



How Transport Costs Shape the Spatial Pattern of Economic Activities

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Why do we need transport?

Because we want to trade commodities

But why do we want to trade?

**Because all goods are
not produced within reach**



Is it because nature is unfair?

Yes, nature is unfair but what really matters is that economic activities display increasing returns

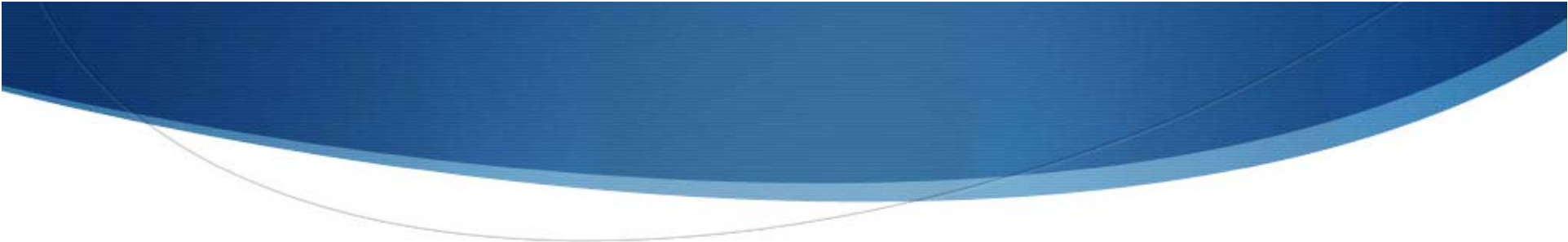


Two types of **IR**

- ◆ **internal** to firms: scale effects
- ◆ **external** to firms: local environment



The Trade-off Between Transport Costs and Increasing Returns

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- 🔥 Three markets: **W**est, **C**enter, and **E**ast
 - 🔥 Building a facility costs **F** euros
 - 🔥 Shipping goods between two adjacent markets costs **T** euros

One facility: **Center**

Total cost is **$F + 2T$**

One facility **Everywhere:**

Total cost is **$3F$**

What to do?

$$F + 2T < 3F \iff$$

$$\iff T < F$$



Strong scale economies (high **F**),

Low transport costs (low **T**), or both
foster the

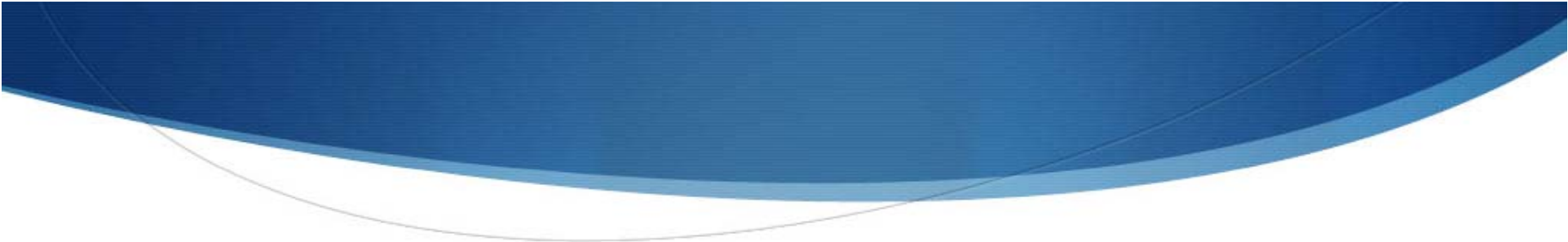
Agglomeration of economic activities in a

Small number of areas

Large Markets: **D**

$$F + 2DT \Leftrightarrow DT < F$$

Proximity of large markets matters



When one region is larger in terms of purchasing power, this region attracts a **more than proportionate** share of firms

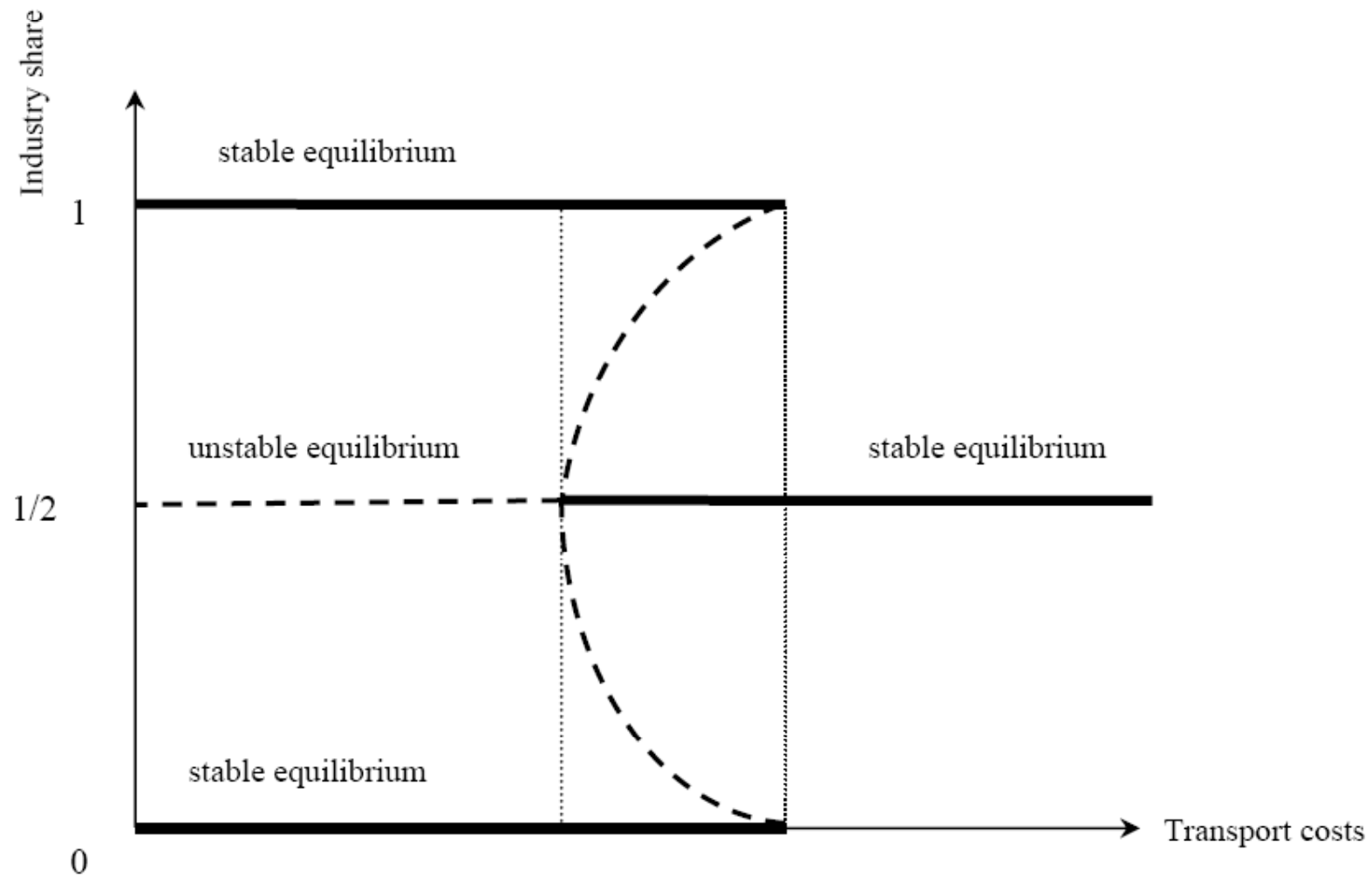
An initial size advantage is **magnified** by lower transport costs



Physical capital is replaced
by **human** capital

When workers move to a new place,
they bring with them both their
production and **consumption** capabilities

Industry share and the level of transport costs



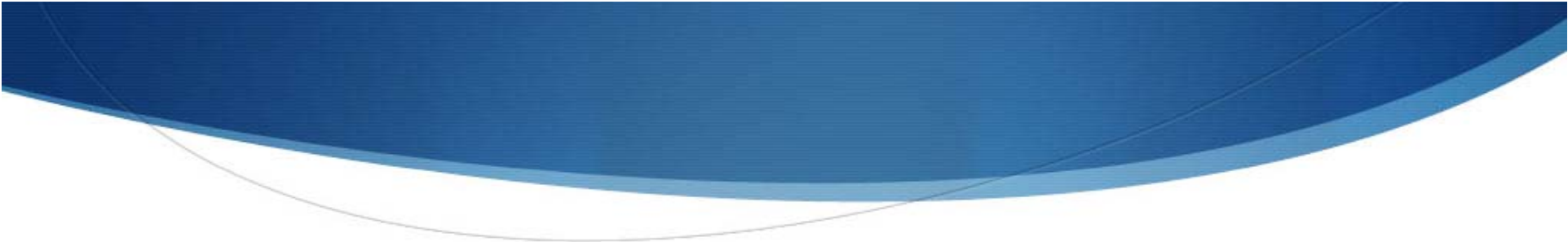


**Better transport infrastructure
could exacerbate
regional disparities**



**What happened within Europe
in the nineteenth century?**

The Great Divergence



“Between **1800** and **1910**, it can be estimated that the lowering of the real average prices of transportation was on the order of **10 to 1**” (Bairoch)

Per capita GDP of European countries expressed in 1960 U.S. dollars and prices

Countries	1800	1830	1850	1870	1890	1900	1913
Austria-Hungary	200	240	275	310	370	425	510
Belgium	200	240	335	450	55	650	815
Bulgaria	175	185	205	225	260	275	285
Denmark	205	225	280	365	525	655	885
Finland	180	190	230	300	370	430	525
France	205	275	345	450	525	610	670
Germany	200	240	305	425	540	645	790
Greece	190	195	220	255	300	310	335
Italy	220	240	260	300	315	345	455
Netherlands	270	320	385	470	570	610	740
Norway	185	225	285	340	430	475	615
Portugal	230	250	275	290	295	320	335
Romania	190	195	205	225	265	300	370
Russia	170	180	190	220	210	260	340
Serbia	185	200	215	235	260	270	300
Spain	210	250	295	315	325	365	400
Sweden	195	235	270	315	405	495	705
Switzerland	190	240	340	485	645	730	895
United Kingdom	240	355	470	650	815	915	1035
Mean	200	240	285	350	400	465	550
Relative standard deviation	12%	18%	23%	31%	38%	39%	42%



**The Trade-off Between
Commuting Costs
Within Cities and Transport Costs
Between Cities**



Commuting costs and land
rents put a break on the
agglomeration process



Monocentric cities

As transport costs decrease

dispersion – agglomeration - dispersion

The **bell-shaped** curve of spatial development

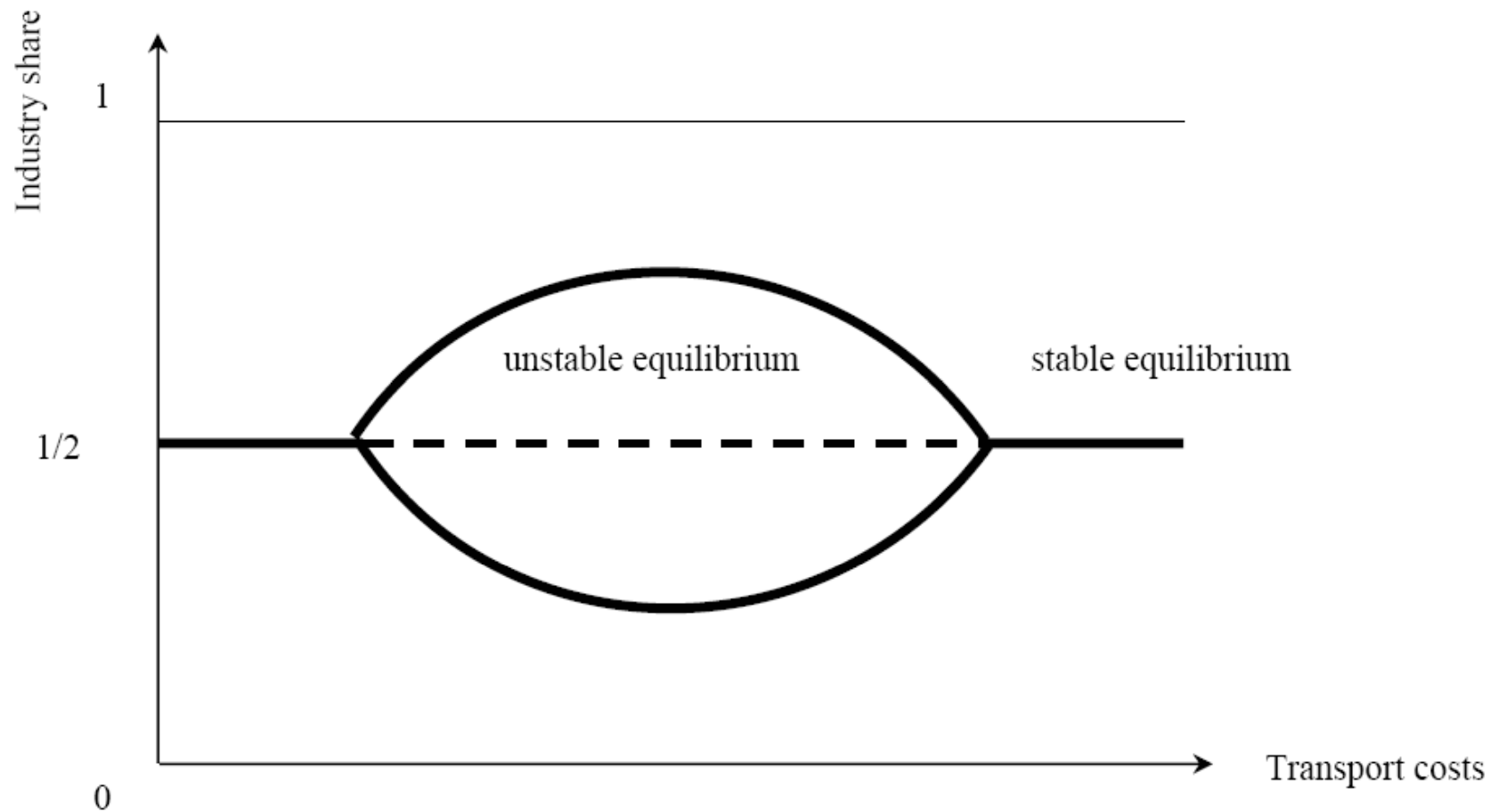
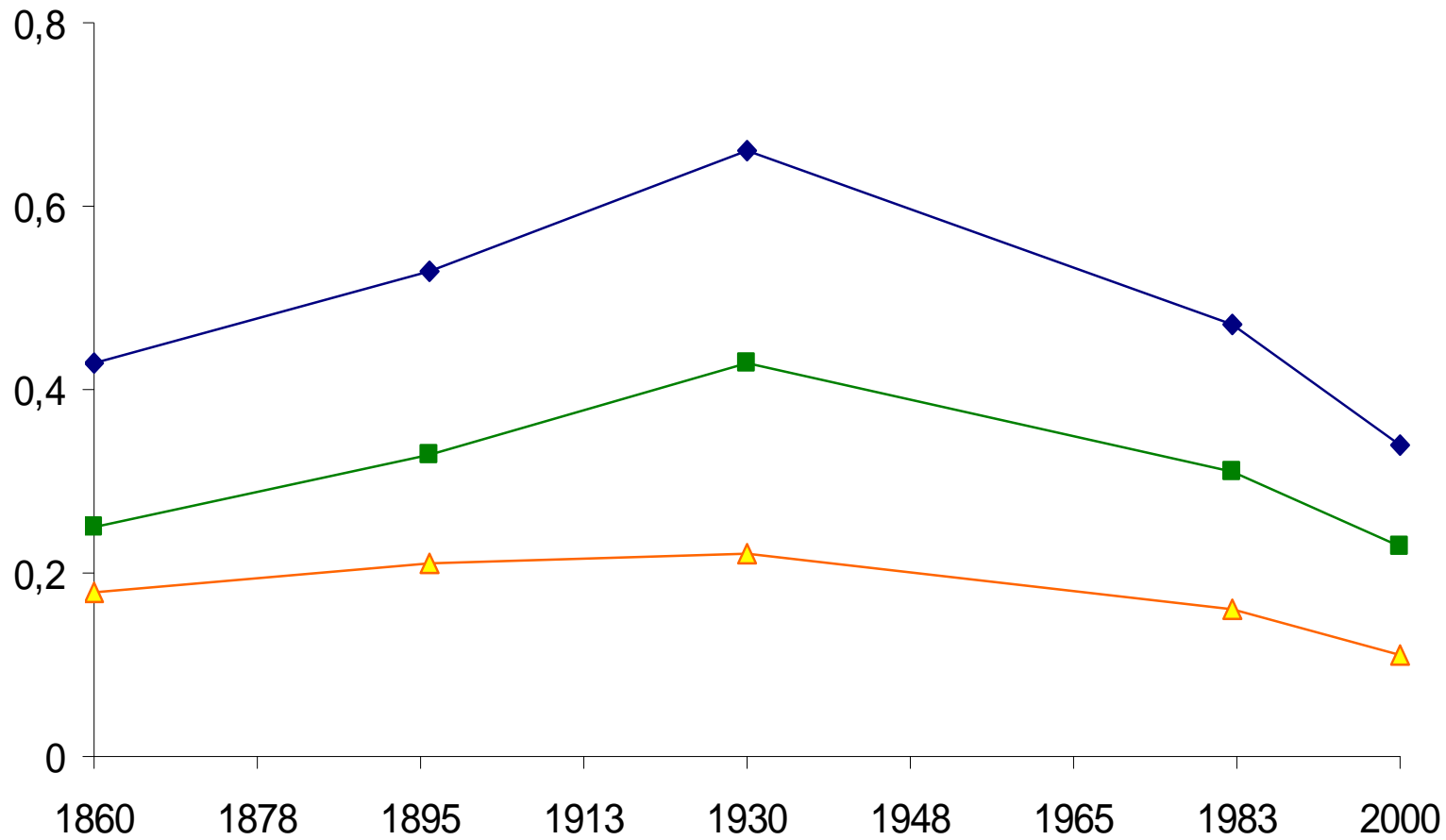


Figure 2: Theil indices for the manufacturing sector



—◆— Manu. Emp. Total —■— Manu. Emp. Within —▲— Manu. Emp. Between



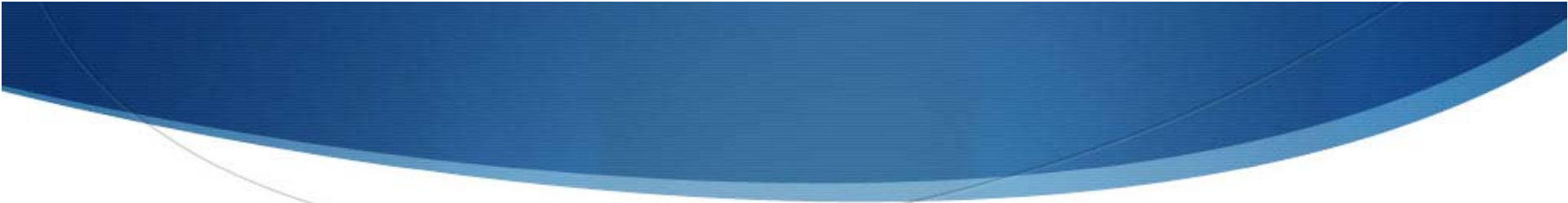
Polycentric cities

Low communication costs foster the **decentralization of jobs** within cities and help the core regions to retain their **primacy**

Conclusions

1. “the improvement of means of transport is dangerous for costly goods: these lose the most effective protection of all tariff protections, namely that provided by bad roads”

(Launhardt, 1885)



“Fast and cheap transportation has been one of the main products of the Industrial Revolution. Distances have been shortened at an astonishing pace. Day by day the world seems smaller and smaller and societies that for millennia practically ignored each other are suddenly put in contact - or in conflict.”

C.M. Cipolla, *The Economic History of World Population*



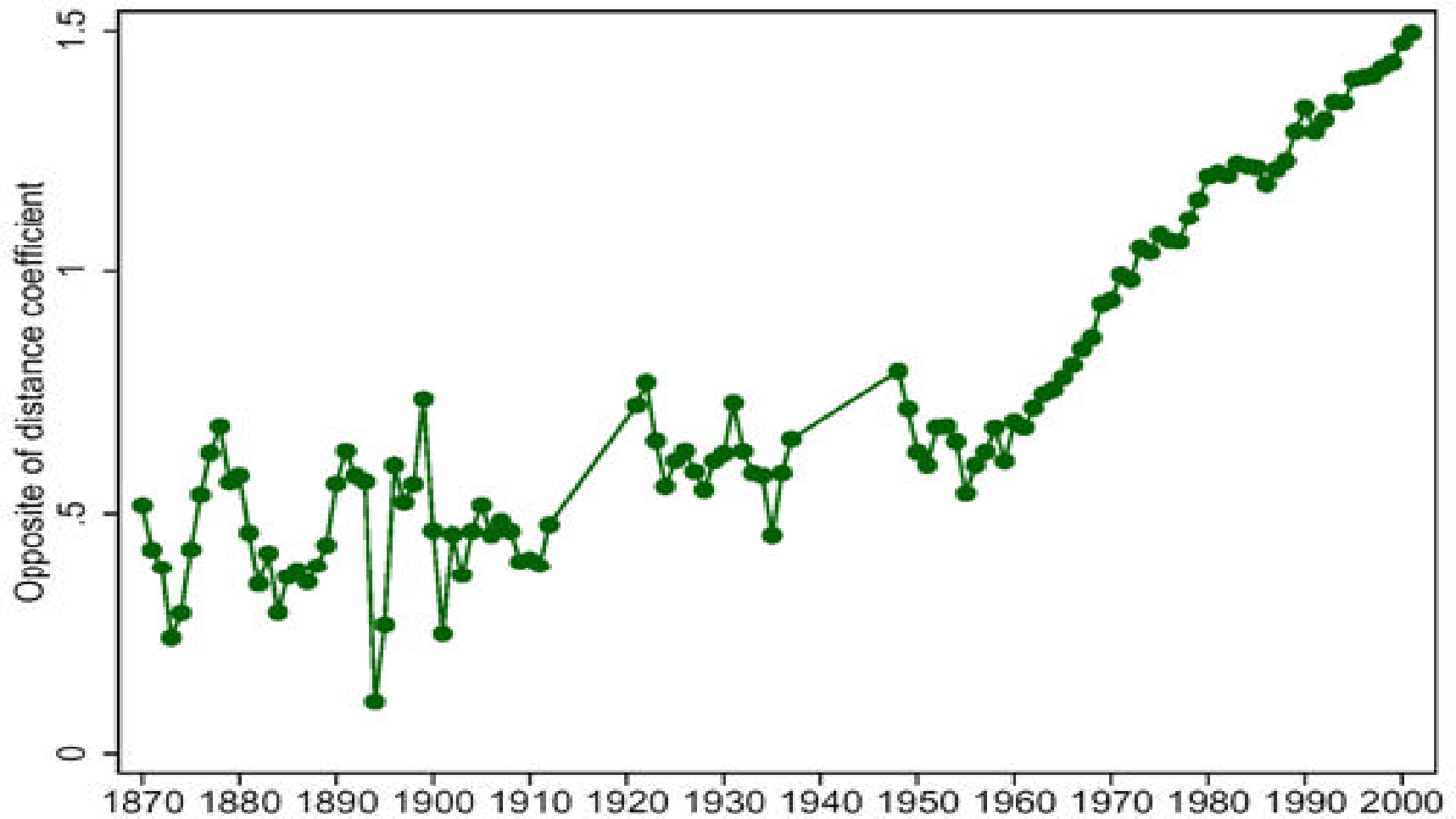
2. Economic journalists have celebrated
the *death of distance*
the *weightless economy* or
the *flat world*

Gravity equation

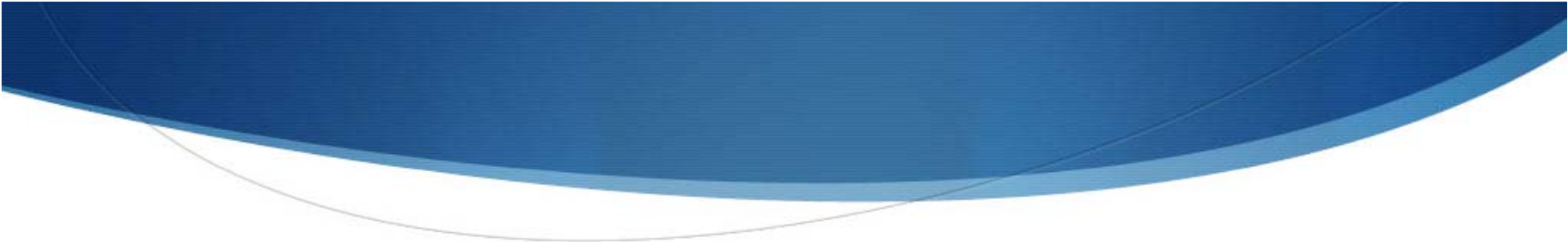
$$X_{rs} = G \frac{\gamma_r^a \gamma_s^\beta}{d_{rs}^\delta}$$

The exponent δ is slightly lower than **1**

(Disdier and Head)

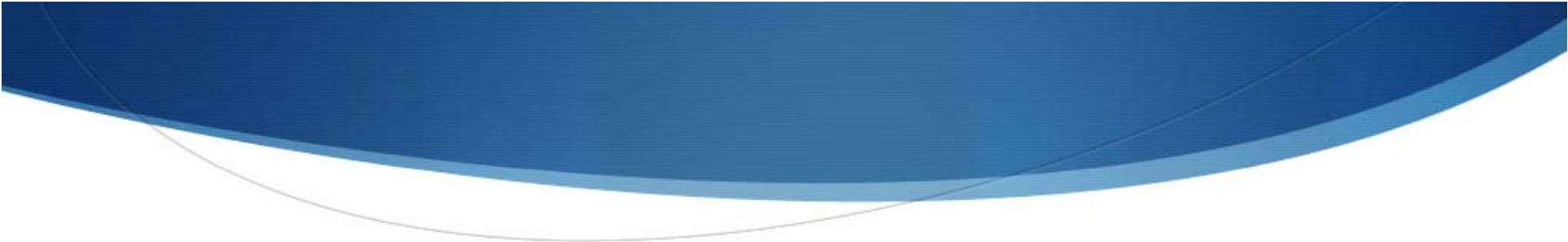


The impact of distance on trade (1870-2001)



3. What matters is the interaction between the “local” and the “global” when designing transport policies

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- 1) Transport costs of goods**
 - 2) Workers' commuting costs**
 - 3) Communication costs across and within firms**



“given the role that transport plays in causing greenhouse gas emissions, any serious action on climate change will zoom in on the transport sector”

(Yvo de Boer, Executive Secretary of the United Nations, January 2009)



4. Low passengers' transport costs

should favor the emergence

of *multi-polarity*

but HSR should connect cities

with *a high potential of interaction*



Lower disparities on the
international (interregional)
level may be accompanied by
increasingly large disparities on
the **intra-national** (intra-
regional) level



Thank you for your attention