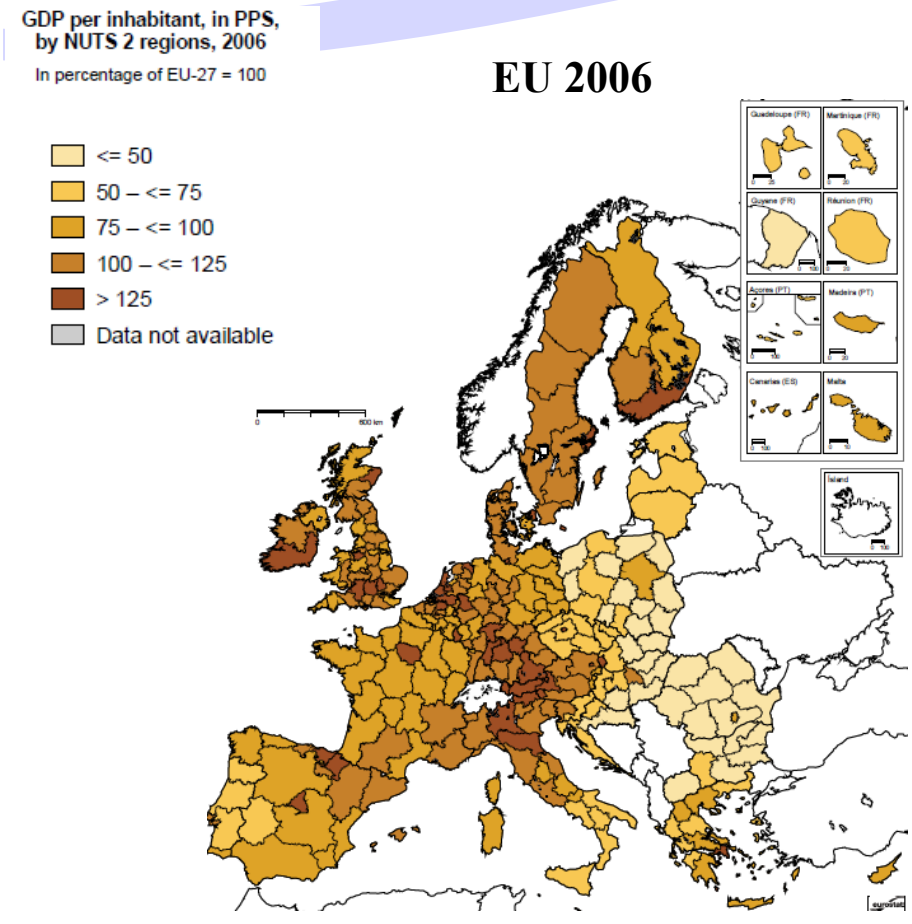
Why geography matters

Limits of traditional trade theory

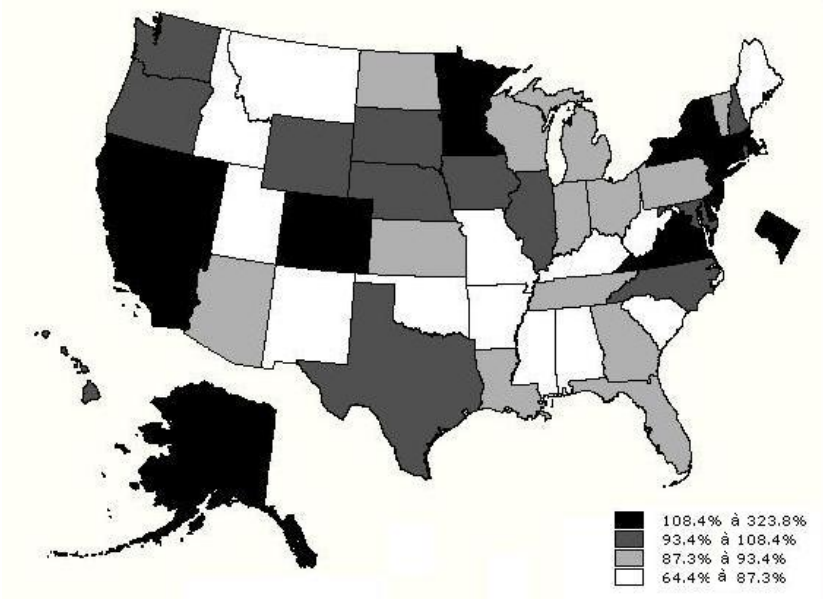
- Hotelling's (1929) seminal work on spatial economy
- Neo-classical growth theory : representative agent models, no spatial granularity ; convergence of nations
- Ricardo, HOS trade theory : explains trade in goods and services, not factor movements
- Such theories ignore **multiple equilibria** and **circular causality**, all of which can be instable
- First-generation endogenous growth models ("AK" models, e.g. Romer)
    1. Based on network or technological externalities
    2. Account for local agglomeration (ex. : Silicon Valley) but not for interactions between regions
- Need to account for pecuniar externalities through market prices

Polarization at work

Regional distribution of GDP per capita



EU 2006



USA 2006

Source : Combes, Mayer, Thisse

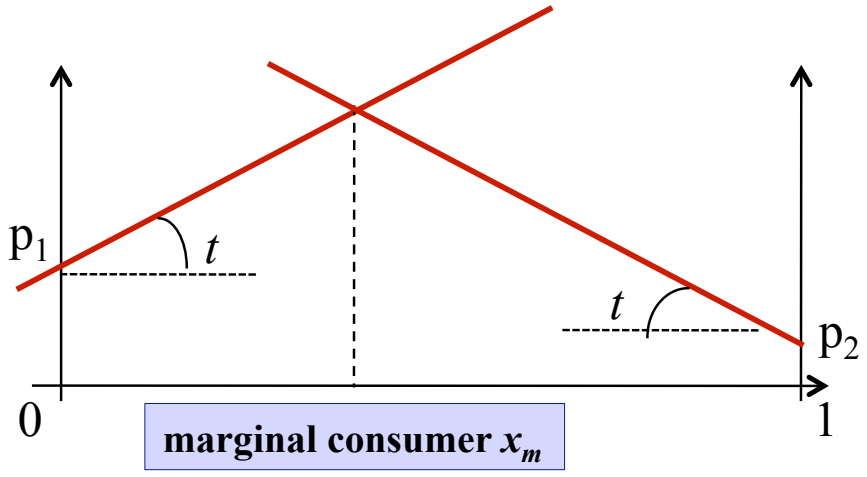
Polarization at work (2)

- Spatial diffusion of economic activity is very uneven. This continues to be true despite the increased mobility of goods, factors, technologies, etc
- Economic geography aims at measuring and explaining the spatial concentration of activities by i) uneven endowments ("first-nature inequalities")By opposition with 2nd nature ones, which are the result of human actions , ii) agglomeration externalities, iii) increasing returns to scale, iv) public policies at the microscopic level, agglomeration is very much related to incentives, eg tax exemptions for firms locating in industrial clusters, etc
- By contrast with international trade theories, economic geography integrates the mobility of factors (capital and labor, firms and workers) $\Rightarrow$ Location of agents is endogenous $\Rightarrow$ Comparative advantages become endogenous as well ("second-nature inequalities")
- Study the interaction between agglomeration and dispersion forces ("centripetal" versus "centrifugal" forces), the possibility of circular causality and the process of development cumulative eg a greater number of activities in an area attracts more people, which in turn fosters the creation of new jobs

Spatial economy : the Hotelling model

Hotelling's location model (1929)

- Firms 1 and 2 compete through prices on a linear market (say, a street)
- Consumers are indexed by location x and bear a proportional transport cost t
- Suppose initially that firms are located in 0 and in 1 : then if $|p_2 - p_1| \geq t$, only one firm covers the whole market
- Consumer x purchases from firm 1 if and only if : $p_1 + t \times x < p_2 + t(1-x)$, ie : $x < x_m = \frac{1}{2} + (p_2 - p_1)/2t$



Cournot-Nash equilibrium with immobile firms

Firms located in 0 and 1

Firm 1	Profit :	$\Pi_1(p_1, p_2) = (p_1 - c)(p_2 - p_1 + t)/2t$
	Reaction function :	$p_1^*(p_2) = \frac{1}{2}(p_2 + t + c)$
Firm 2	Profit :	$\Pi_2(p_1, p_2) = (p_2 - c)(p_1 - p_2 + t)/2t$
	Reaction function :	$p_2^*(p_1) = \frac{1}{2}(p_1 + t + c)$
Nash equilibrium :		$p_1^* = p_2^* = t + c$
Equilibrium profit :		$\Pi_1^* = \Pi_2^* = t/2$

Lower transport costs erode equilibrium profits

Cournot-Nash equilibrium with mobile firms

Firms located in x_1 and x_2 ; $c = 0$ for simplicity

If $|p_2 - p_1| \geq t|x_2 - x_1|$, a single firm covers the whole market

Marginal consumer : $x_m = \frac{1}{2}(x_2 + x_1) + (p_2 - p_1)/2t$

FOC : $p_1^* = t/3(2 + x_1 + x_2)$

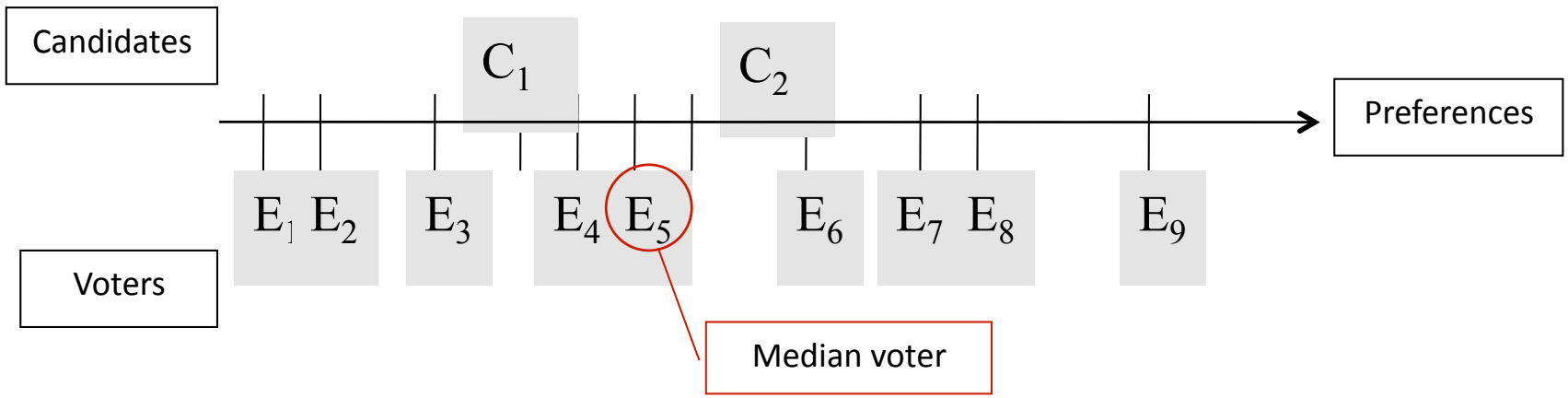
$p_2^* = t/3(4 - x_1 - x_2)$

Equilibrium profit : $\Pi_1^* = t/2(2 + x_1 + x_2)^2$

$\Pi_2^* = t/2(4 - x_1 - x_2)^2$

Unstable equilibrium. Both firms have an incentive to locate at the centre of the market = **minimum differentiation principle** or **Hotelling's law**

Analogy with "median-voter" theory



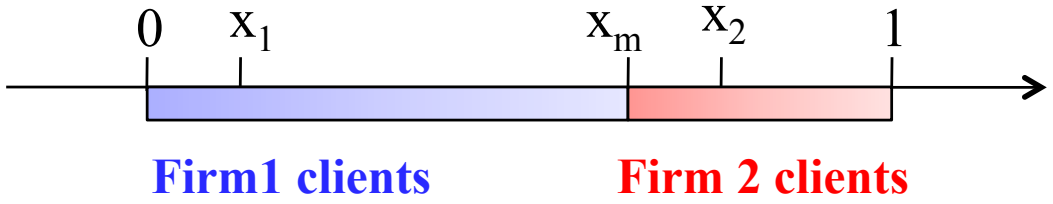
Minimum differentiation principle: in a one-dimensional political space, political parties have an incentive to appeal to the median voter.

Discontinuous equilibria

FOCs are not enough to characterize Nash equilibrium :

- If $x_2 < 1$, firm 2 sells to consumers located between x_m and x_2 but also to consumers located between x_2 and 1.

  If Firm 1 sets p_1 below $p_1' = p_2^* - t(x_2 - x_1)$, then x_m drifts beyond x_2 and all clients buy from firm 1 (p_1 "undercuts" p_2^*)



  Firm 1 chooses p_1' rather than p_1^* if $\Pi_1(p_1') > \Pi_1(p_1^*)$. This is the case if $(x_1 + x_2 + 2)^2 < 4/3(2 + x_1 - 2x_2)$. Firm 2's profit then falls to zero and there is no Nash equilibrium

- Conversely, if $x_1 > 0$, firm 2 chooses p_2' rather than p_2^* if $(4 - x_1 - x_2)^2 < 4/3(1 + 2x_1 - x_2)$.

Special case : symmetrical equilibriums ($x_1 + x_2 = 1$)

- Price equilibrium is possible if firms are sufficiently far apart (namely, if $x_1 \leq 1/4$ and $x_2 \geq 3/4$)

$\Rightarrow$ In order to divert all firm 2 clients, firm 1 would have to cut its price by such an amount that it would make it unprofitable

- Nash equilibrium is given by : $p_1^* = p_2^* = t$

The core-periphery model

Models with a core-periphery structure where the core is formed by regions that supply a large array of differentiated products whereas the periphery specialize in the production of fairly standardized goods.

Driving forces

Equilibrium of economic geography models results from the relative strength of agglomeration and dispersion forces. Spatial equilibrium is defined as a situation in which no factor have an incentive to relocate. 2 types of equilibria : corner solutions with the activity entirely concentrated in one location (when agglomeration forces are strong enough), interior solutions (when agglomeration and dispersion forces cancel each other). Determination of the equilibrium done by considering the location choices of all mobile factors. Two main factors are considered : capital/firms, labor/workers. Agglomeration forces are due to workers having an incentive to locate near firms, firms having an incentive to agglomerate near workers. Dispersion forces are explained by negative externalities induced by such agglomeration

Agglomeration forces

- *Upstream, demand-shifting externalities ("backward linkages")*
  - New workers coming in → higher local demand → entry of new firms
- *Downstream, production-shifting externalities ("forward linkages")*
  - More product diversity → lower prices → more purchasing power

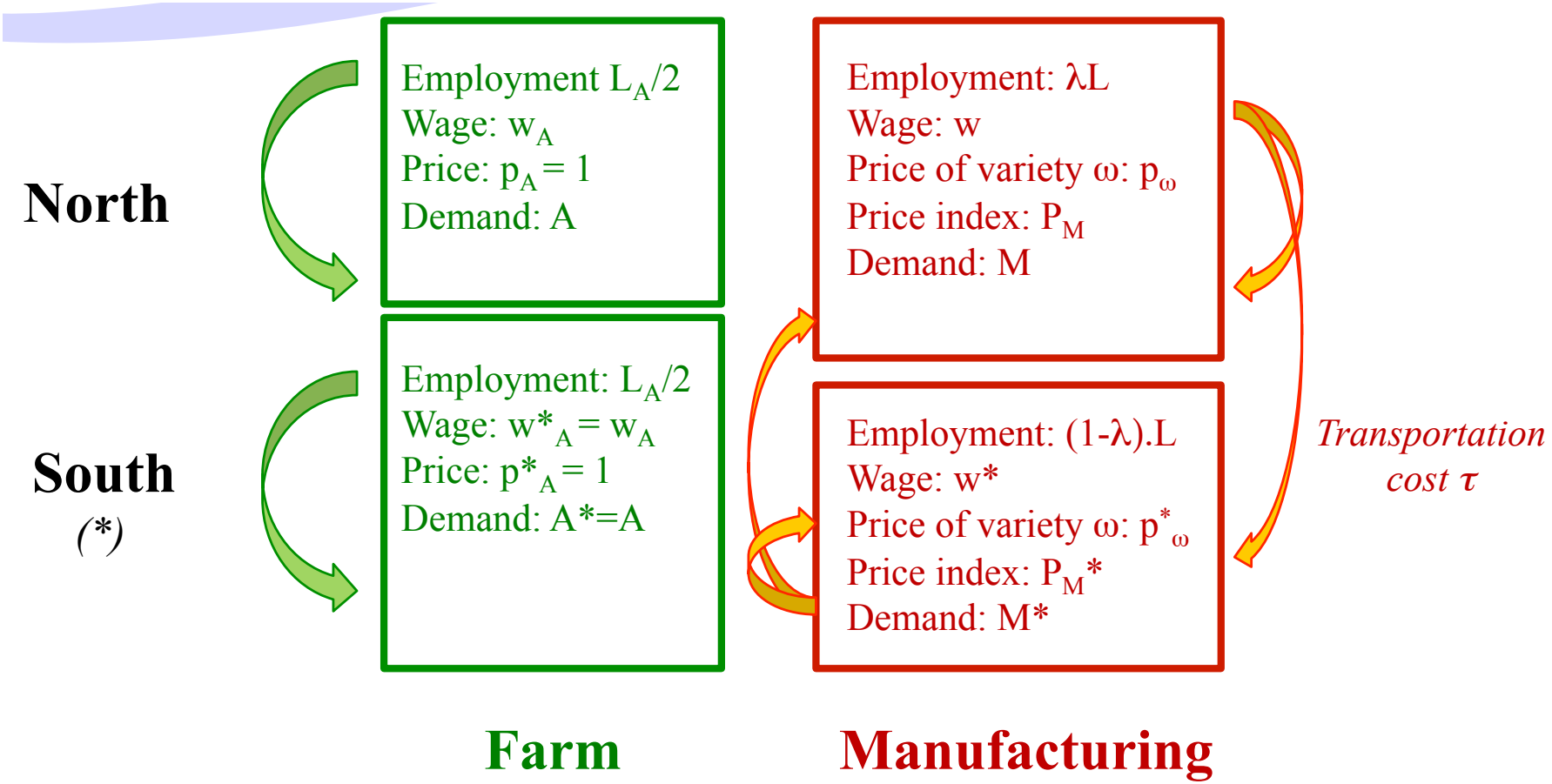
Dispersion forces

- *Pro-competitive effect*
  - New workers coming in → lower wages
  - Entry of new firms → lower prices
- *Congestion costs*
  - Pollution, traffic, jams, bottlenecks, scarcer land resources

The core-periphery ("CP") model

- Two countries ("North" and "South") and two goods :
  - Non-tradable good A : variable cost and constant-return to scale. Farm sector hiring geographically immobile non-skilled workers
  - Tradable good M : manufacturing industry with N firms producing N differentiated goods under monopolistic competition with fixed costs and hiring geographically mobile skilled workers
  - A is used as numeraire in each country
  - For M, Iceberg-type transportation cost : a fraction $1/\tau < 1$ reaches its destination
- L_M : supply of skilled workers, a fraction $\lambda \in [0, 1]$ of which is located in North
- L_A : supply of non-skilled workers, equally spread between North and South

Overview



Attention, A n'est pas egal a Aast je crois

Sector M Equilibrium (cf Krugman)

- Fixed cost technology : $l = f + \frac{q}{\varphi}$
- Domestic price : $p_\omega = \frac{\sigma}{\sigma-1}\frac{w}{\varphi} \qquad p^*_\omega = \frac{\sigma}{\sigma-1}\frac{w^*}{\varphi}$
- Export price : τp_ω (goods produced in North)
  τp^*_ω (goods produced in South)
- Free entry condition (zero profit) : $q_\omega = (\sigma - 1)\varphi f$
- Number of firms : $N = \lambda L/\sigma f$ and $N^* = (1-\lambda)L/\sigma f$

  Remark : firm location is perfectly correlated with worker location
- Definitions :

$$\textit{Aggregate Demand} : \qquad M = \left(\int q_\omega^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

$$\textit{Price Index} : \qquad P_M = \left(\int p_\omega^{1-\sigma} \right)^{\frac{1}{1-\sigma}}$$

Short-term equilibrium

- In the short-run, the location of workers is given
- Utility maximization : $Max\ U = M^{\mu} A^{1-\mu}$

  Revenue sharing : $M = \mu R / P_M$ and $A = (1-\mu)R$

  (remember $P_A = 1$)

  with $R = 1/2 w_A L_A + \lambda w L_M$

  Local demand of North-produced variety ω : $\left(\frac{p_\omega}{P_M}\right)^{-\sigma} \frac{\mu R}{P_M}$

  Total demand : $q_\omega = \left(\frac{p_\omega}{P_M}\right)^{-\sigma} \frac{\mu R}{P_M} + \tau \left(\frac{\tau p_\omega}{P_M^*}\right)^{-\sigma} \frac{\mu R^*}{P_M^*}$

Price equations

- Aggregate price :

$$P_M = \left(Np^{1-\sigma} + N^*(\tau p^*)^{1-\sigma}\right)^{\frac{1}{1-\sigma}}$$

- Remember that :

$$N = \frac{\lambda L}{\sigma f} \text{ and } N^* = \frac{(1-\lambda)L}{\sigma f} \qquad (\textit{free entry})$$

$$p = \frac{\sigma}{\sigma - 1}\frac{w}{\varphi} \text{ and } p^* = \frac{\sigma}{\sigma - 1}\frac{w^*}{\varphi} \qquad (\textit{profit maximization})$$

$\Rightarrow$ Hence the **price equations** :

$$\begin{aligned} P_M &= k_1 \left[\lambda w^{1-\sigma} + (1-\lambda)(\tau w^*)^{1-\sigma}\right]^{\frac{1}{1-\sigma}} \\ P_M^* &= k_1 \left[\lambda(\tau w)^{1-\sigma} + (1-\lambda)\, w^{*\,1-\sigma}\right]^{\frac{1}{1-\sigma}} \end{aligned}$$

$$\textit{where} \qquad k_1 \equiv \frac{1}{\varphi}\frac{\sigma}{\sigma - 1}\left(\frac{L}{\sigma f}\right)^{\frac{1}{1-\sigma}}$$

Wage equations

- Market clearing for good ω :

$$(\sigma-1)\varphi f = \left(\frac{p_\omega}{P_M}\right)^{-\sigma}\frac{\mu R}{P_M} + \tau\left(\frac{\tau p_\omega}{P_M^*}\right)^{-\sigma}\frac{\mu R^*}{P_M^*}$$

with $p_\omega = \frac{\sigma}{\sigma-1}\frac{w}{\varphi}$

- Hence the **Wage equations** :

$$\begin{aligned} w &= k_2\left[RP_M^{\sigma-1} + \tau^{1-\sigma}R^*\ {P_M^*}^{\sigma-1}\right]^{1/\sigma} \\ w^* &= k_2\left[\tau^{1-\sigma}RP_M^{\sigma-1} + R^*\ {P_M^*}^{\sigma-1}\right]^{1/\sigma} \\ \textit{with} \quad & k_2 \equiv \left(\frac{\mu}{(\sigma-1)\varphi f}\right)^{1/\sigma}\frac{\sigma-1}{\sigma}\varphi \end{aligned}$$

Spatial equilibrium : definition

- The price and wage equations yield a non-linear system in (P_M, P_M^*, w, w^*) which does not have a closed solution but can be solved numerically
- A **spatial equilibrium** is a long-term equilibrium, as described by state variable λ, such that **no single skilled worker has an interest to relocate**. It can be either stable or unstable.
- Criterium is welfare of skilled worker : $U = M^\mu A^{1-\mu}$
  with $M = \mu w / P_M$ and $A = (1-\mu)w$
  Hence : $U = \mu^\mu (1-\mu)^{1-\mu} w P_M^{-\mu} \equiv \mu^\mu (1-\mu)^{1-\mu} V$
- Spatial equilibrium is defined by :

$$0 < \lambda < 1 \text{ and } V(\lambda) = V^*(\lambda^*)$$

or (corner solution with full specialization in South) :

$$\lambda = 0 \text{ and } V(0) < V^*(0)$$

or (corner solution with full specialization in North) :

$$\lambda = 1 \text{ and } V(1) > V^*(1)$$

The polarized world ($\lambda = 1$)

- **Prices** : $P_M = k_1 w \quad P_M^* = k_1 \tau w$
- **Wages** :

$$\begin{aligned} w &= k_2 \left[R (k_1 w)^{\sigma-1} + \tau^{1-\sigma} R^* (\tau k_1 w)^{\sigma-1} \right]^{1/\sigma} = \frac{\mu}{L}(R + R^*) \\ w^* &= k_2 \left[\tau^{1-\sigma} R (k_1 w)^{\sigma-1} + R^* (\tau k_1 w)^{\sigma-1} \right]^{1/\sigma} \\ &= \left(\frac{\mu}{L}\right)^{1/\sigma} w^{\frac{\sigma-1}{\sigma}} (R\tau^{1-\sigma} + R^*\tau^{\sigma-1})^{1/\sigma} \end{aligned}$$

- **Revenues** :

$$R = wL + 0.5 w_A L_A \quad \text{and} \quad R^* = 0.5 w_A L_A$$

$\Rightarrow$ Skilled workers in the North earn 100% of manufacturing revenue : $wL = \mu(R + R^*)$

$\Rightarrow$ **Equilibrium revenues** :

$$R = \frac{1}{2}\frac{1+\mu}{1-\mu} w_A L_A \quad \text{and} \quad R^* = \frac{1}{2} w_A L_A$$

The polarized world ($\lambda = 1$) (2)

- Hence the **level of wages** :

$$w = \frac{\mu}{1-\mu}\frac{w_A L_A}{L}$$

$$w^* = \left(\frac{\mu}{2}\right)^{\frac{1}{\sigma}} \left(\frac{\mu}{1-\mu}\right)^{\frac{\sigma-1}{\sigma}} \left(\frac{1+\mu}{1-\mu}\tau^{1-\sigma} + \tau^{\sigma-1}\right)^{\frac{1}{\sigma}} \frac{w_A L_A}{L}$$

- and of **welfare** :

$$V = k_1^{-\mu} w^{1-\mu}$$

$$V^* = w^* k_1^{-\mu} \tau^{-\mu} w^{-\mu}$$

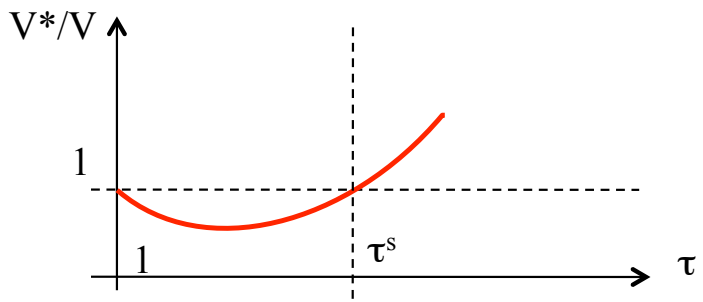
$$\Rightarrow \frac{V^*}{V} = \frac{\tau^{-\mu} w^*}{w} = \left(\frac{1+\mu}{2}\tau^{-\sigma\left(\mu+\frac{\sigma-1}{\sigma}\right)} + \frac{1-\mu}{2}\tau^{-\sigma\left(\mu-\frac{\sigma-1}{\sigma}\right)}\right)^{\frac{1}{\sigma}}$$

The polarized world ($\lambda = 1$) (3)

- The previous short-run equilibrium is a spatial equilibrium if :

$$\frac{V^*}{V} = \left(\frac{1+\mu}{2} \tau^{-\sigma\left(\mu + \frac{\sigma-1}{\sigma}\right)} + \frac{1-\mu}{2} \tau^{-\sigma\left(\mu - \frac{\sigma-1}{\sigma}\right)} \right)^{\frac{1}{\sigma}} < 1$$

- $V^*/V = 1$ when $\tau = 1$ (no transportation cost). For any other value of τ, answer depends on comparison between μ and $(\sigma - 1)/\sigma$:
  - If $\mu > (\sigma - 1)/\sigma$, then V^*/V decreases with τ : polarization is a spatial equilibrium whatever the level of transportation costs ("black hole" condition)
  - If $\mu < (\sigma - 1)/\sigma$, then there exists a unique $\tau_S > 1$ called the **"support point"** such that $V^* = V$. Polarization is a spatial equilibrium only if $\tau \leq \tau_S$



- The same reasoning holds for the South-polarized equilibrium

The flat world ($\lambda = 1/2$)

- Both countries being identical, it is obvious that $V = V^*$ and the symmetrical equilibrium is a spatial equilibrium. But we need to check it is stable, i.e. :

$$V(1/2+\varepsilon) < V^*(1/2+\varepsilon) \quad \text{and} \quad V(1/2-\varepsilon) > V^*(1/2-\varepsilon)$$

- Differentiating the 4 equations, 4 variables system made of the price and wage equations around $\lambda = 1/2$, one deduces a linear system in (dP, dP^*, dw, dw^*), then dV and dV^* (see Fujita et al., 1999, chapter 5)
- After tedious (but simple) computation, one shows that :
  - If $\mu \geq (\sigma-1)/\sigma$ ("black hole"), symmetrical equilibrium is always unstable ;
  - If $\mu < (\sigma-1)/\sigma$, symmetrical equilibrium is stable if and only if :

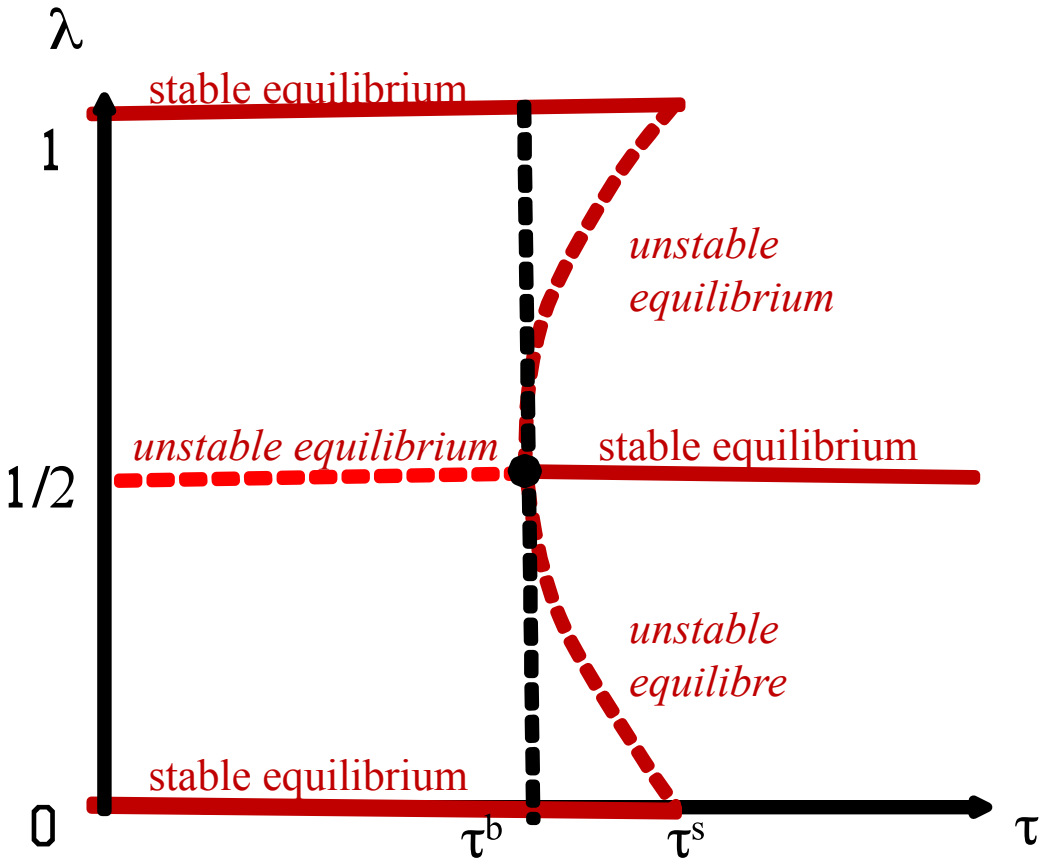
$$\tau \geq \tau_B = \left(\frac{(1+\mu)(\sigma/(\sigma-1)+\mu)}{(1-\mu)(\sigma/(\sigma-1)-\mu)} \right)^{1/(\sigma-1)}$$

  - τ_B is the **"break point"** and $\tau_B < \tau_S$

Spatial equilibria

- If $\mu < (\sigma - 1)/\sigma$, spatial equilibria are :
  - $\lambda = 0$ or 1 if $\tau \leq \tau_S$
  - $\lambda = 1/2$ if $\tau \geq \tau_B$
- When transportation cost τ is between τ_B and τ_S, there are three stable equilibria : $\lambda = 0$, $\lambda = 1$ (agglomeration), and $\lambda = 1/2$ (dispersion)
- Furthermore, it can be shown that there are two unstable, intermediary equilibria for $0 < \lambda < 1/2$ and $1/2 < \lambda < 1$

Spatial equilibrium and transportation cost : the "Tomahawk" diagram



Understanding the driving forces

- What if λ increases steadily starting from symmetrical equilibrium $\lambda = 1/2$ (workers relocating from South to North) ?
- **Cumulative demand effect ("forward linkage")**
  - Income and wages increase in North (since revenue is consumed locally) and decrease in South, creating additional incentive for firms to locate in North remember that wages for skilled workers are determined by market clearing conditions, more demand at given supply implies higher prices ie higher wages
- **Cumulative supply effect ("backward linkage")**
  - Number of firms increases in North ; prices thus decrease due to higher number of varieties and lower imports, which adds to income and create additional incentive to migrate
- **Stabilizing, pro-competitive effect**
  - Higher wages are passed to prices

Lessons of the CP model

- When transportation costs go down, there is a **catastrophic shift** from symmetric to polarized equilibrium
- **History matters** : industry location is path-dependent
- **Agglomeration prevails** :
  1. **when goods are more differentiated**
     When σ is high (homogenous varieties), $\tau_S \approx \tau_B \approx 1$ and dispersion is always stable
     Conversely, when $\sigma \longrightarrow 1$ (differentiated varieties), τ_S and τ_B are high and polarization is more likely
  2. **when manufacturing dominates the economy**
     τ_S and τ_B are increasing functions of μ

Limitations of the CP model

- No closed-form solution
- Disputable assumption of a marginal need of skilled workers (in the real world, skilled work is more needed for conception than for production)
- No equilibrium selection mechanism ; no expectations
- Model is biased towards polarization
- One single dispersion force = pro-competitive effect
- No congestion cost
- Main driver of agglomeration = labor mobility (true in US, not in Europe)

Lessons for regional policies

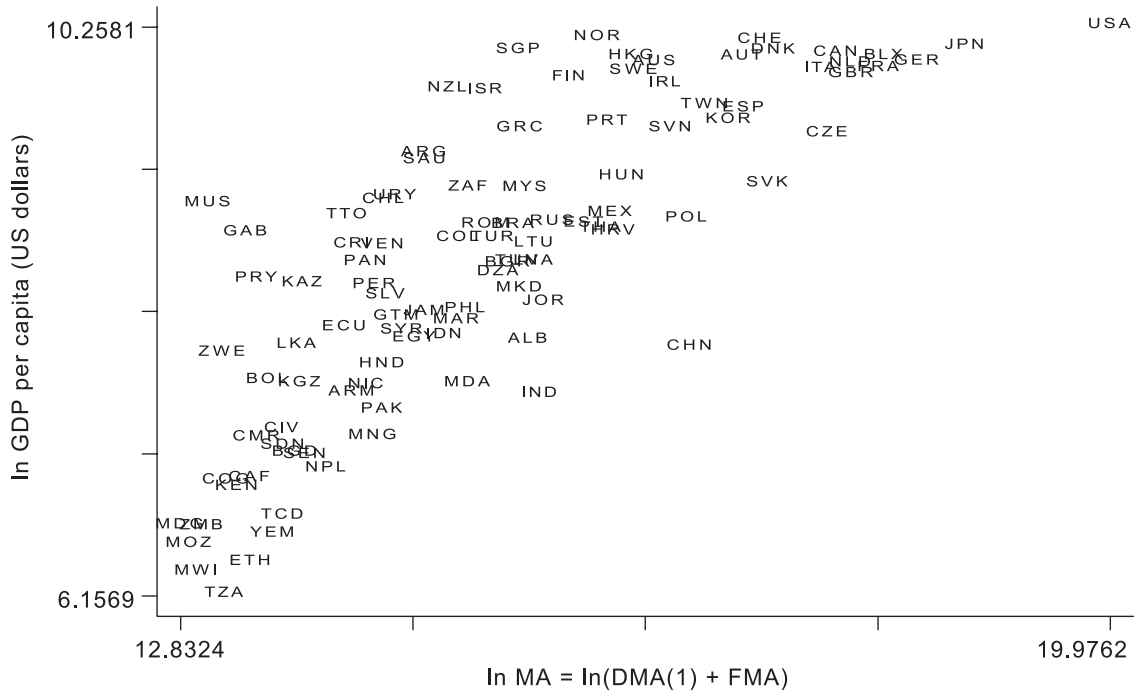
- Conflict of objectives between :
  1. **Geographical fairness** - need for regional policies, budget transfers
  2. **Efficiency** (welfare-improving concentration) - need for competitiveness clusters
- **First rank optimum** : do not oppose concentration ; compensate loosing regions with lump-sum transfers
- Ambiguous **role of transport infrastructures** : in CP model, lower transport costs increase concentration ; risk of desindustralization of peripheral regions
- IT has a potential to overcome this dilemma by "making the world flatter", ex : 3-G access in rural areas

Lessons for development policies

- Risk of "underdevelopment trap" in countries w/o natural resources (i.e. landlocked, non commodity-producing countries)
- Remedies :
  1. "Big push" to coordinate expectations (Krugman, 1991 ; Murphy, Schleifer et Vishny, 1989) = not enough in practice
  2. Openness to international markets (EU, Mercosur-like regional custom unions ; trade deals such as NAFTA, Cotonou-Lom ; WTO-led multilateral trade rounds)

Geography and income inequality

Firms' market access and GDP per capita



Source : Redding & Venables, 2004

Market access is a measure of firms' proximity to markets, of the export demand each country faces given its geographical position and that of its trading partners : $MA_j = \sum_i \tau_{ij}^{1-\sigma} \frac{E_i}{P_i^{1-\sigma}}$. It is estimated using a gravity model.

Geography and income inequality (2)

Impact of geography on GDP per capita

Table 7
Economic magnitudes

Country	Variable (%)				
	(1) Access to coast	(2) Loss of island status	(3) Become open	(4) Distance (Central Europe)	(5) Distance (50% closer to all partners)
Australia		7.34			27.06
Sri Lanka		7.34	20.66	67.40	27.06
Zimbabwe	24.03		27.65	79.74	27.06
Paraguay	24.03		25.28	58.29	27.06
Hungary	24.03		26.46		27.06

The table reports the predicted effect on GDP per capita of a change in the economic and geographical characteristics that determine market and supplier access in the trade equation estimation (Eq. (22)). The predictions are based on parameter estimates using Foreign Market Access and Foreign Supplier Access assuming an intermediate share of $\alpha = 0.5$ and an elasticity of substitution of $\sigma = 10$, and including the baseline set of control variables from column (1) of Table 3. The predicted effect of becoming open varies across countries because they begin from different values for the Sachs and Warner (1995) openness index: 1 in Australia, 0.231 in Sri Lanka, 0 in Zimbabwe, 0.077 in Paraguay, and 0.038 in Hungary. To provide an indication of the advantages of a location on the borders of Western Europe, column (4) reports the results of giving each country Hungary's vector of distances to all other countries. Column (5) reports the results of the hypothetical experiment of halving a country's distance from all of its trade partners.

Source : Redding & Venables, 2004

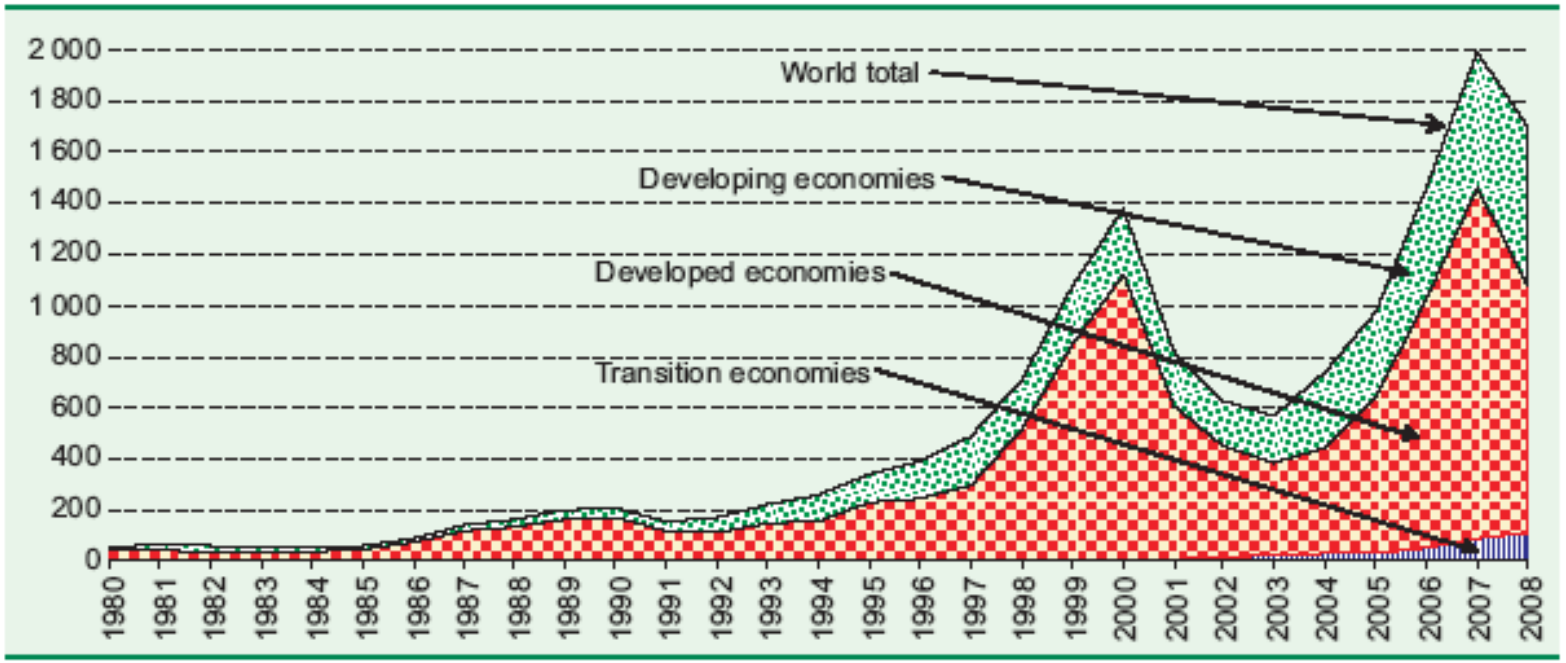
Multinational firms : a bird's eye view

Definition of FDI

- **Foreign Direct Investment** : Long-term participation by a firm into a foreign company. The investment must be substential (at least 10% of the voting power, $\neq$ portfolio investment). Several form : M&A with a foreign company, joint venture, purchase of shares, etc.
- Two kinds of FDI in the literature :
  1. **Horizontal FDI** : Cross-border relocation of production close to final demand. Objective : Increase market potential by reducing trade costs between the producer and the consumer (arbitrage between export and FDI)
  2. **Vertical FDI** : cross-border fragmentation of production process reflecting international division of labour. Objective : Reduce production costs by exploiting comparative advantages

Growth of FDI : still mainly North-North

Figure I.1. FDI inflows, global and by groups of economies, 1980–2008
(Billions of dollars)



Source: UNCTAD FDI/TNC database (www.unctad.org/fdistatistics) and UNCTAD Secretariat estimates.

Source : UNCTAD, World Investment Report 2009

Rising role in international trade

Table: Share of foreign affiliates in manufacturing exports

Canada	39	Hungary	86
Finland	31	Poland	52
France	26	China	44
Japan	4	India	3
Netherlands	22	Malaysia	49
Ireland	90	Singapore	38
Portugal	21	Brazil	21
EU	14	Argentina	29

Source : World Investment Report, 2002

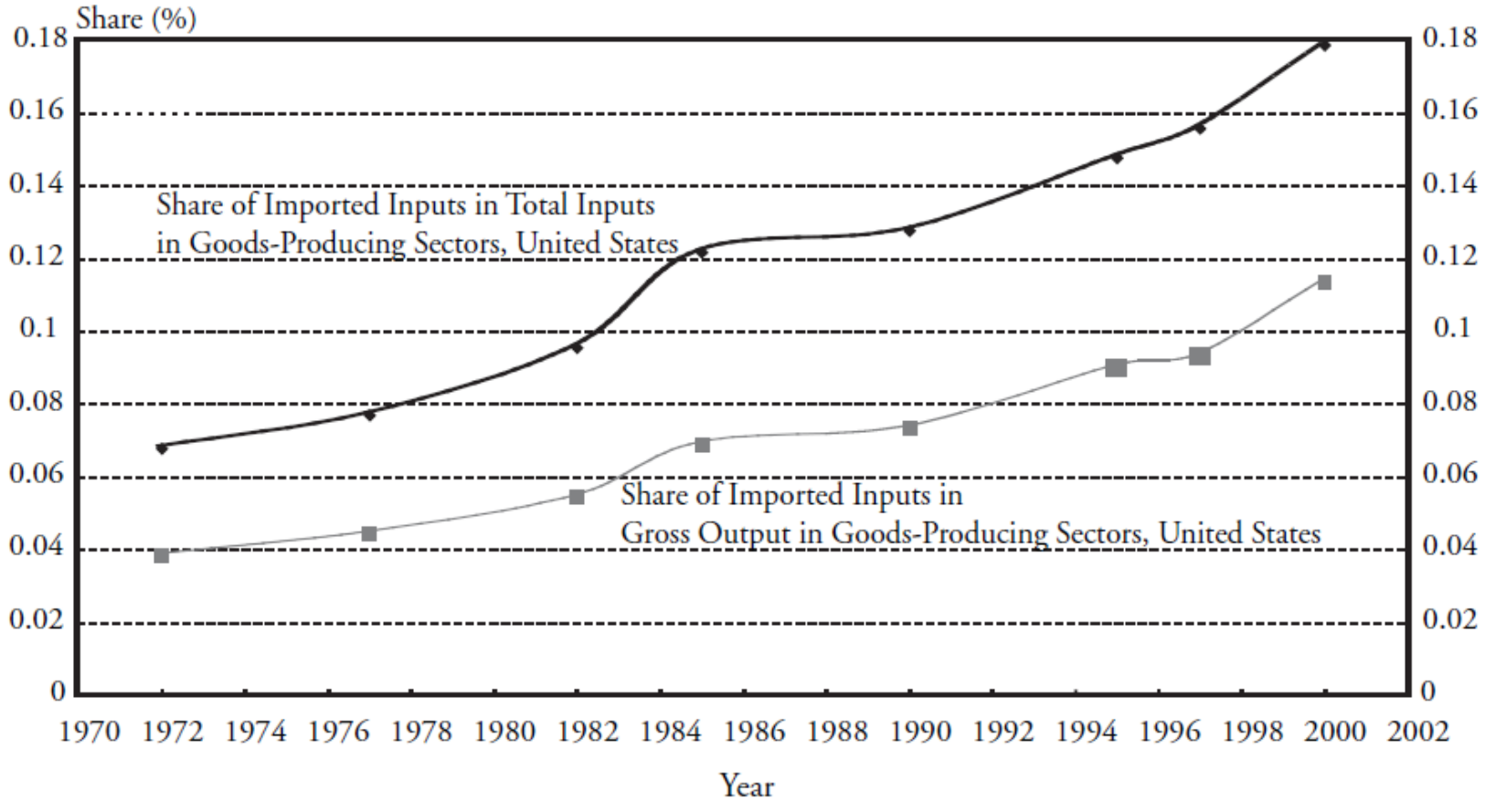
Horizontal FDI and Trade : the O-L-I paradigm

- "Ownership-Location-Internalization" paradigm (Dunnning, 1973) explains trade-off between exports and FDI
- FDI based on three conditions :
  1. **Intangible advantage (Ownership)**
     Technology, work organization, brand, reputation. Exploited within the firm Explains why a firm has an incentive to serve foreign markets through fdi rather than exporting and letting foreign importers sell their goods. Suggests that the MNE has one or more firm specific advantages (e.g. core competency) which allows it to overcome the costs of operating in a foreign country
  2. **Comparative advantage of host country (Location)**
     Difference in factor endowment, taxation, public infrastructures, market size, institutions (property rights, regulation, graft...)Explains where the firm produce. Factor advantages in a foreign country. Through these factors (e.g. labor, land), the MNE makes profits (earns rents) on its firm specific advantages
  3. **Advantage of internalization** (as opposed to licensing)
     Depends on industrial organization, information asymmetry, comparison beween external and internal transaction costs. Ex : "tariff-jumping" FDIExplains how the firm produces abroad. The MNE has various choices of entry mode, ranging from the market (arm's length transactions) to the hierarchy (wholly owned subsidiary). If there is no market or the market functions poorly, transaction costs can be kept in check through internalization

HFDI and Trade : Recent Development

- Brainard (AER, 1997)
  - Trade-off between proximity and concentration depends on comparison between transport costs and location costs, and on scale economies within the firmConsider a MNE that has two options : Producing for markets A and B through one plant located in A / producing for market A through plant located in A and for market B through plant located in B. Advantage of option 1 : Maximizes economies of scale through concentration of production in one single plant. Advantage of option B : save on transportation costs for sales in B. Can eventually adjust product to local tastes
- Markusen and Venables (JIE, 2000)
  - Synthesis with HOS model. Case for FDI when countries are relatively similar in absolute and relative endowments and/or when trade costs are high and/or when plant-specific fixed costs are low enough.
- Helpman, Mélitz and Yeaple (AER, 2004)
  - Synthesis with Mélitz model (2003) of heterogeneous firms. Only firms with higher productivity can afford to relocate production
- Latest studies attempt to describe complex VFDI strategies (ex : multinational relocating part of supply chain from host-country to third country)

Vertical supply chains ("task trade")



Source : Grossman and Rossi-Hansberg (2006)

Domestic value added in exports

Table: Ratio of local value added over exports

Germany	.74	UK	.79
Belgium	.48	France	.73
Mexico	.52	USA	.77
Canada	.70	Brazil	.86
Japan	.85	Korea	.63
China	.59	Singapore	.37
Hungary	.54	Poland	.70

Source : Johnson & Noguera, 2010