

# Globotics and development: When manufacturing is jobless and services are tradeable

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**The future is unknowable,  
but also inevitable**



Caveat emptor:  
This is a think piece

Digital  
Technology

Automation

Globalization

Development  
realities

Implications



This time is different

# Machine learning is different

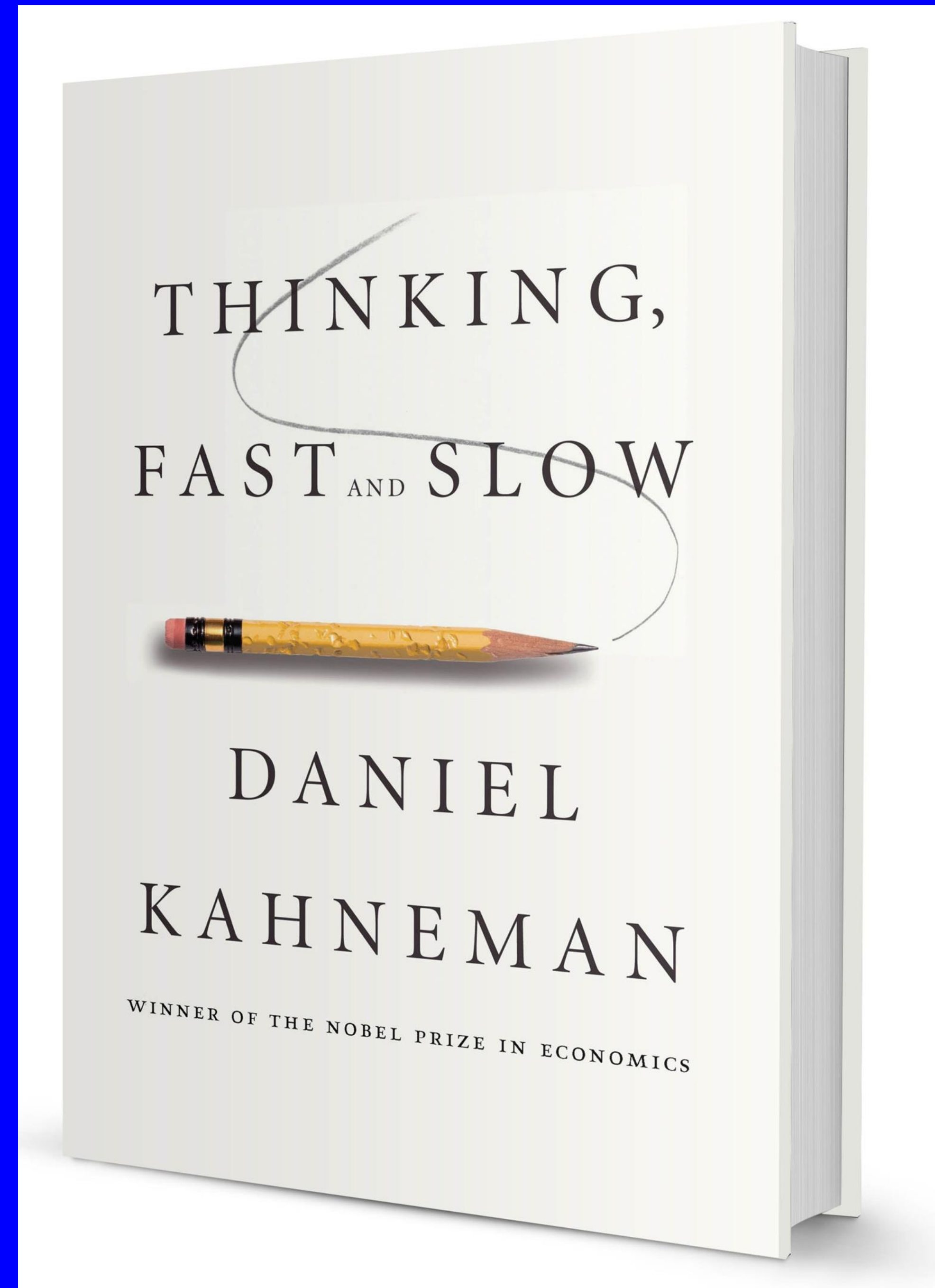
In 2019 computers can read, write, see, speak, understand speech, create visual output, recognize subtle patterns.

In 2015 they couldn't. What changed?

Programming is  
different

Coding =  
thinking slow

Machine learning =  
thinking fast



# IT's new cognitive capacities =>

- Manufacturing may become nearly fully automated, so production is rebundled with consumption (nontraded)
- Few jobs for humans



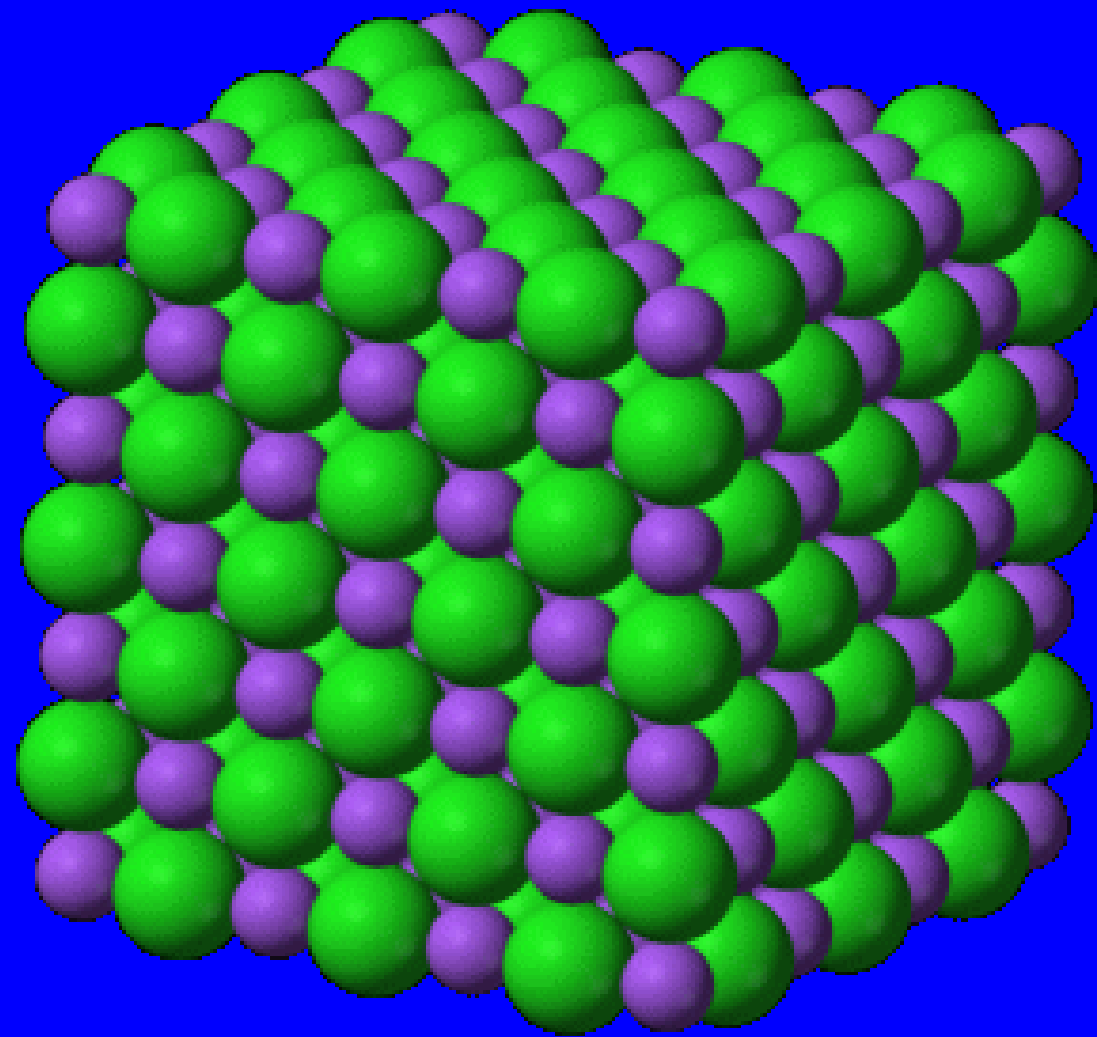
# Digitech is ICT, but...

ICT applied to manufacturing (mostly physical + bit of “I” & “C”)

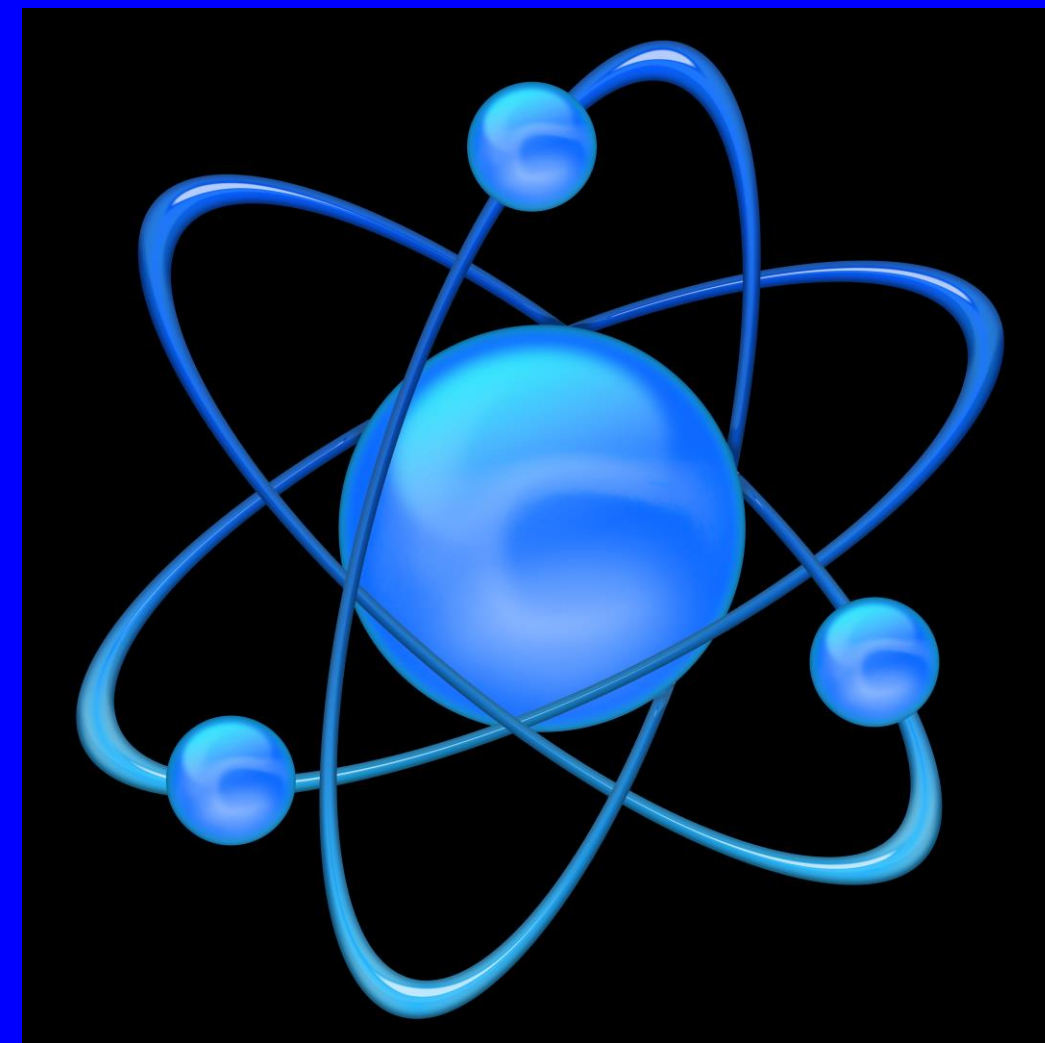
Digitech applied to services (mostly “I” & “C” + bit of physical)

# Different physics applies

Matter



Electrons



*How fast to double flows?*

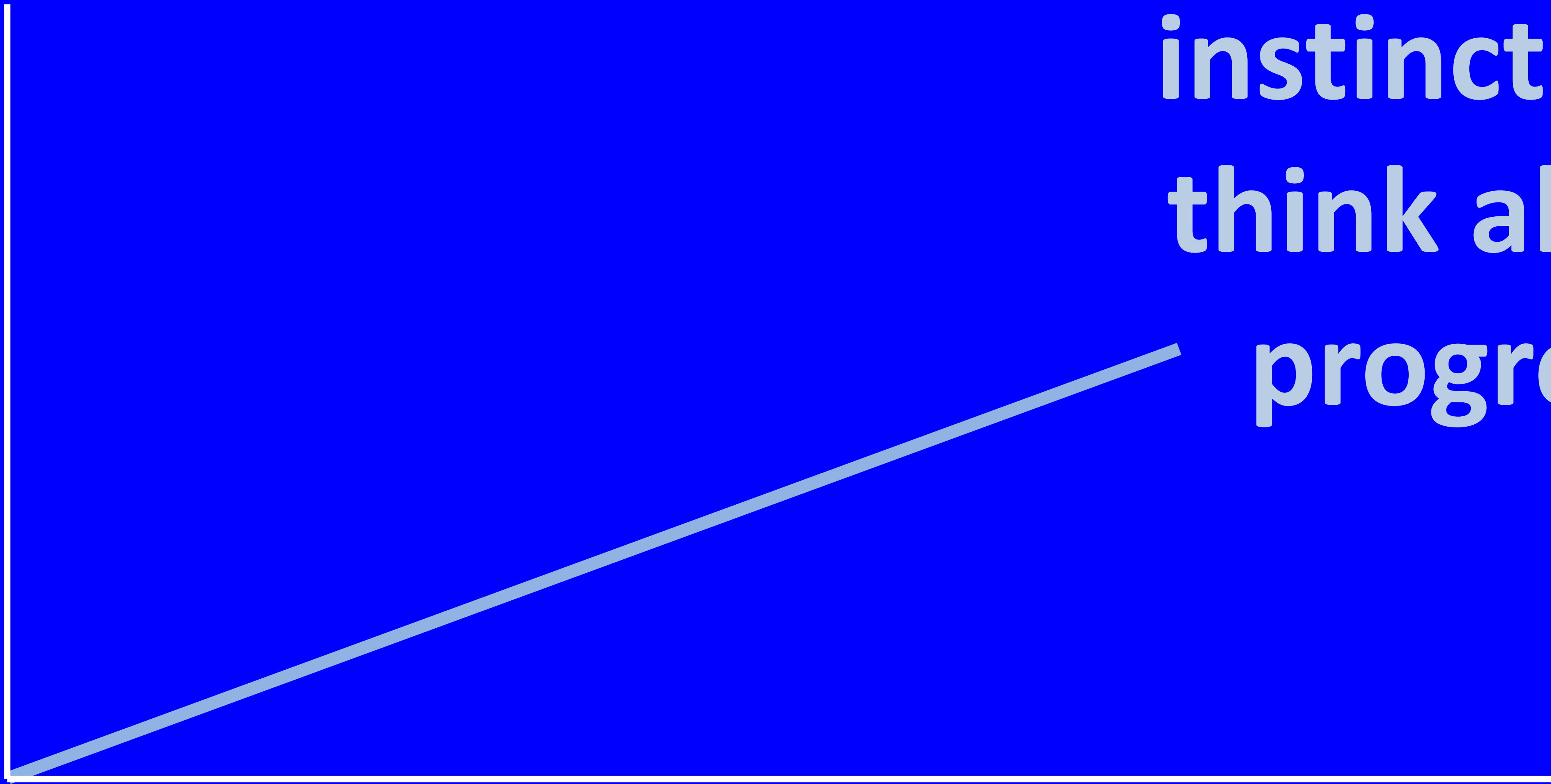
# Radically faster transmission & processing speeds =>

- Labour and labour-services can be unbundled over long distances (tradeable)
- Globalisation's "3<sup>rd</sup> unbundling"

**The speed is a problem in itself**

Progress

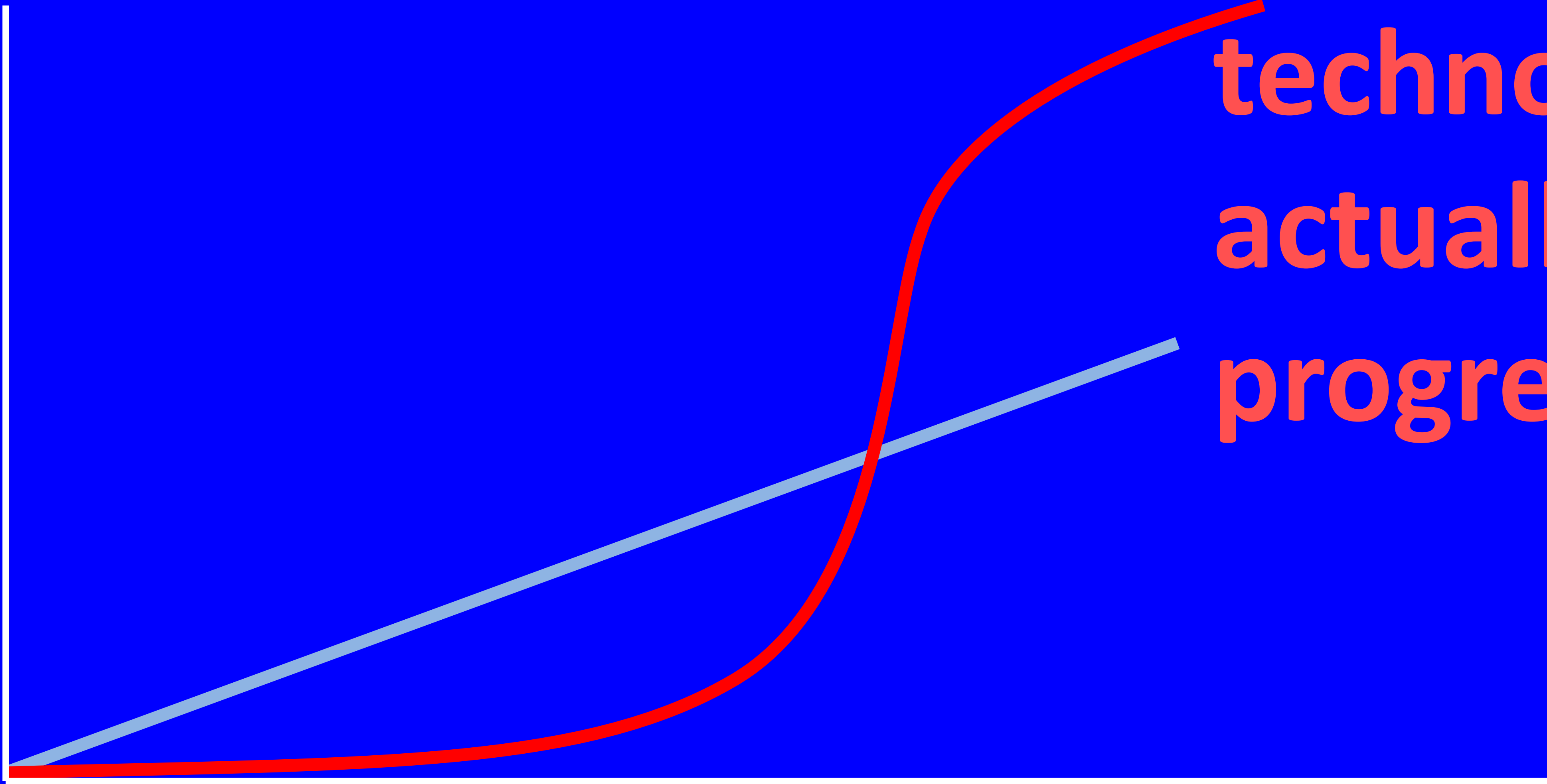
How humans  
instinctively  
think about  
progress



Years

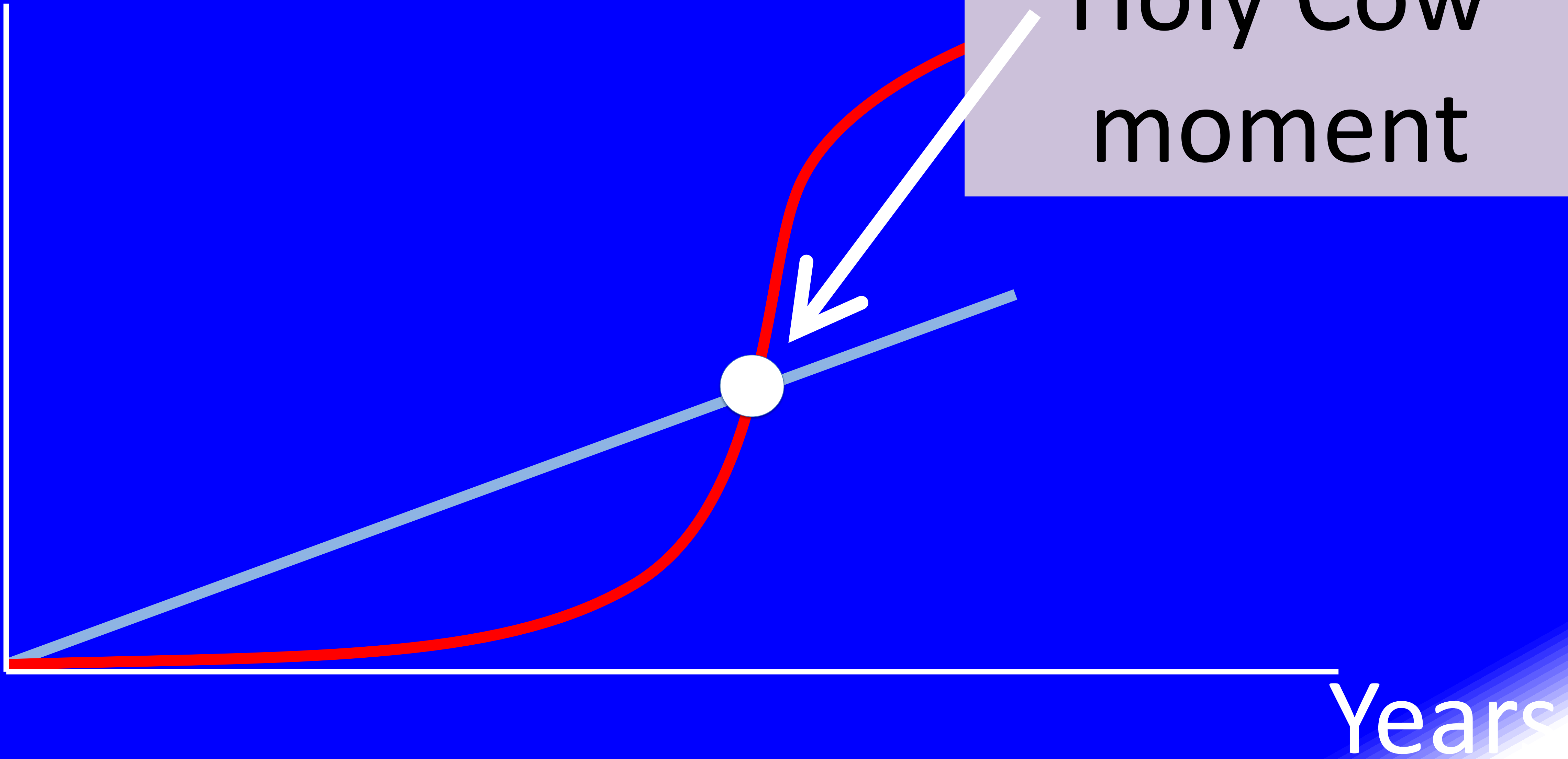
Progress

How digital  
technology  
actually  
progresses



Years

Progress



“Holy Cow”  
moment

Years

**Coming ways  
few expect**



# Think “iPhone infiltration”



Radical changes in  
globalisation are not  
new

Arbitrage drives  
globalisation

# Arbitrage in 3 things

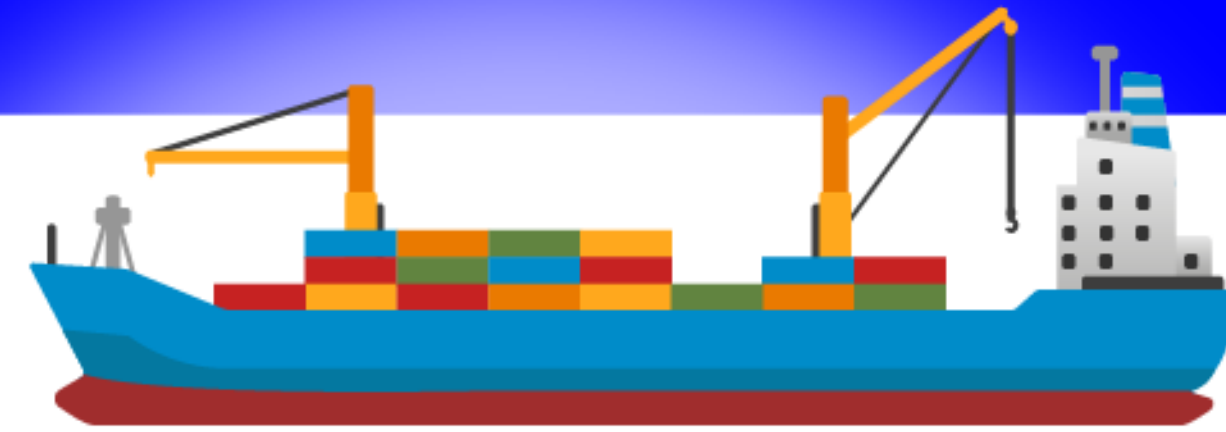
**Goods**

**Knowhow**

**Labour services**

# Arbitrage/Globalisation constrained by 3 costs

Trade costs



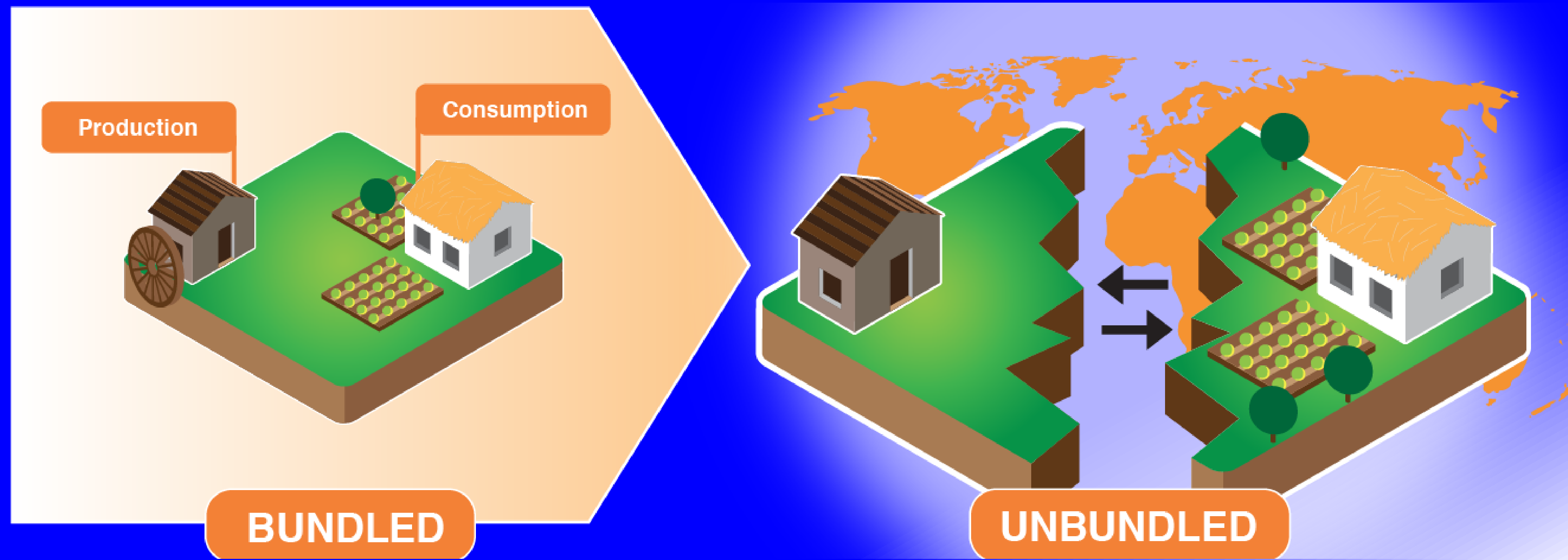
Communication  
costs



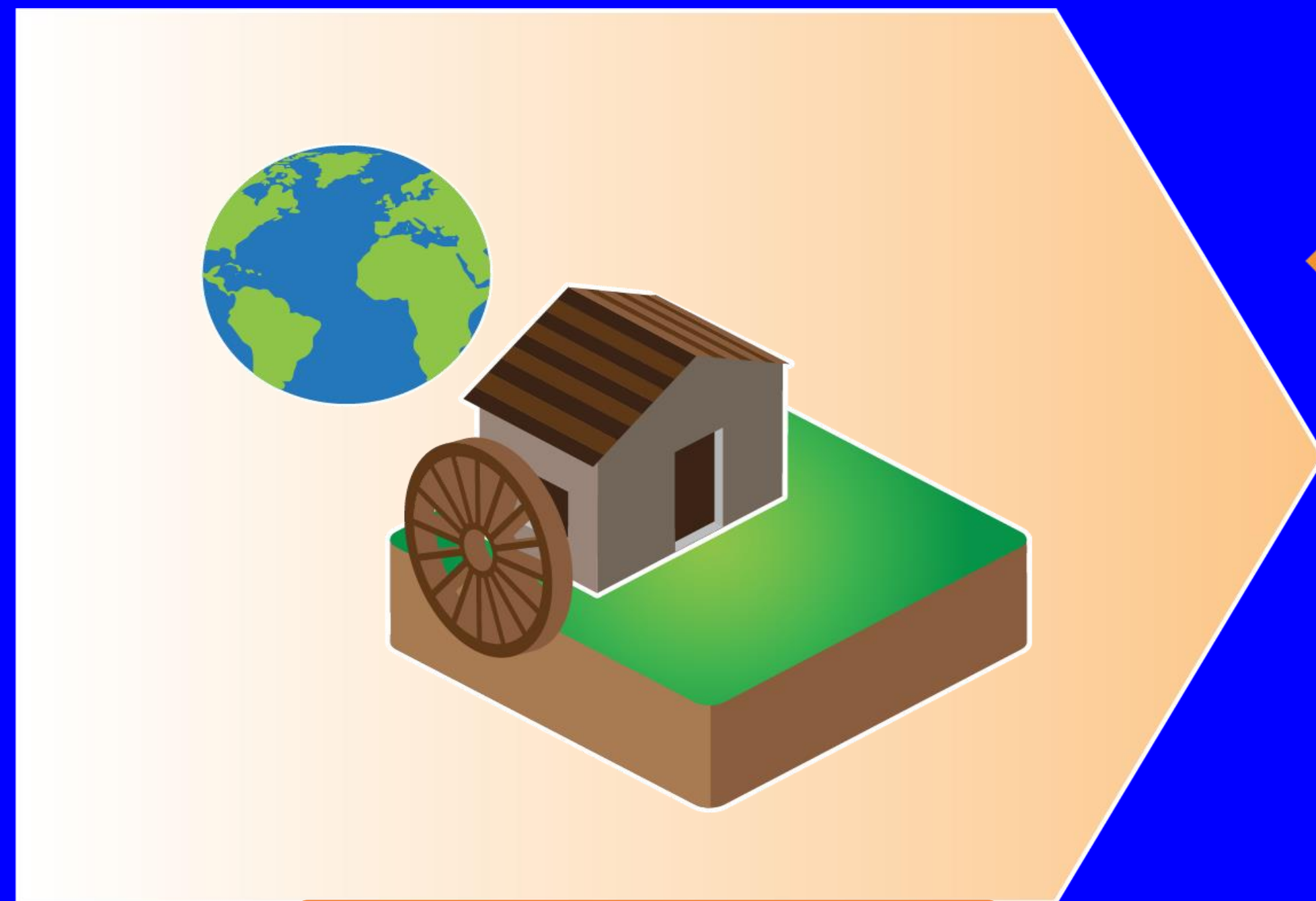
Face-to-face costs



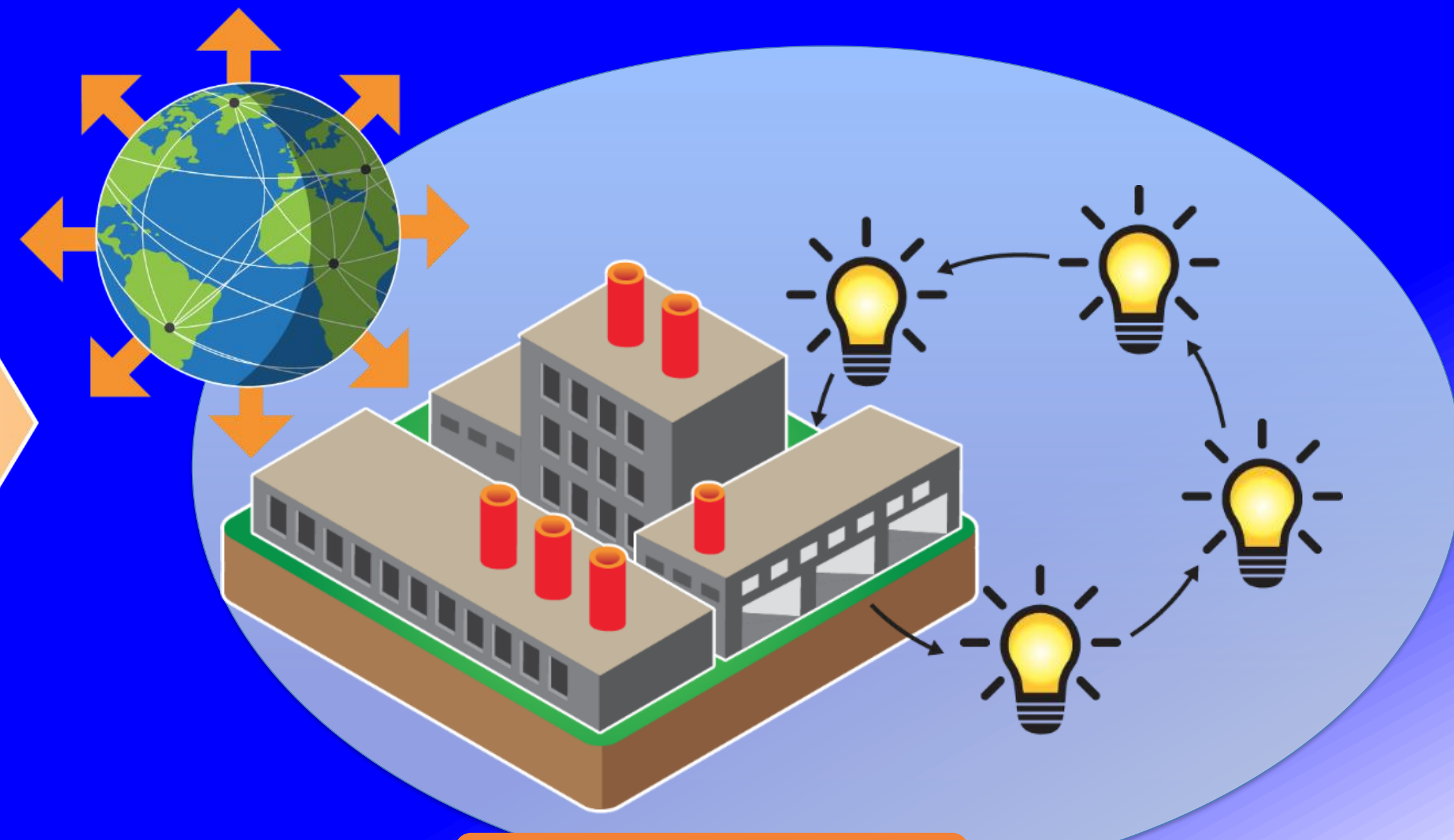
Low trade costs makes high-volume trade feasible; Comparative advantage makes it profitable; **1<sup>st</sup> unbundling begins**



Production micro-clusters → Innovation & growth, but innovations stay in G7 => “Great Divergence”



DISPERSED PRODUCTION



MICRO-CLUSTERED

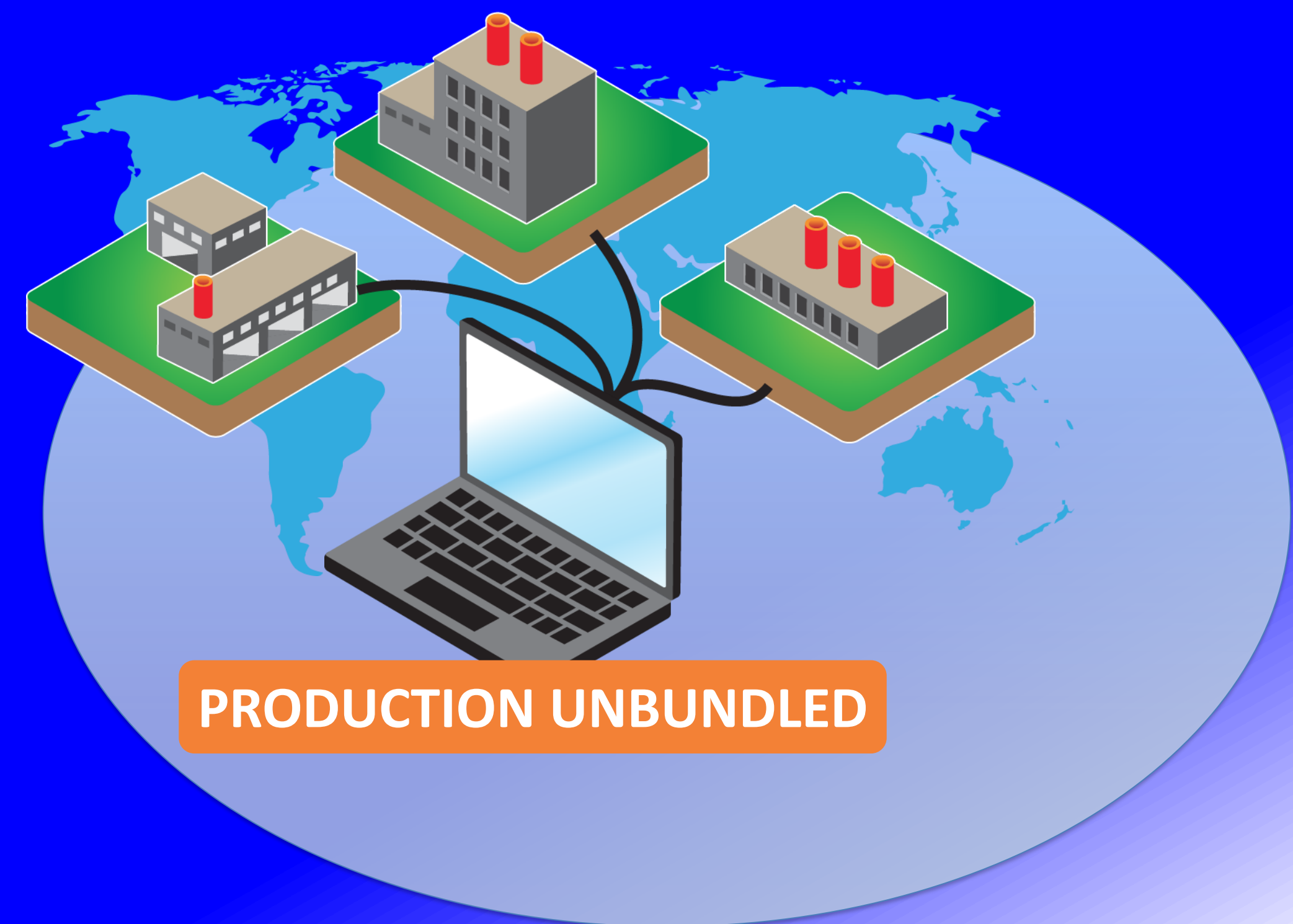
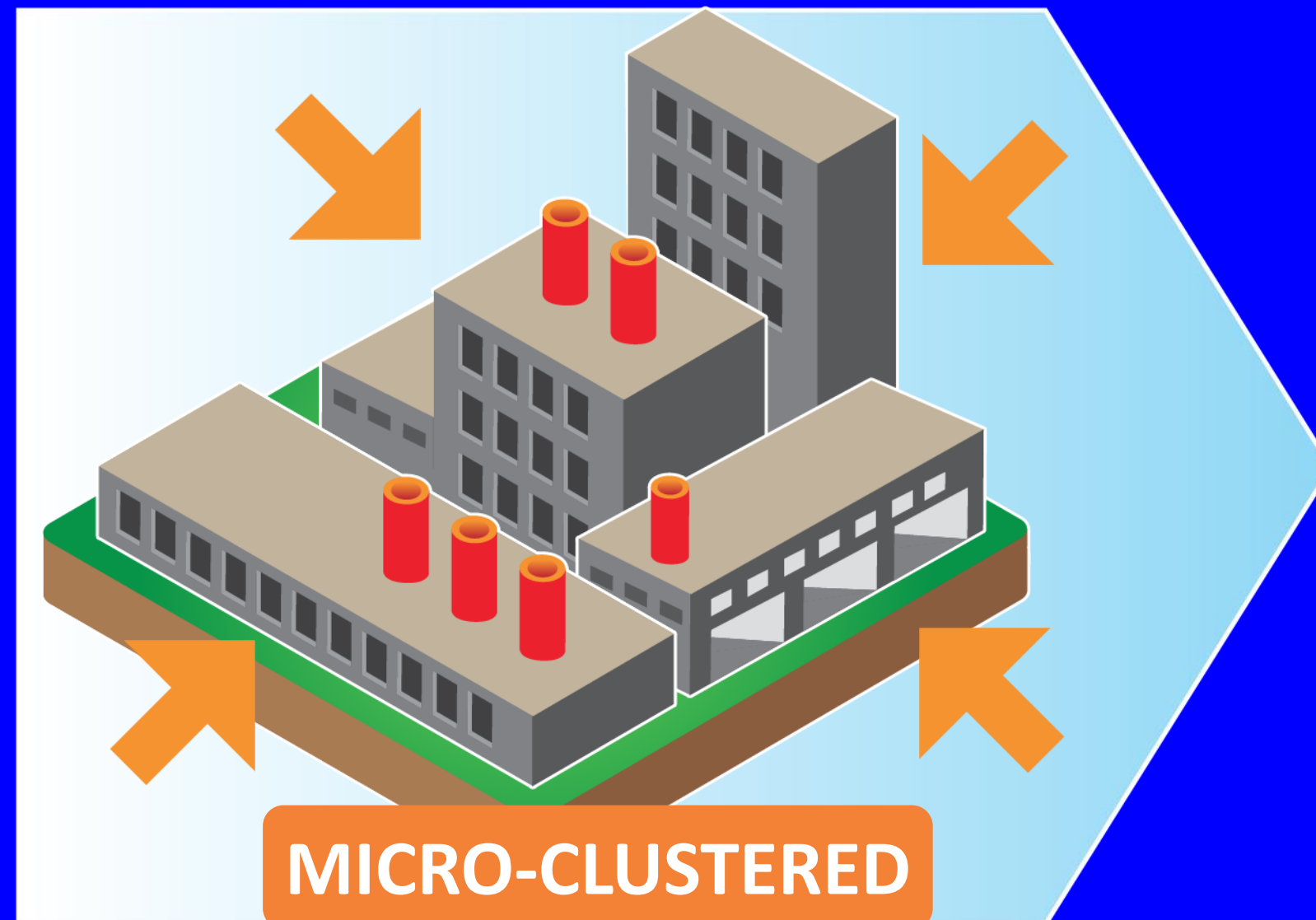
# Information & Communication Technology (ICT) lowers the cost of moving ideas



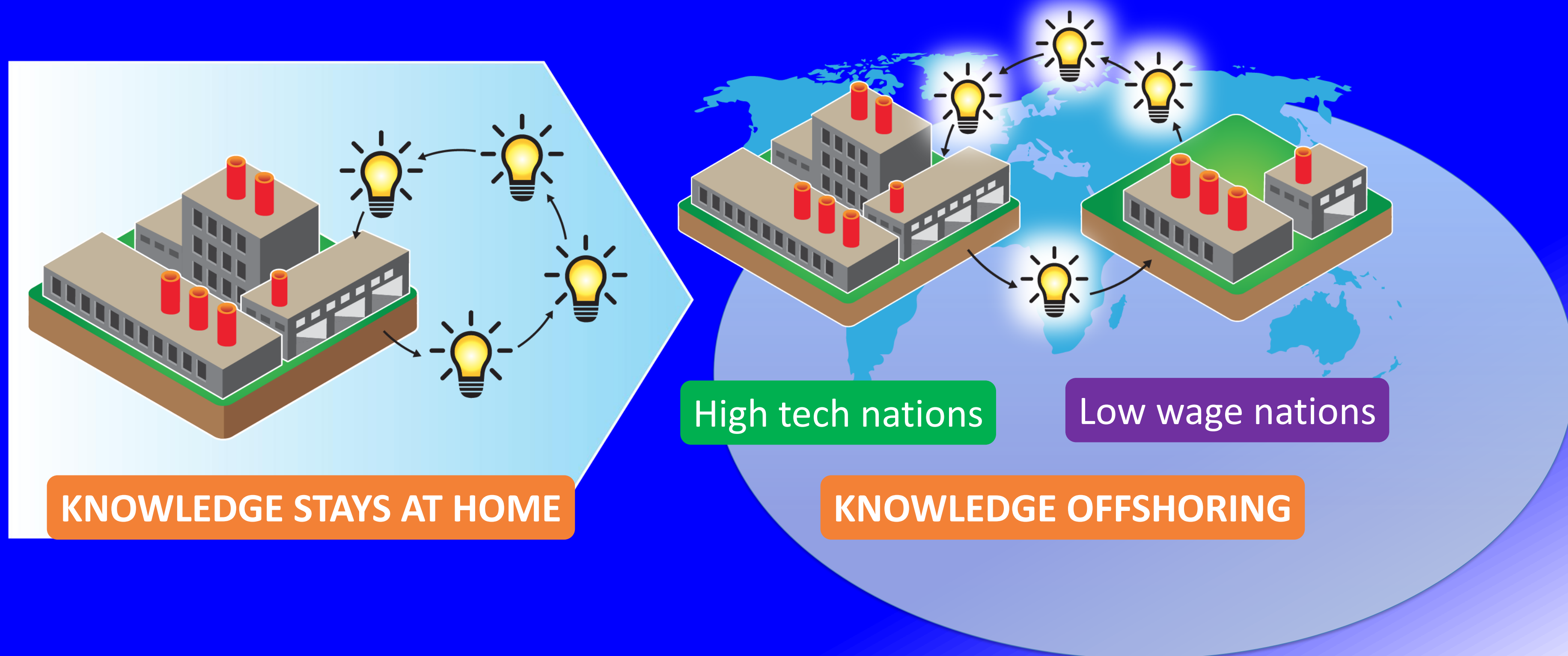
	<b>LOWER</b>
	<b>LOWER</b>
	High Face 2 face costs



ICT Revolution makes offshoring feasible;  
Vast wage differences make it profitable;  
2<sup>nd</sup> unbundling begins



# Knowledge arbitrage begins: G7 firms offshore knowhow with the jobs & factories => Great Convergence



# Pre-ICT revolution, knowledge is 'stuck' in G7

## Headquarter Economies (G7)

High Knowhow  
Labour

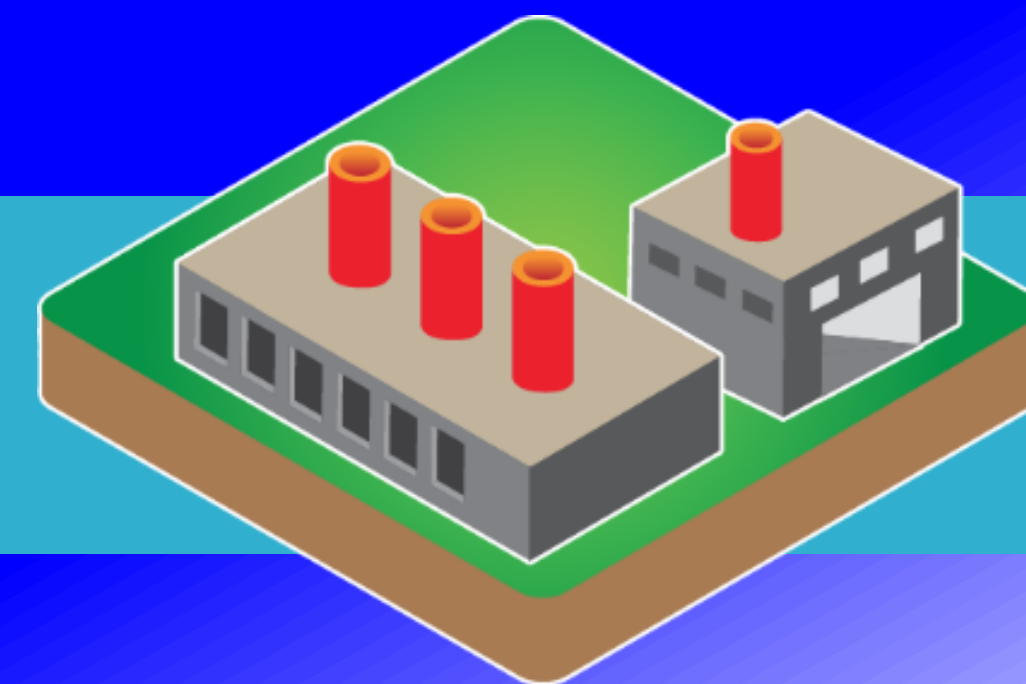
High wages



## Factory Economies

Low Knowhow  
Labour

Low wages



# Global value chains open a 'pipeline' for globalisation as knowledge arbitrage

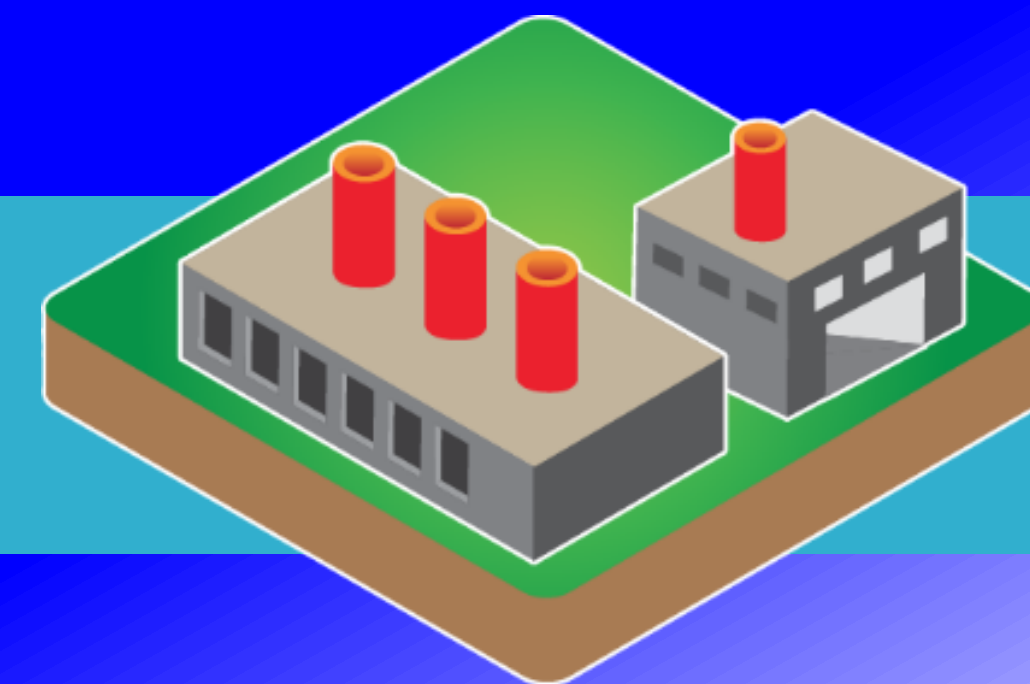
## Headquarter Economies (G7)

High Knowhow  
Labour High wages



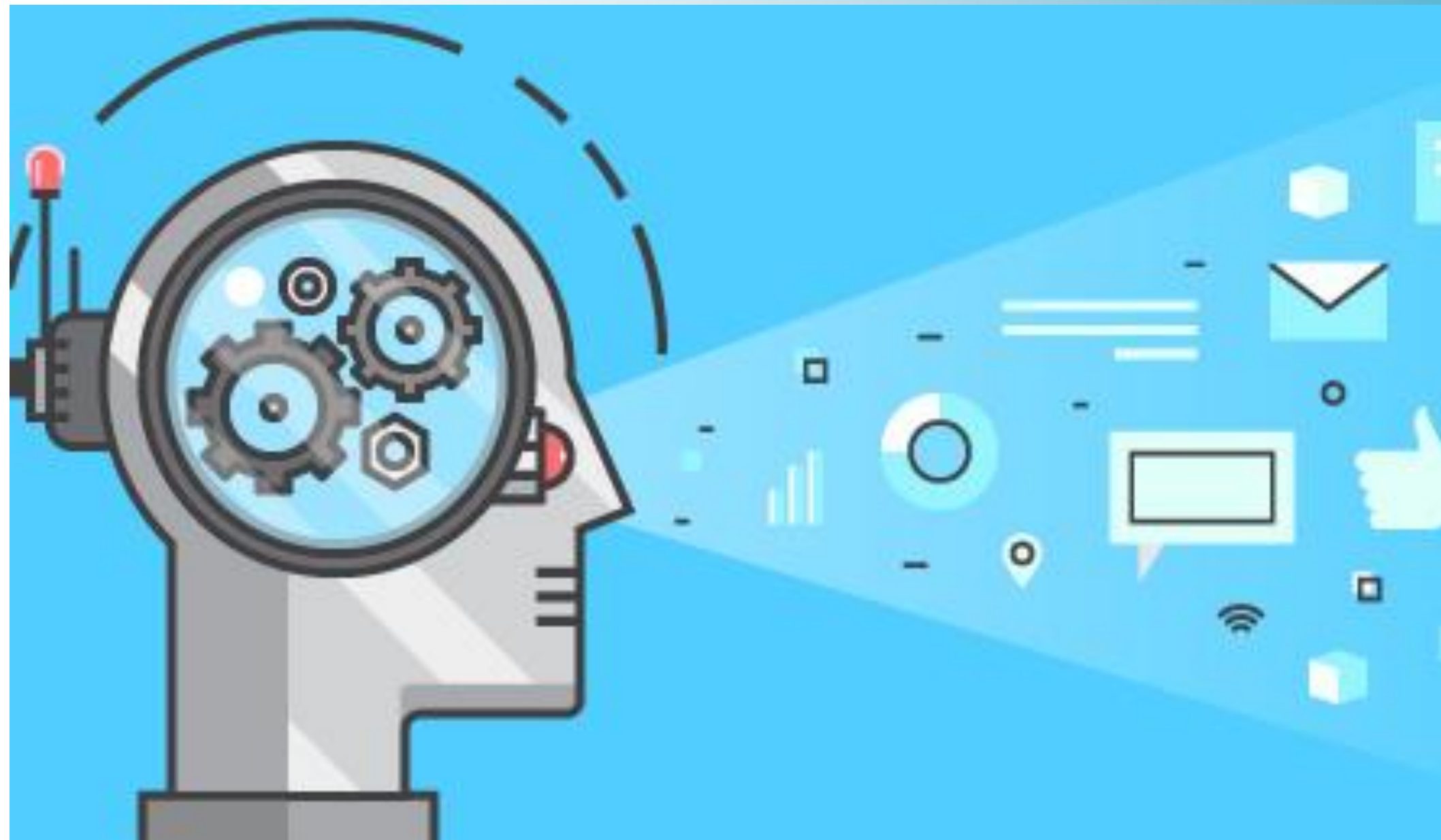
## Factory Economies

Low Knowhow  
Labour Low wages



*High Tech + Low Wages revolutionises world manufacturing*

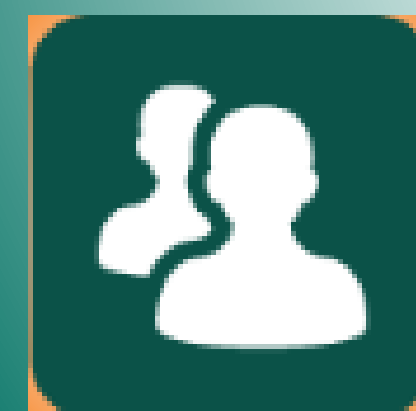
Digital Technology lowers face2face costs,  
making remote workers less remote; 3<sup>rd</sup>  
unbundling begins?



Lower



Lower



Lower

Digital technology has opened a 'pipeline' for arbitrage: "Telemigration"

## Headquarter Economies (G7)

High  $\frac{\text{Knowhow}}{\text{Labour}}$

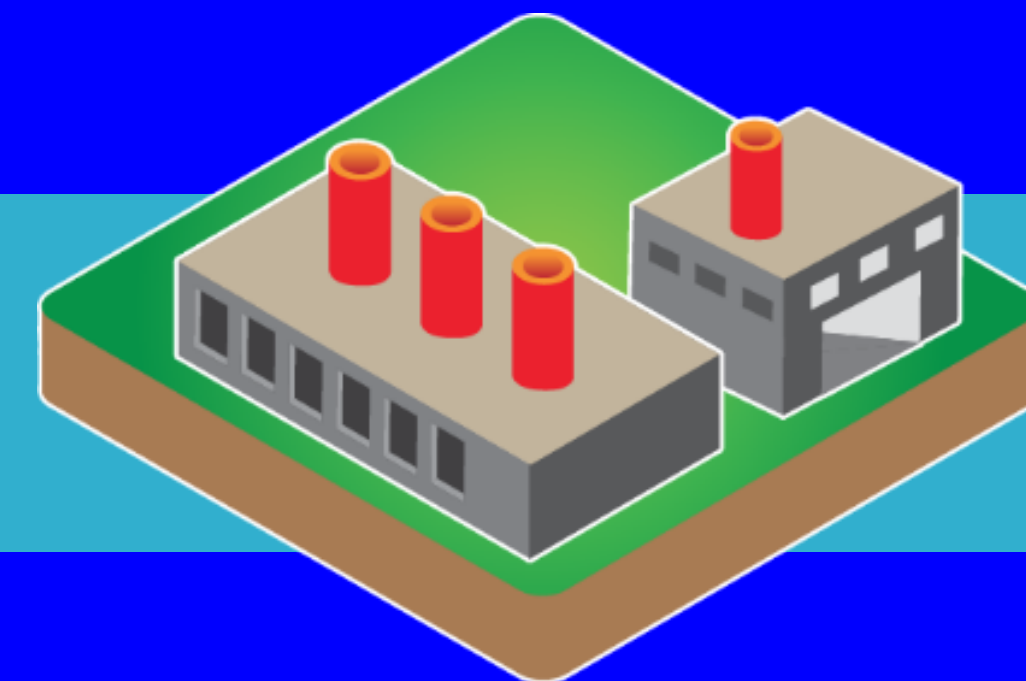
High wages



## Factory Economies

Low  $\frac{\text{Knowhow}}{\text{Labour}}$

Low wages



# Tele-migration

People in one  
nation & working  
in offices in  
another



International wage differences  
make telemigration profitable

Digitech makes it possible

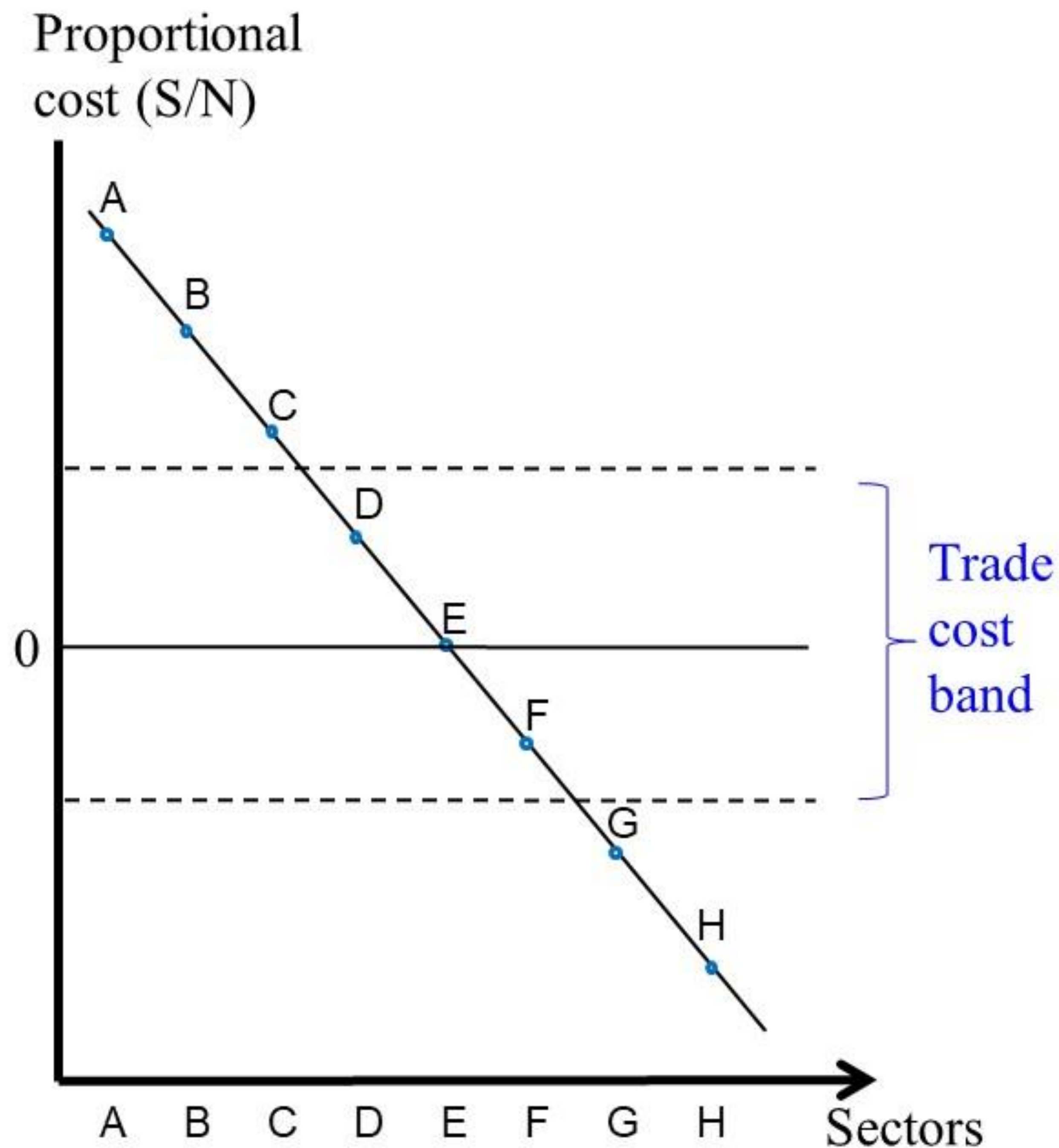


# Digitech enables tele-migration

1. Domestic remote work paves the way.
2. Online “match making” platforms.
3. Advanced telecomms.
4. Machine translation.

How digitech makes  
manufacturing jobless  
& services freely traded

# Tradability by sector



# Digitech impact on manufactures

Assume:  $c_i^n = w^n a_i^n + r$

$w^n a_i^n \equiv$  unit labour cost

$r \equiv$  all other inputs (same in all nations).

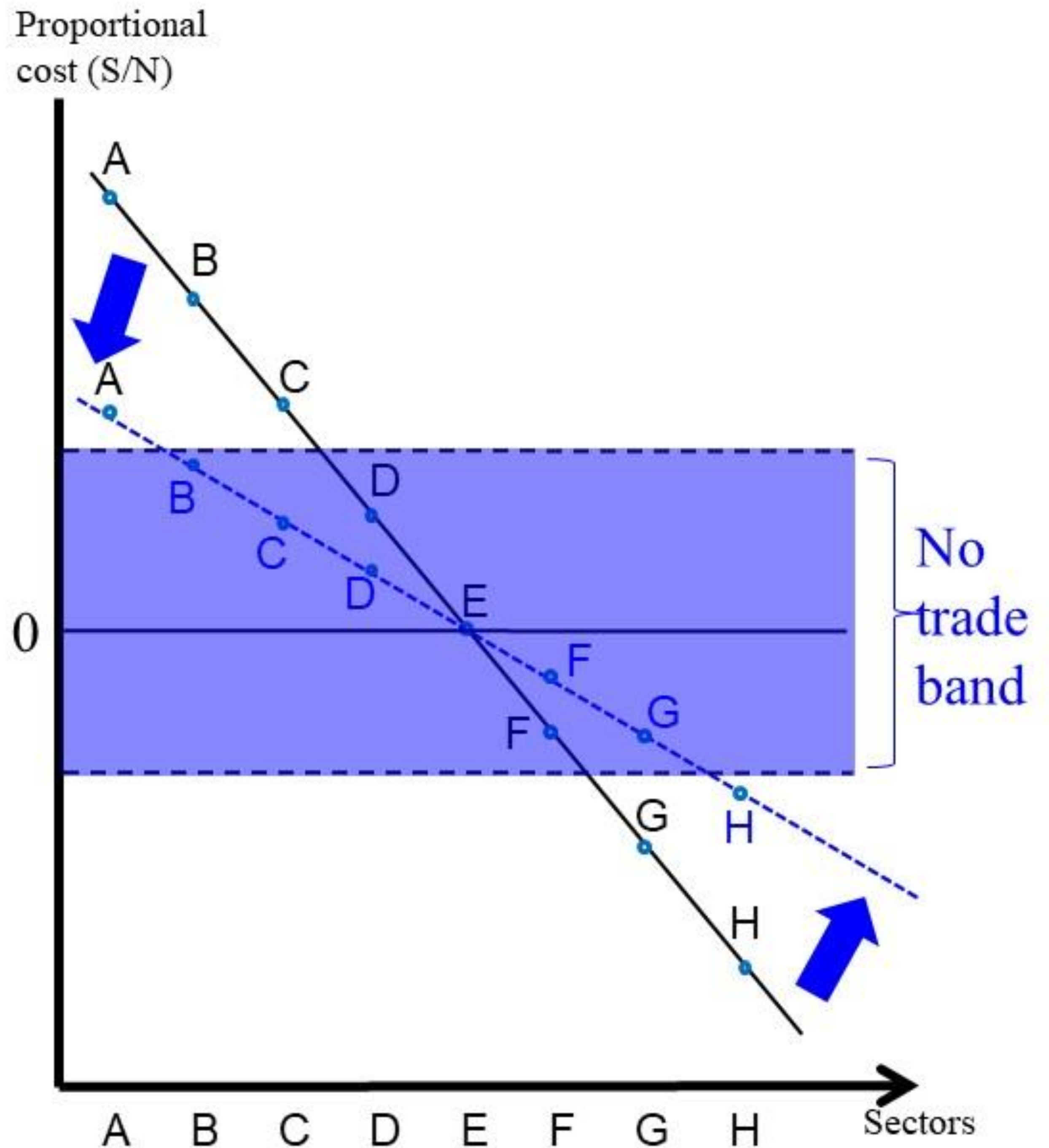
Cost difference North vs South is:

( $\theta_L$  is labour cost share)

$$\frac{c_i^n - c_i^s}{c_i^n} = \theta_L \left( 1 - \frac{w^s a_i^s}{w^n a_i^n} \right)$$

Digitech lowers labour cost share to (towards) zero, for all goods

$$\frac{c_i^n - c_i^s}{c_i^n} = \theta_L \left( 1 - \frac{w^s a_i^s}{w^n a_i^n} \right)$$

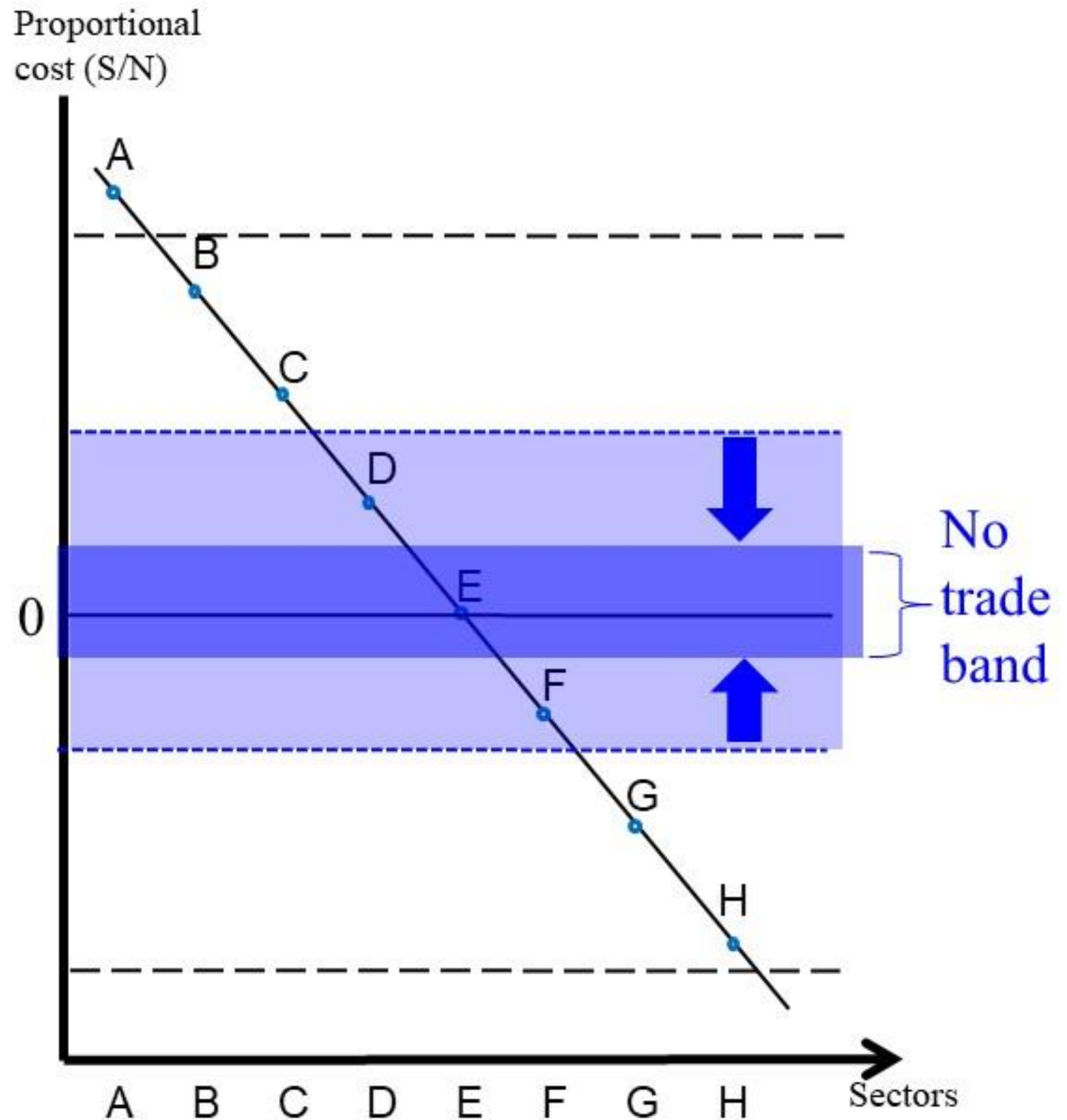


# Manufactures become:

- Nontraded (locally produced)
- Jobless

Services:  
Digitech makes  
remote workers  
less remote

Services become  
traded



# Development conjectures



Think of development as a transition between steady state growth paths (Roy 2000)

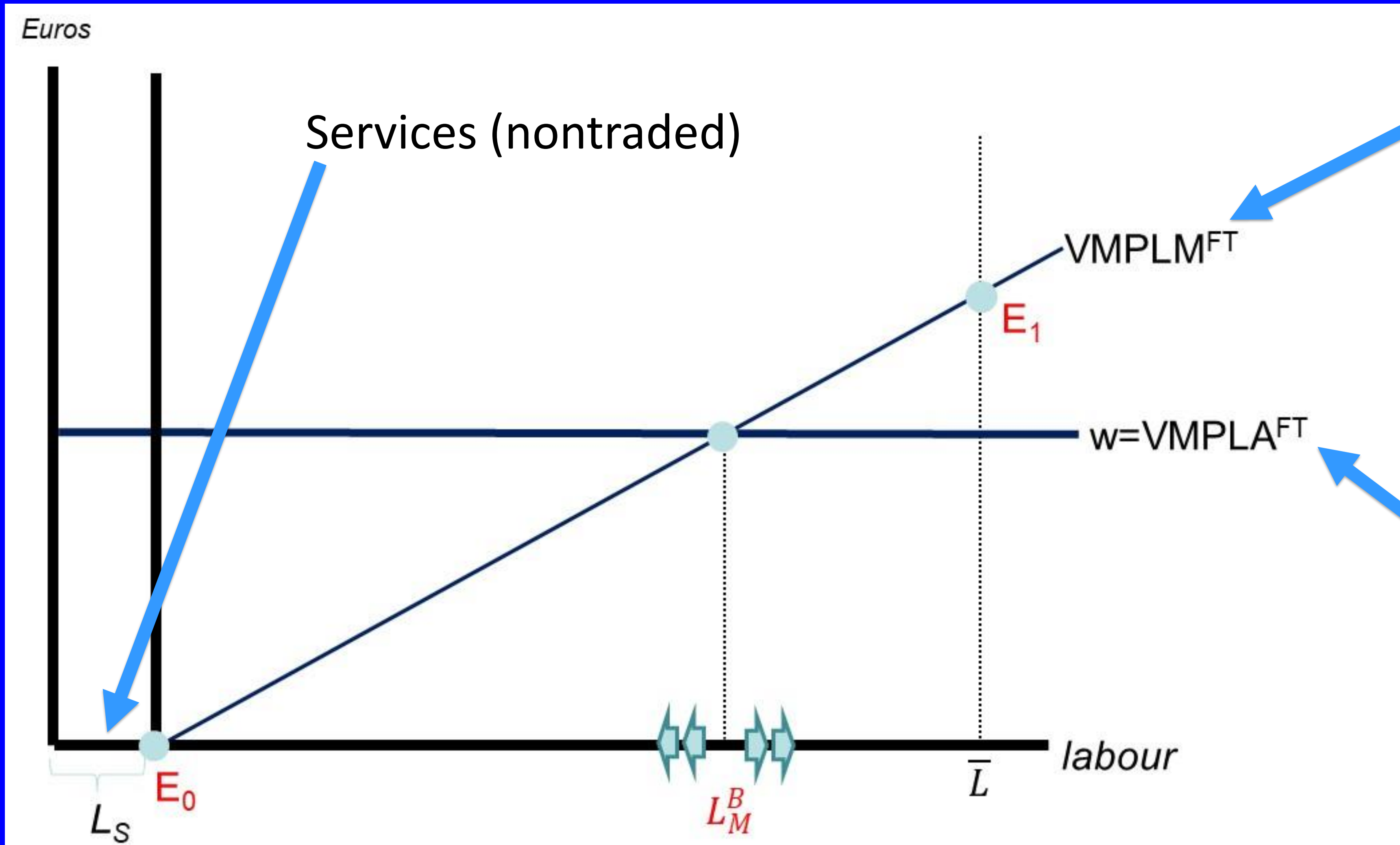
- From slow growth since poor;
- To slow growth since rich

Traditionally, the transition involved  
“industrialisation”

Since WWII, export-based  
industrialisation

Why? How?

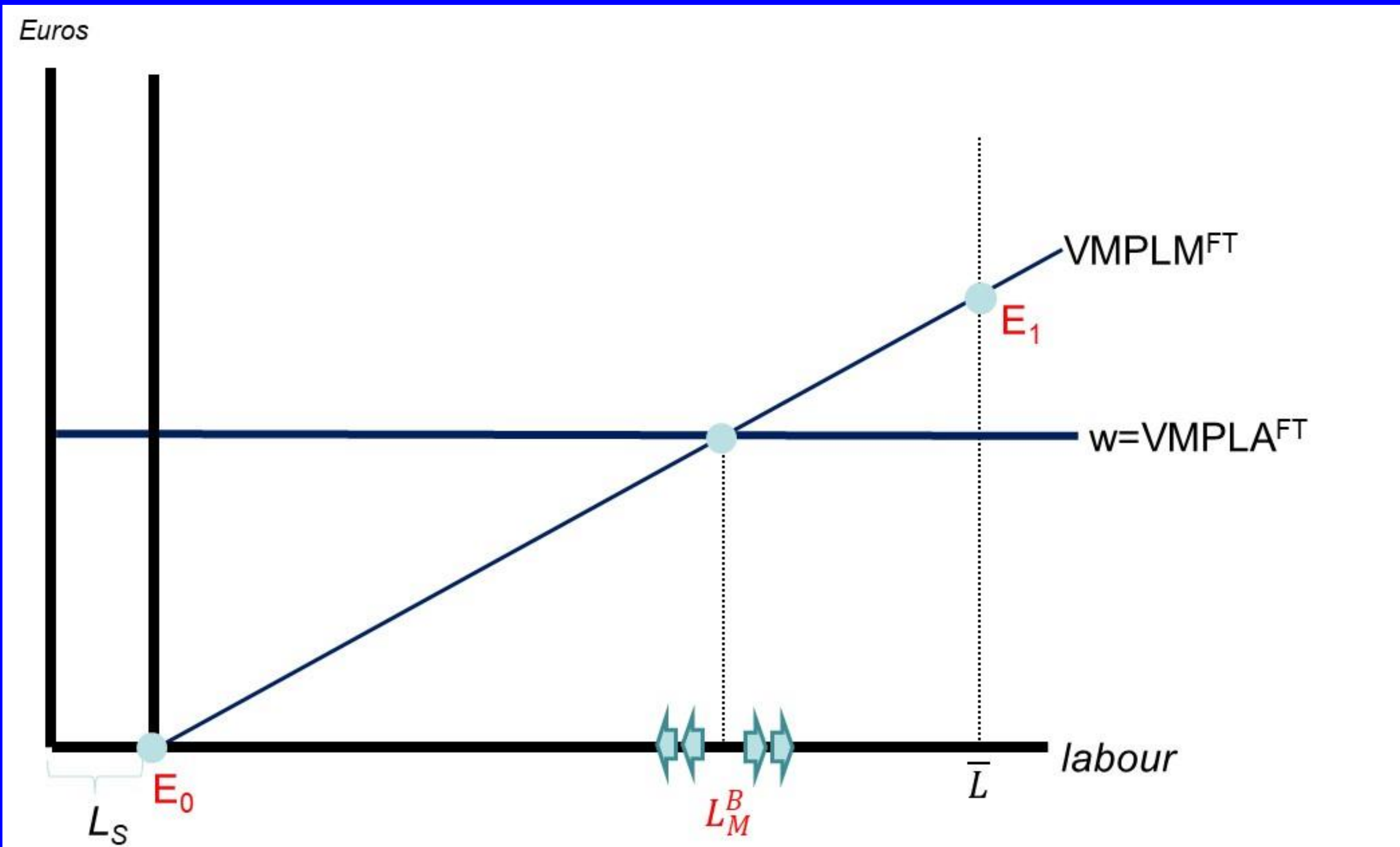
# Labour allocation with free trade



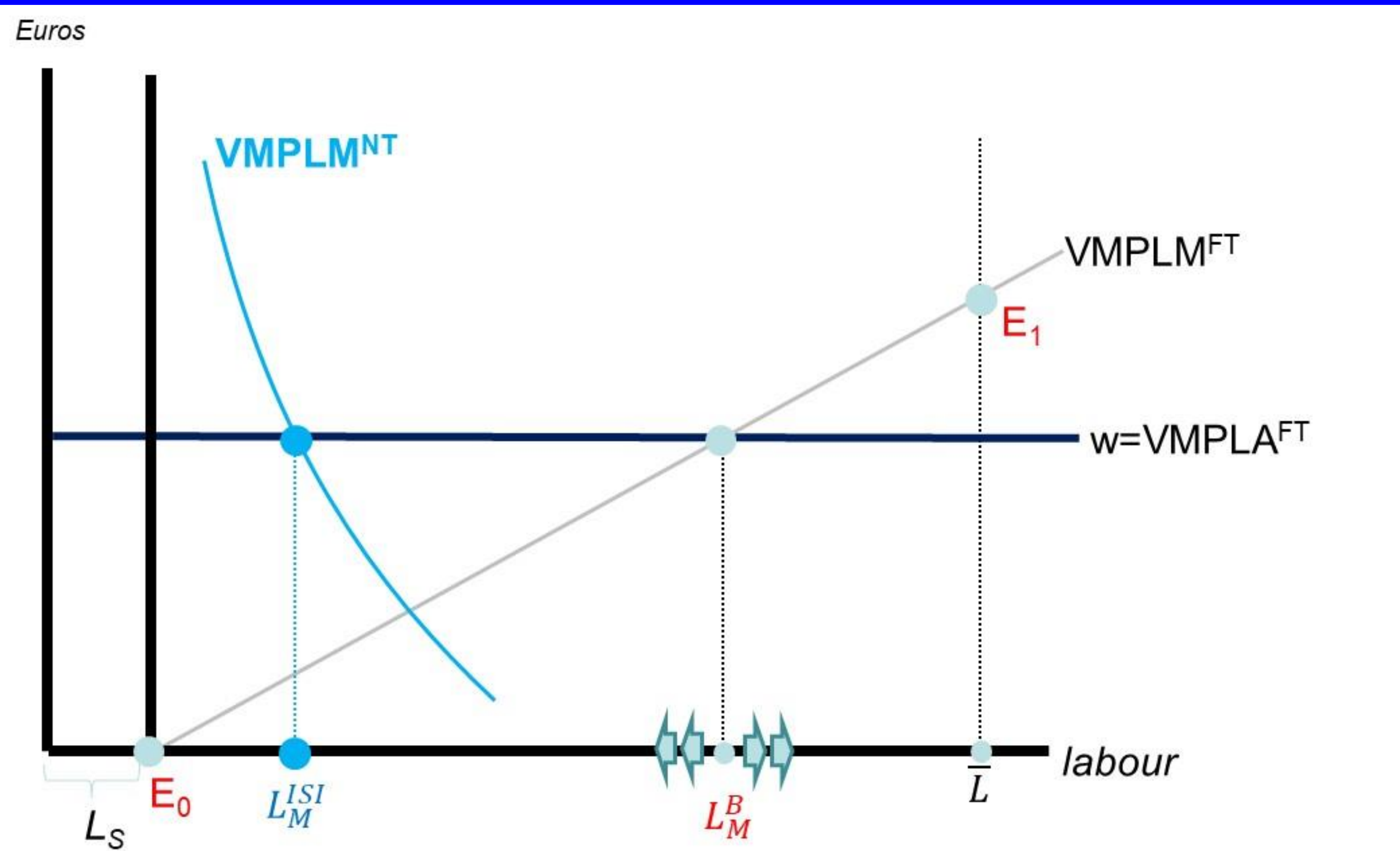
Value of Marg'l Prod. of Labour (MPL) in Manuf (external economies of scale)

VMPL in Agriculture (Constant Returns to Scale)

Development = move  $E_0$  past  $L_M^B$

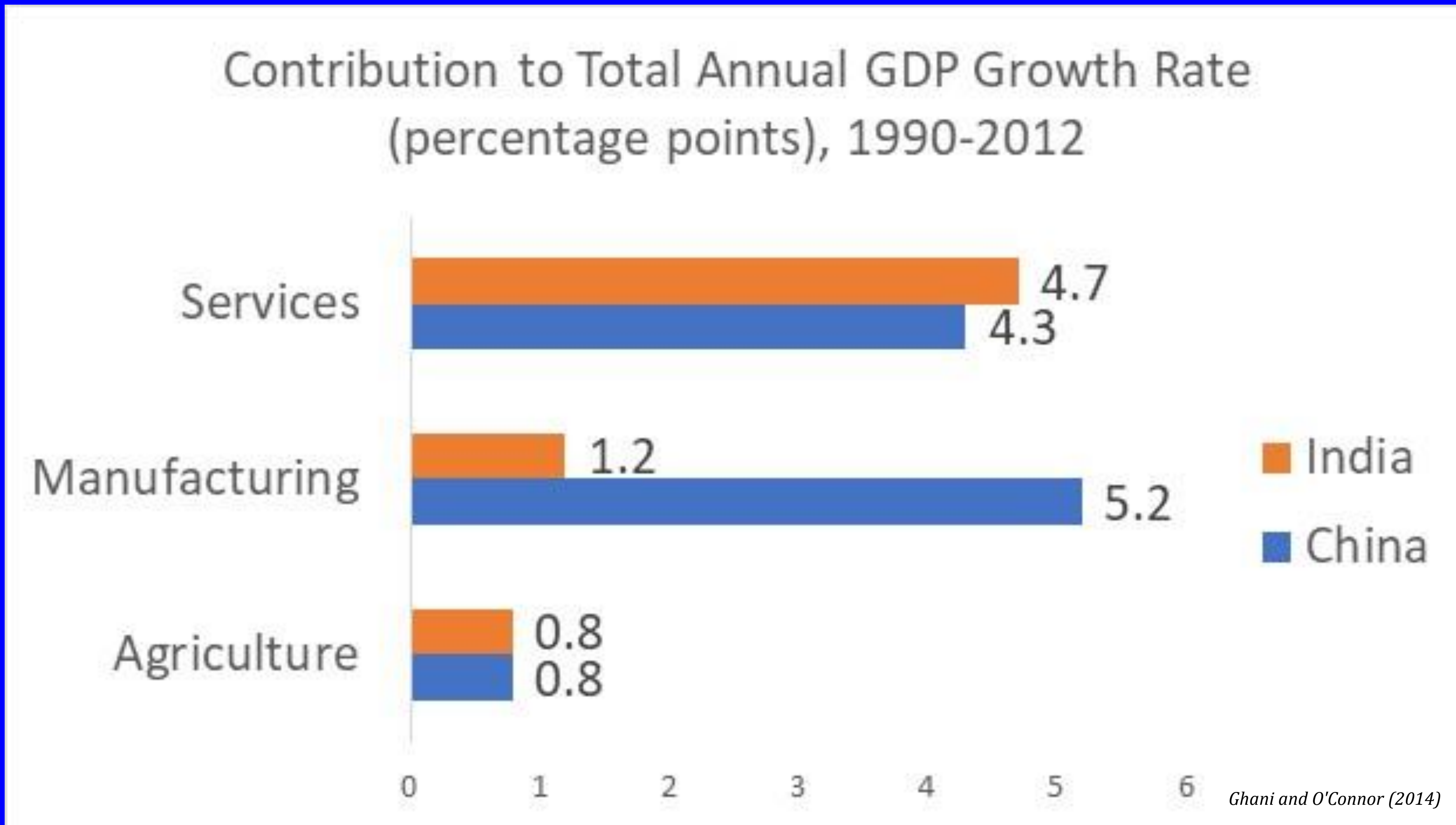


# ISI, big push, etc



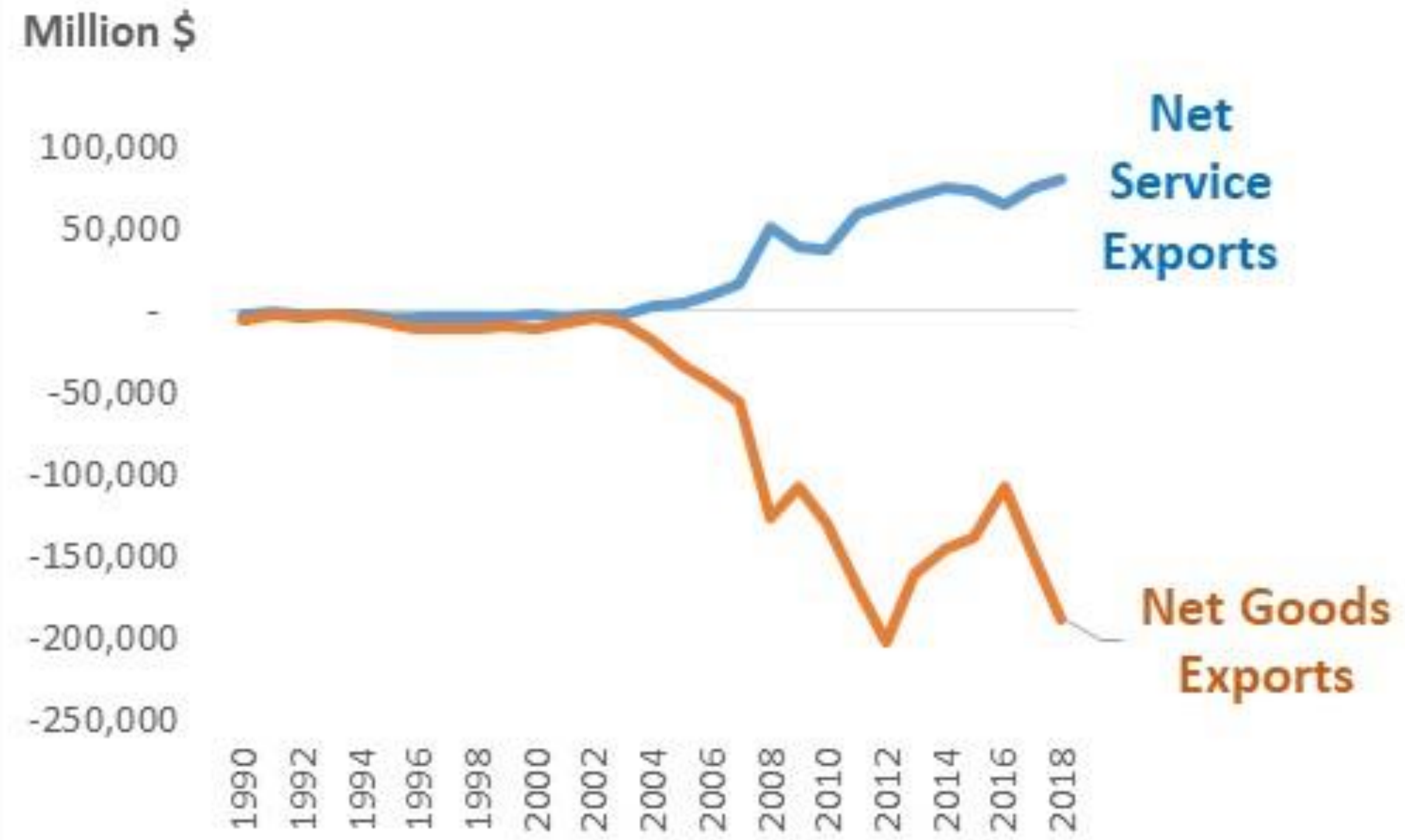
# India & China contrasted

# India v China, Growth Sources

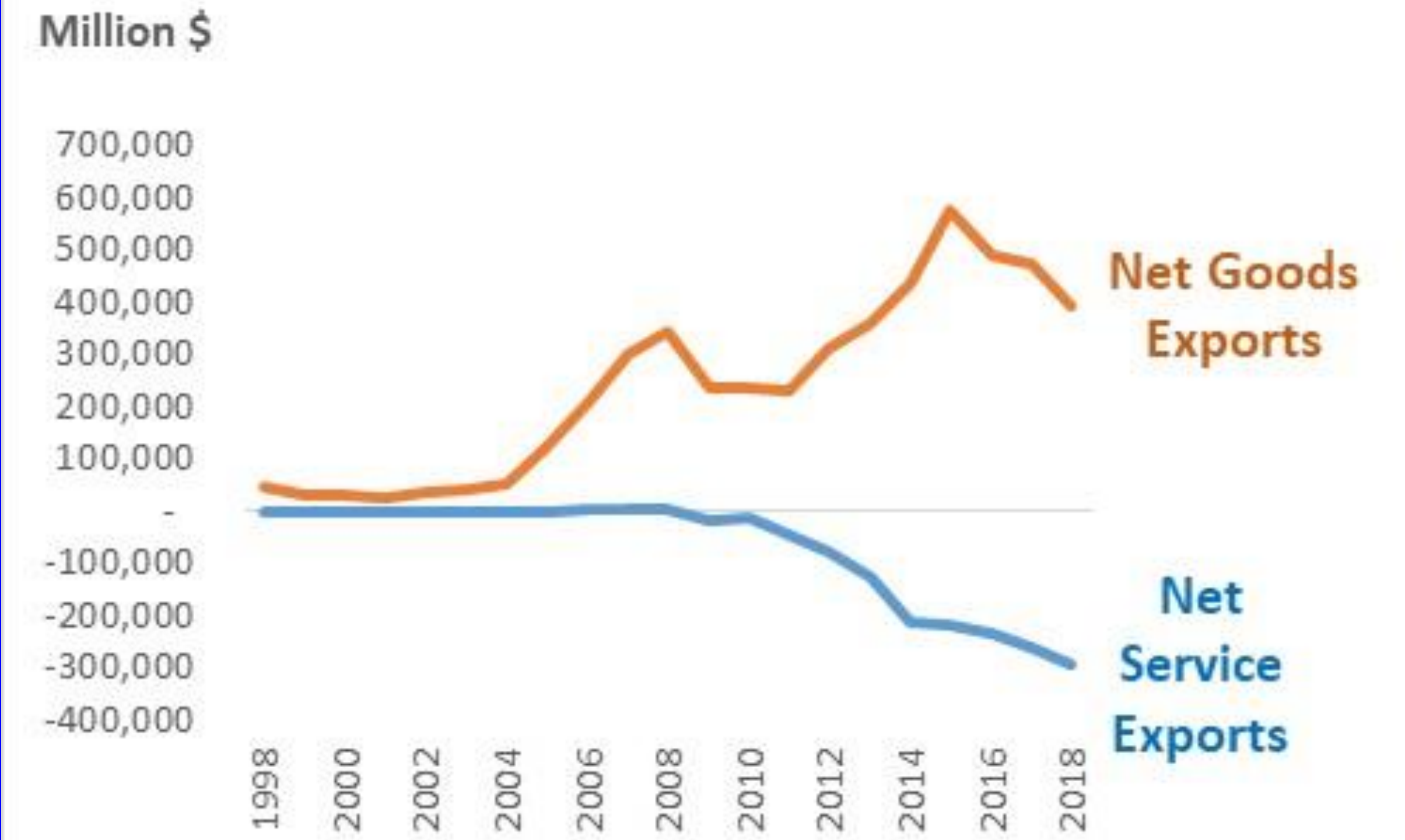


# India v China paths, Net Trade

## India, 1990 - 2018

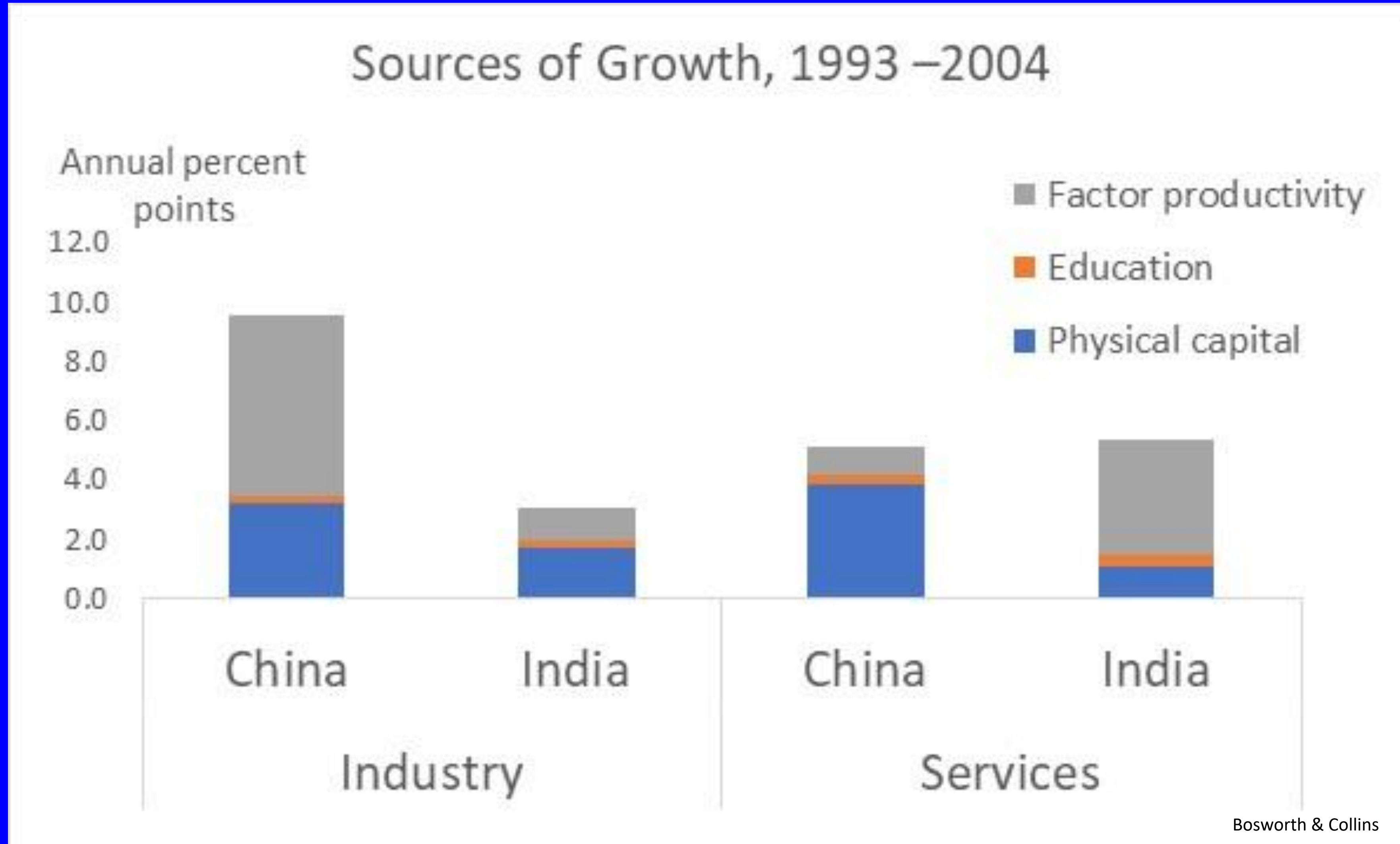


## China, 1998 - 2018

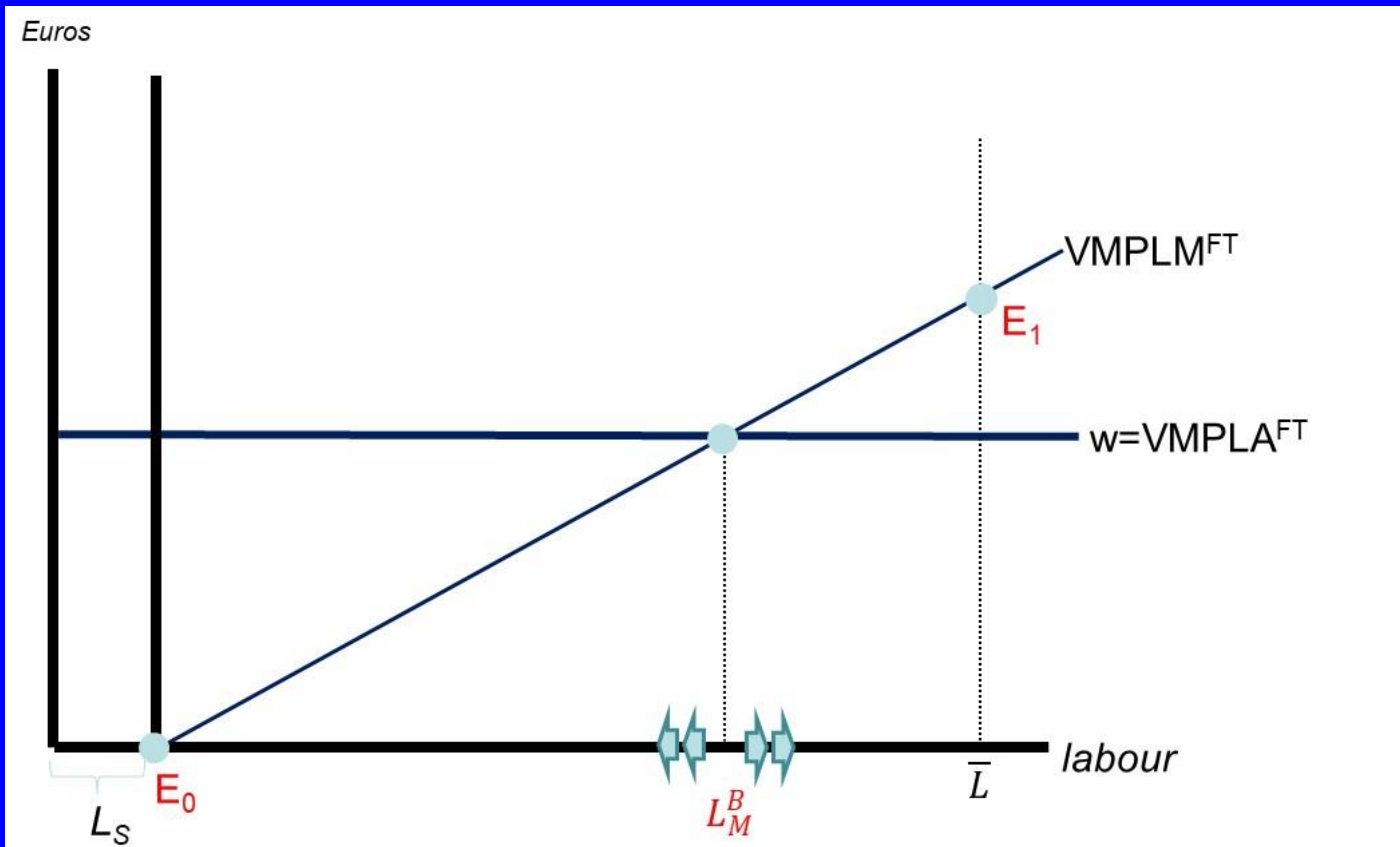




# India v China paths, Drivers



# China (M-led) vs India (S-led)





**Policy**

**conjectures**

**1**

**The Emerging Market miracle  
will continue and spread**

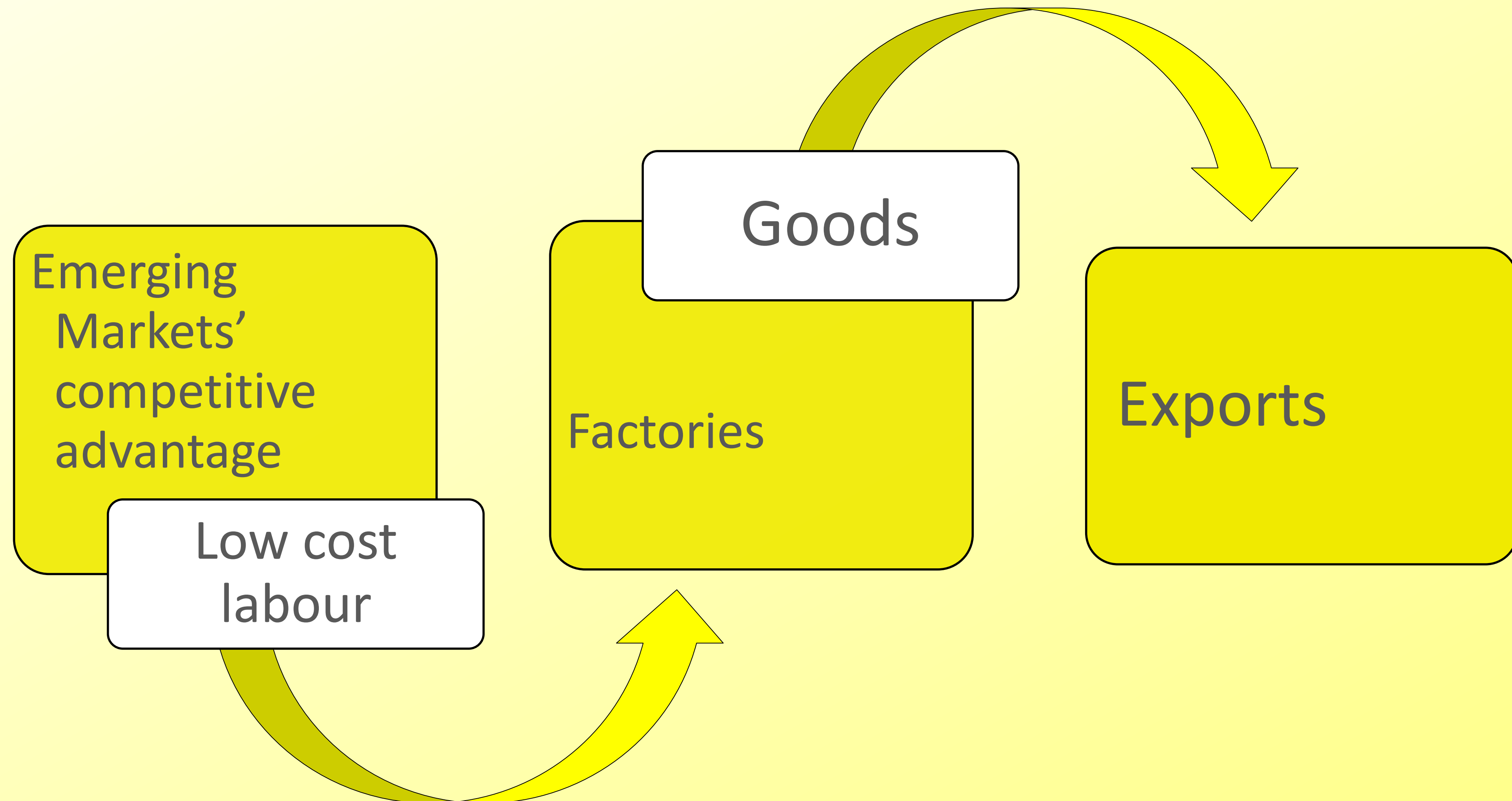
# **Different structural transformation**

**“Service-led” development, not  
“manufacturing-led” development**

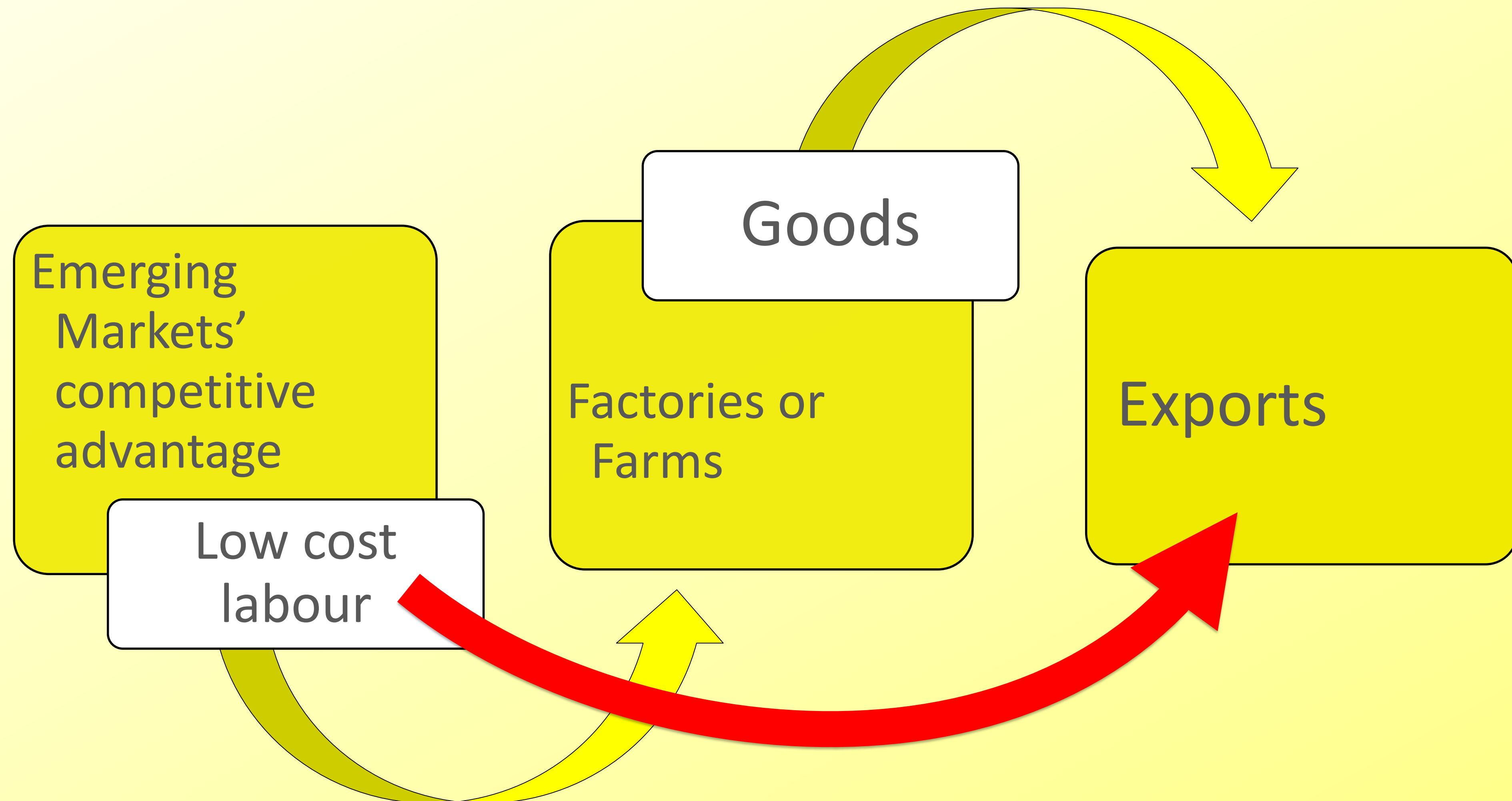
# **Same comparative advantage**

**Emerging Markets' true competitive advantage is quality-adjusted low-cost labour**

# Before the advantage was “filtered” through goods, making development difficult



# Digitech will allow Emerging Markets to export their advantage directly





**2**

**New role models will emerge**

- Think India, not China**
- Think “Service Value Chains”,  
not GVCs**

# **NB: Services are easier**

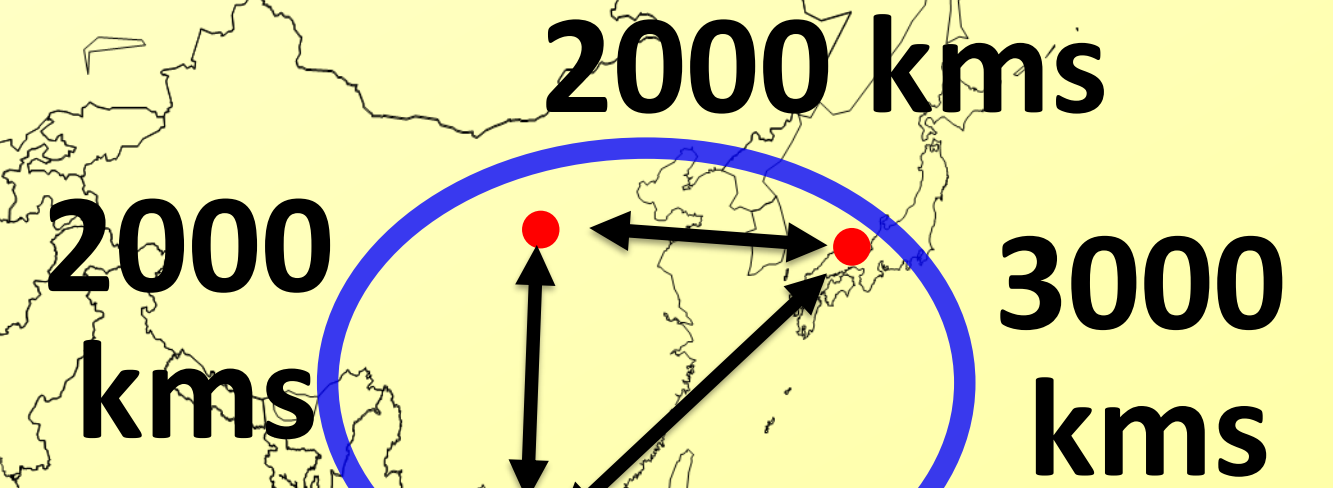
- 1. Lower scale economies**
- 2. Less complex supply chains & logistics**
- 3. Geographic distance matters less**

# Geography matters for manufacturing

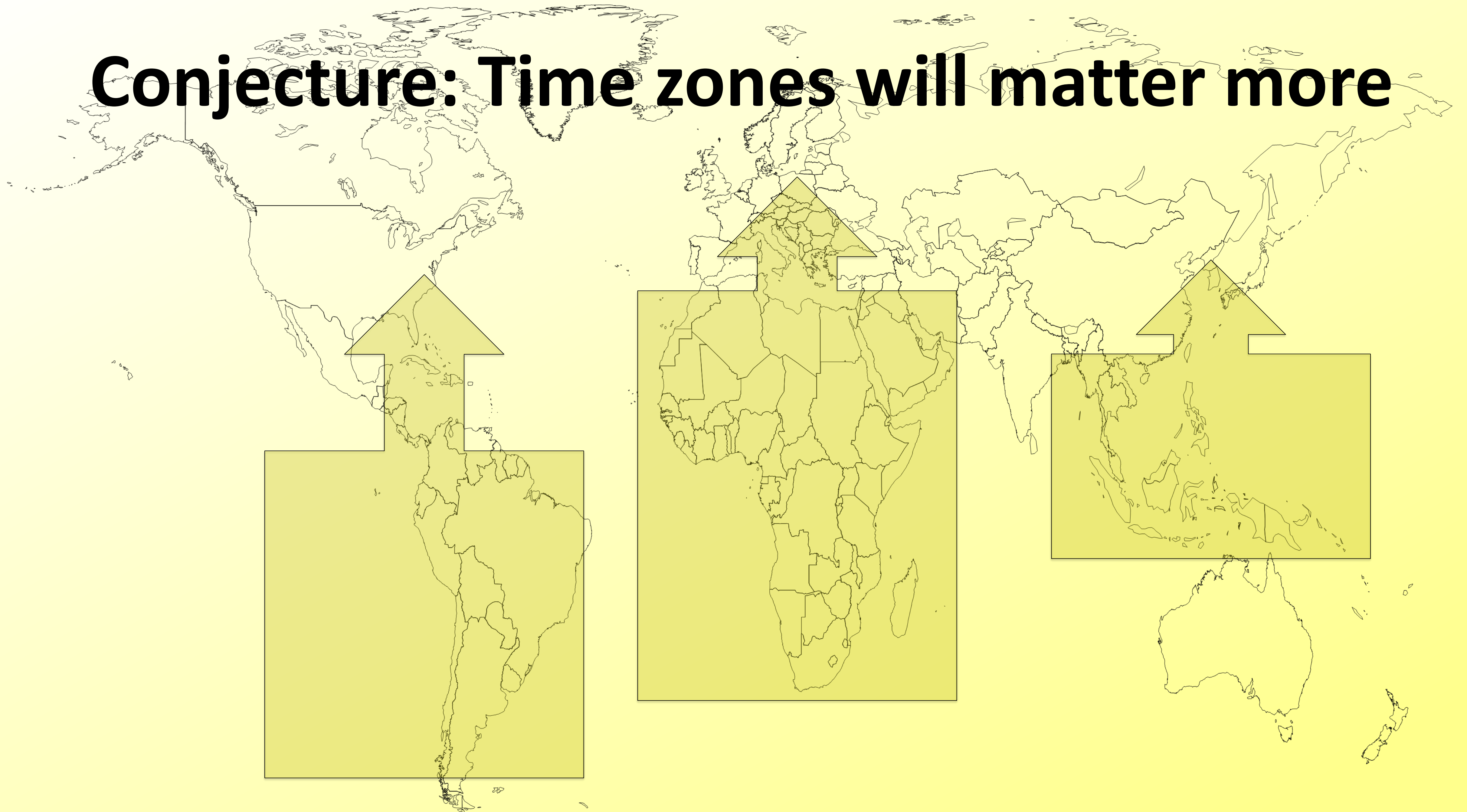
Factory N.Amer.  
(19%)

Factory Europe  
(20%)

Factory N.E. Asia  
(38%)



# Conjecture: Time zones will matter more



**3**

**New, national development strategies will be needed**

# **New Development Strategies**

**Think cities, services, and training**

**Not factories, industrial equipment,  
and technology**

**4**

**Telemigration will foster a new  
backlash against globalisation  
in advanced economies**

Thanks  
for  
listening

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yet on the new  
economic era'

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