



# 講演3

## Presentation 3

### Handout

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March 22, 2019

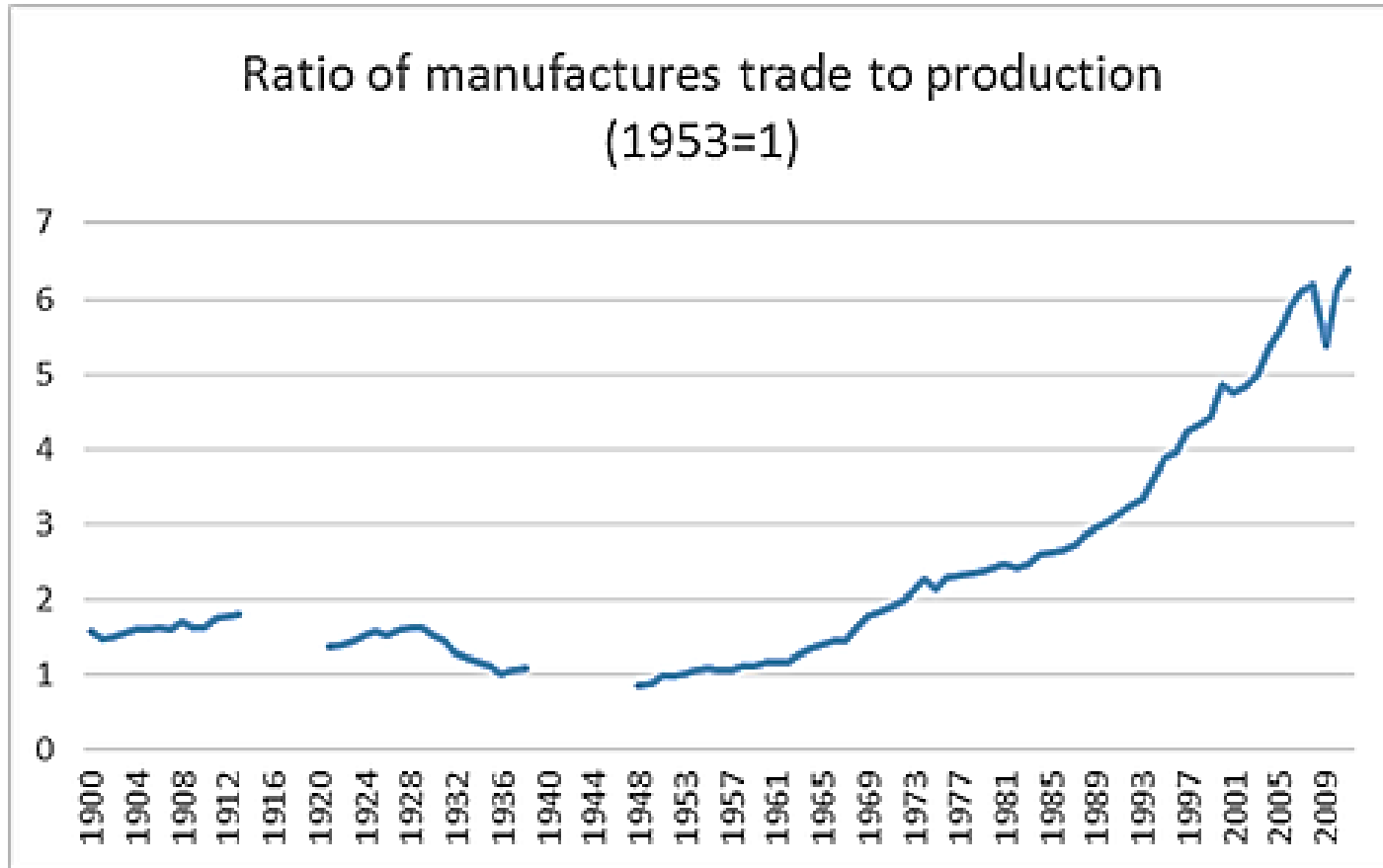
# **A New Era of World Trade? The Role of Robots**

Dalia Marin

University of Munich and CEPR

RIETI-CEPR Symposium  
Post-Brexit World Economy  
Tokio, March 2019

# We live in an Era of Hyper-Globalization



Source: <https://krugman.blogs.nytimes.com/2013/09/30/should-slowing-trade-growth-worry-us/>

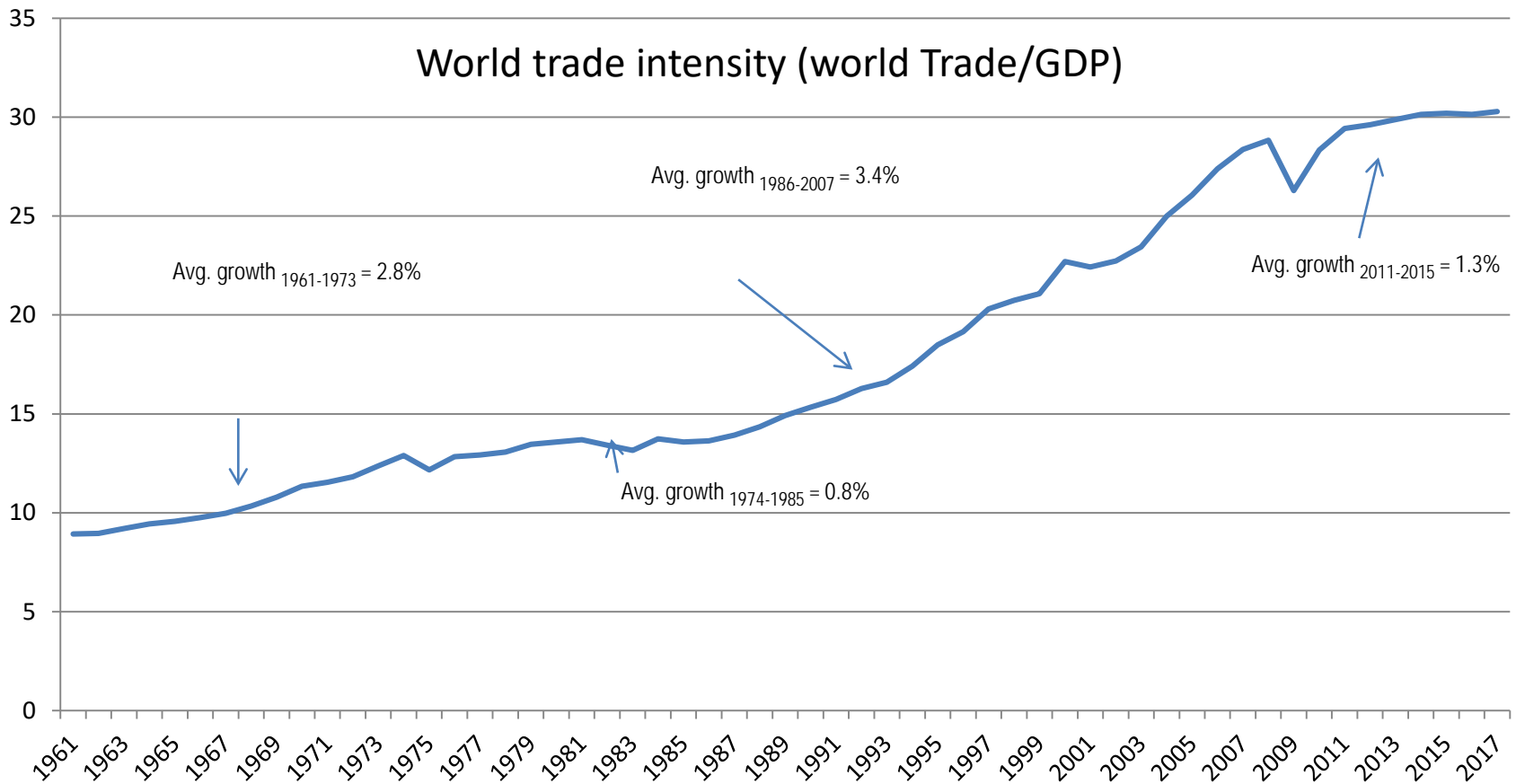
# **Three waves of Trade Liberalization**

**First Wave 1950-80: liberalization in industrialized countries**

**Second Wave 1980-2009: opening up of developing countries**

**Third Wave, Hyper-Globalization, since 1990: the rise of global value chains**

# But, since 2011 trade openness is stagnating...



Note: measured at market exchange rates in constant 2010 US dollars. World Trade is the average of world imports and exports

Source: OECD Economic Outlook Database 99, June 2016.

© David Haugh, Economics Department, OECD

# What Explains the Trade Slowdown?

# **The Trade Slowdown: Three Candidate Explanations**

**Reshoring**, global value chains stop to grow

**Slow investment growth**

**Inward-looking China**, switch from exporting to consumption

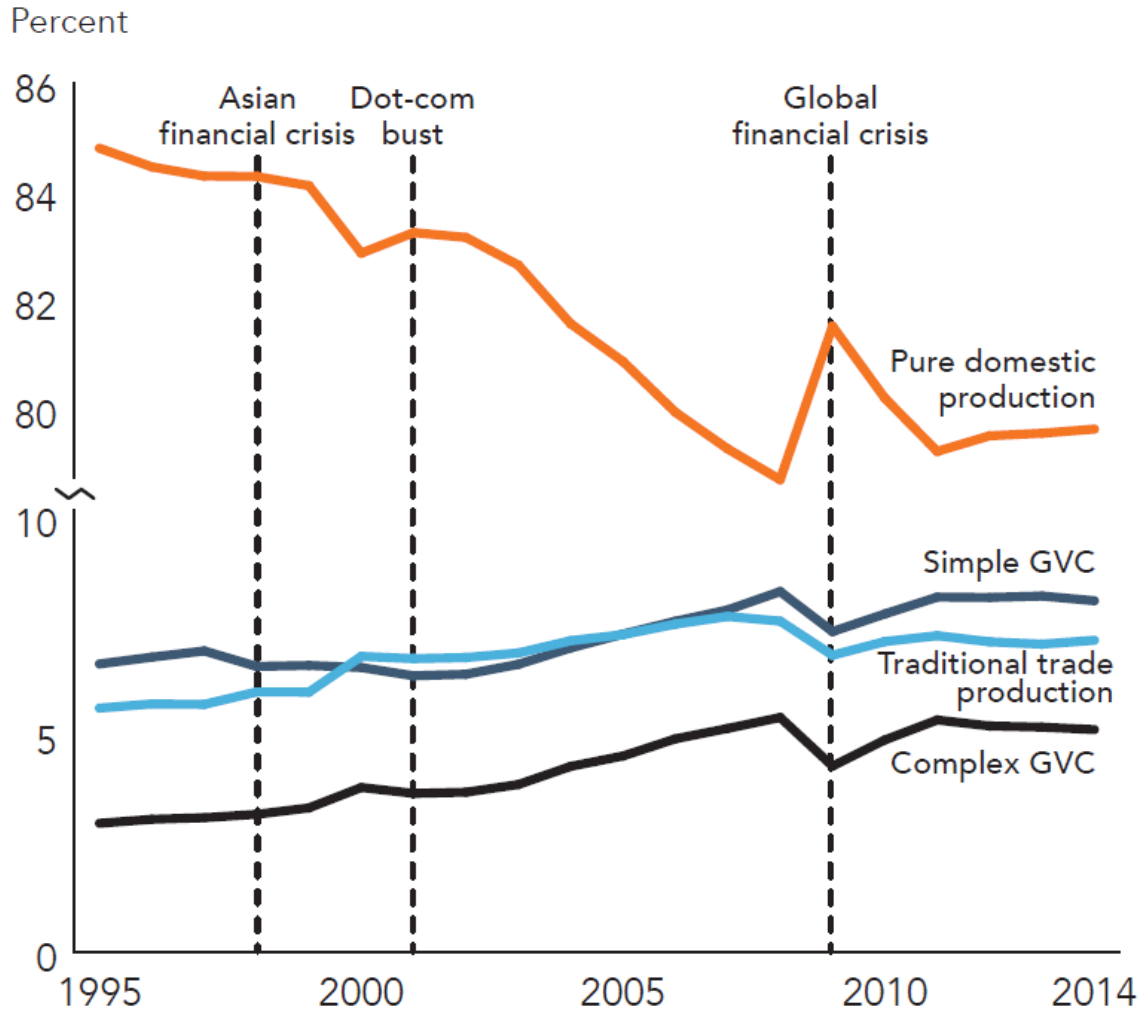
# **In this presentation...**

Focus on Global Value Chains.

Can we find Evidence for Reshoring?



# Global Value Chains are expanding until the Financial Crisis



Source: University of International Business and Economics global value chain indexes derived from the 2016 World Input-Output Database.

**Why have Global Value Chains stopped to grow?**

# Hypothesis 1

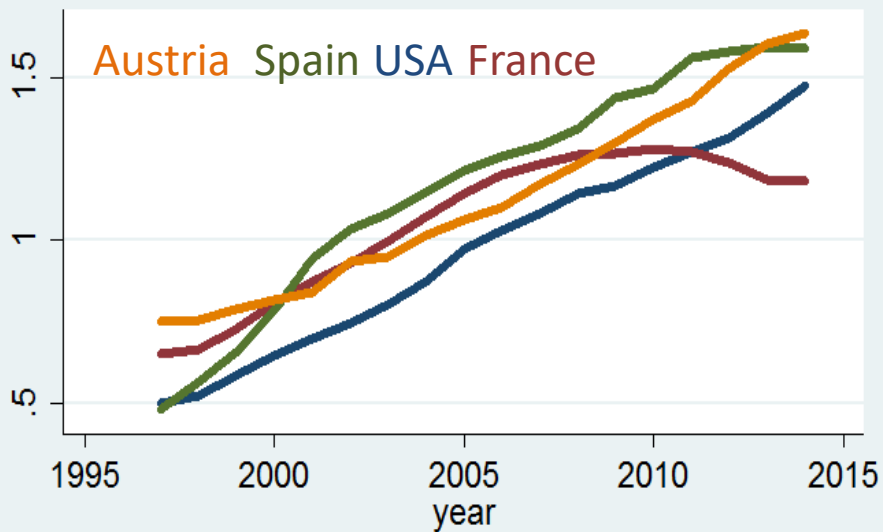
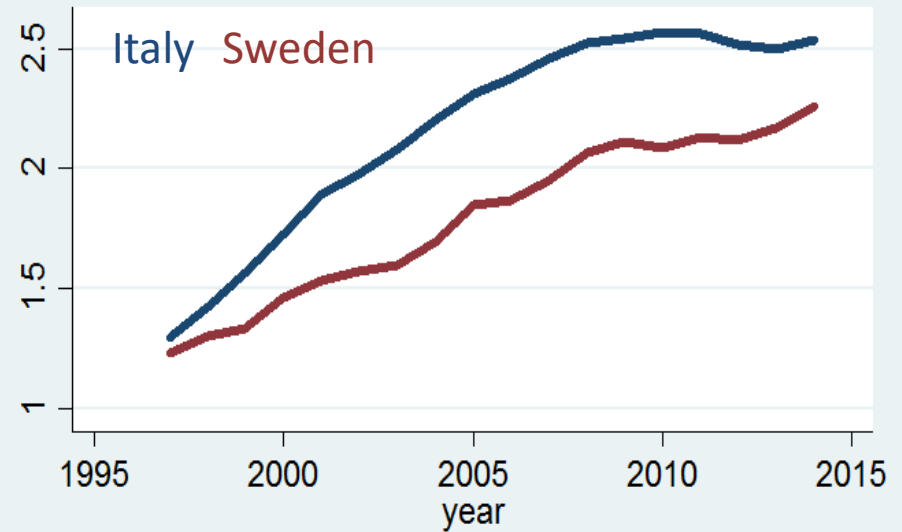
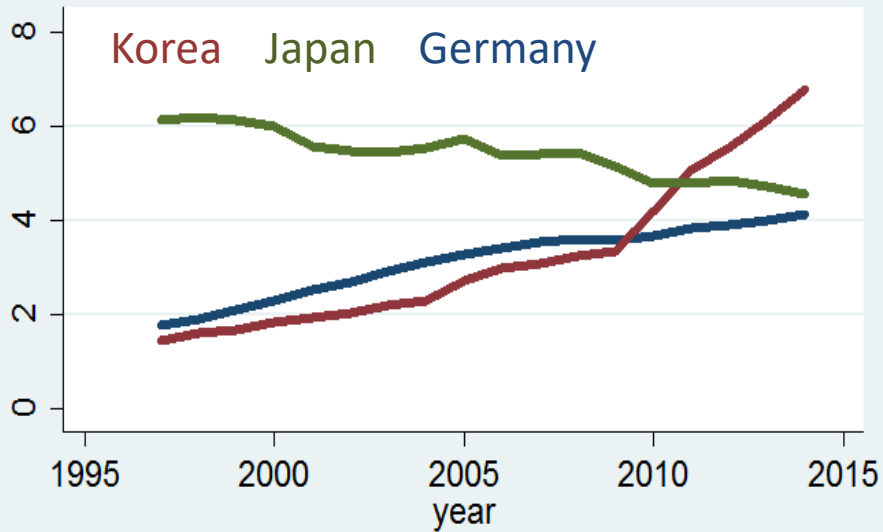
**A revival of manufacturing in rich countries**

Robots will bring manufacturing back to the rich countries as machines are replacing workers and the cost of labor will not matter much.

**How important  
are Robots in Industrialized Countries?**

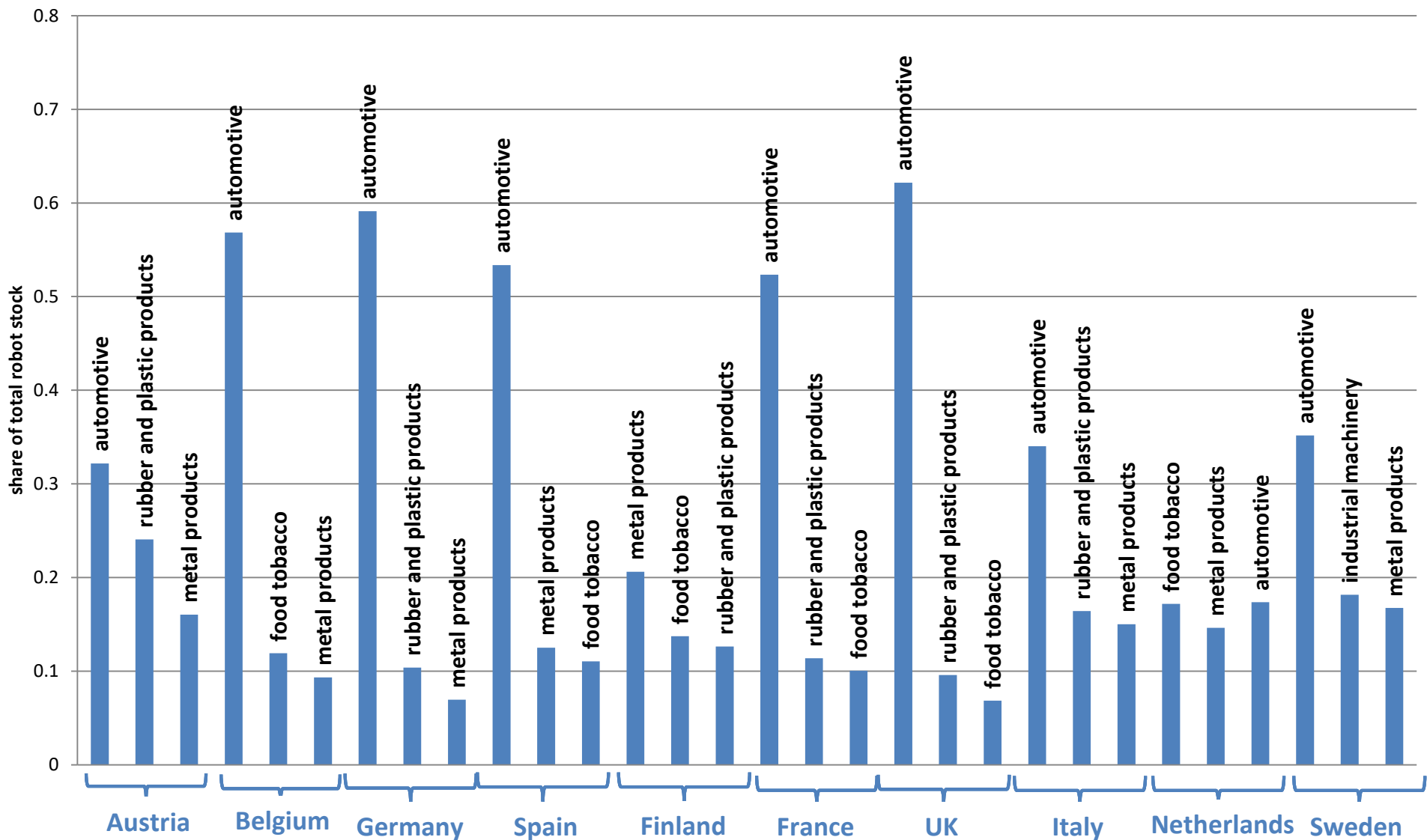
# Robots in Industrialized Countries

## Robots per 1000 Employees



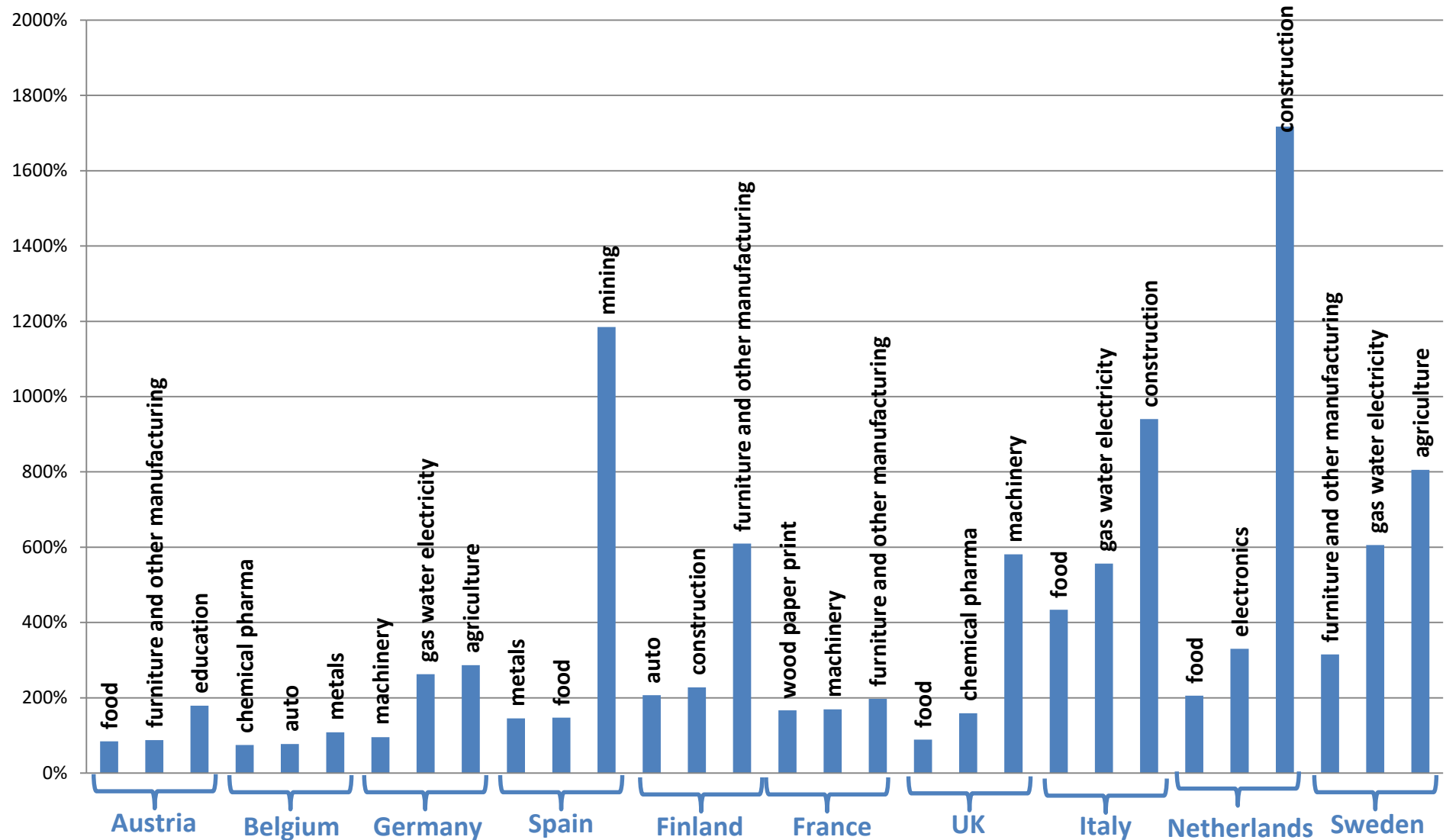
What explains the Difference across  
countries?

# Top 3 robot employing sectors in 2014



# Growth in robot intensity 2007-2014

## top 3 sectors



\*robot intensity is measured as sectoral number of robots per thousand employees



# **Global Value Chains GVS**

# Measuring GVS

Imported Inputs in total inputs used by a sector

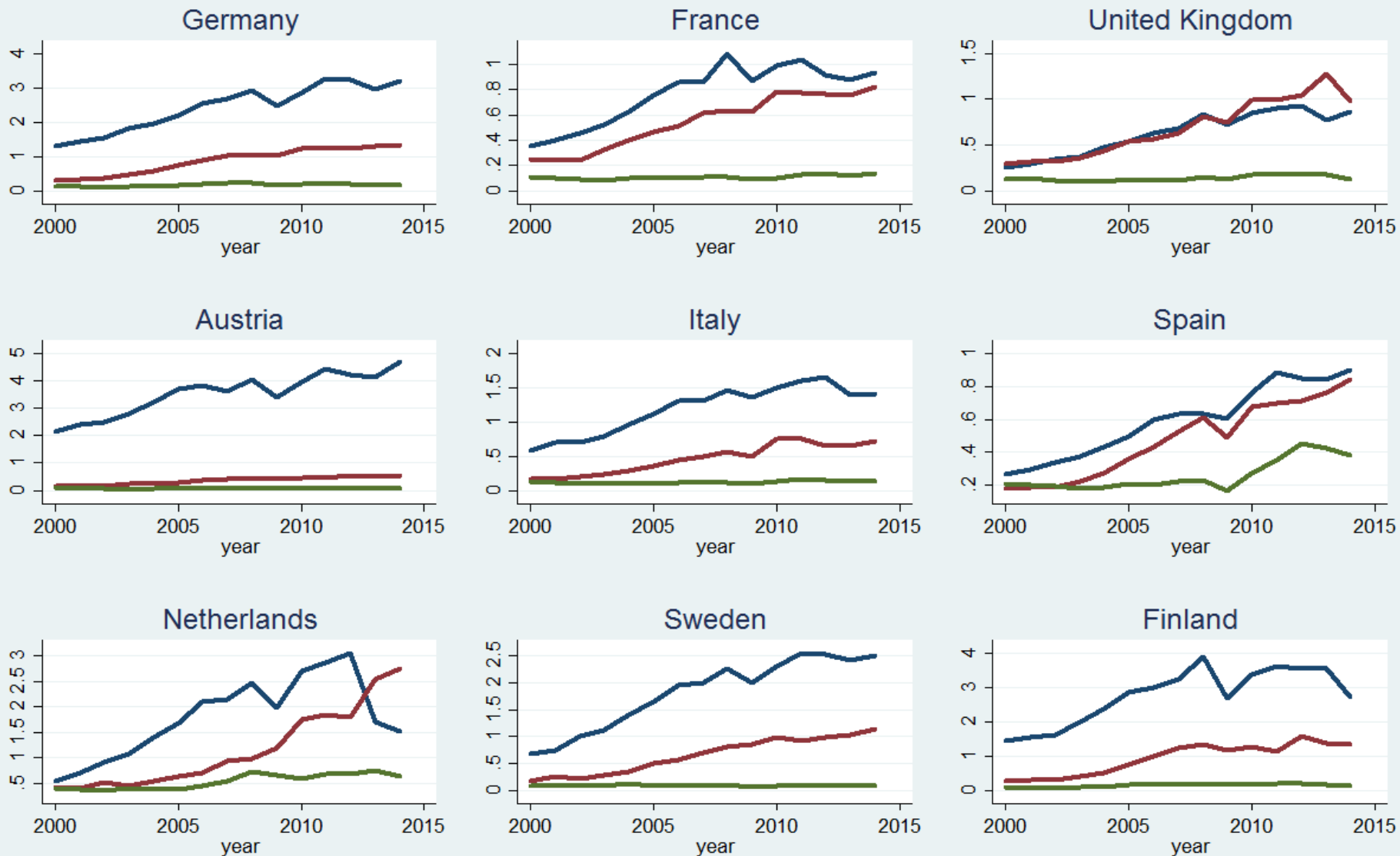
Idea: relocation to low wage countries leads to the import of inputs from this region (before produced at home)

Offshoring increases the import of inputs

Reshoring lowers the import of inputs

# Offshoring to Low Wage Countries

## Imported Inputs in Total Inputs in Percent

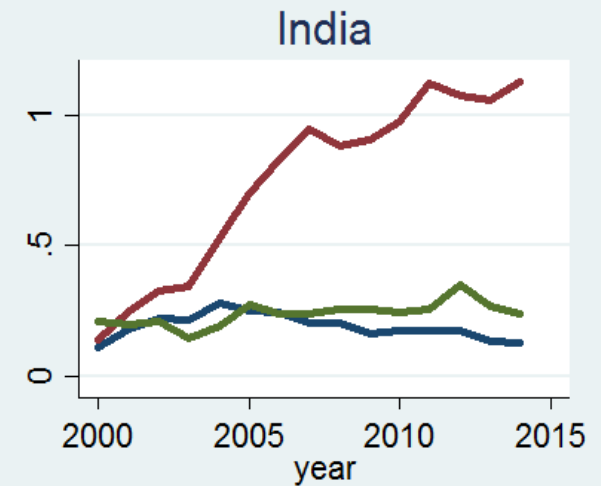
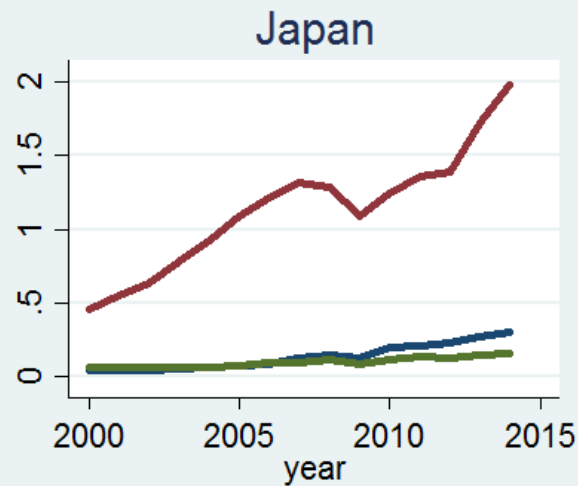
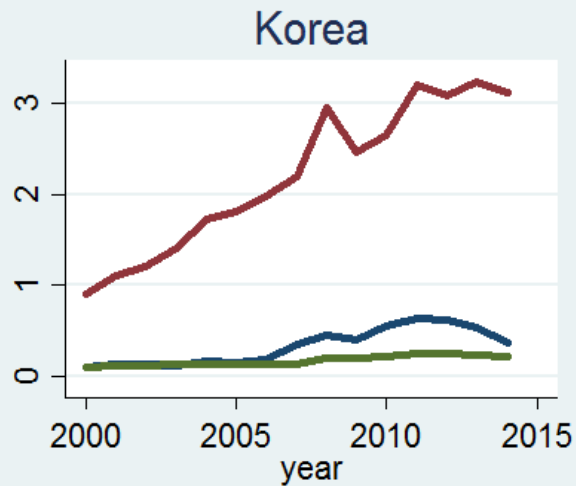
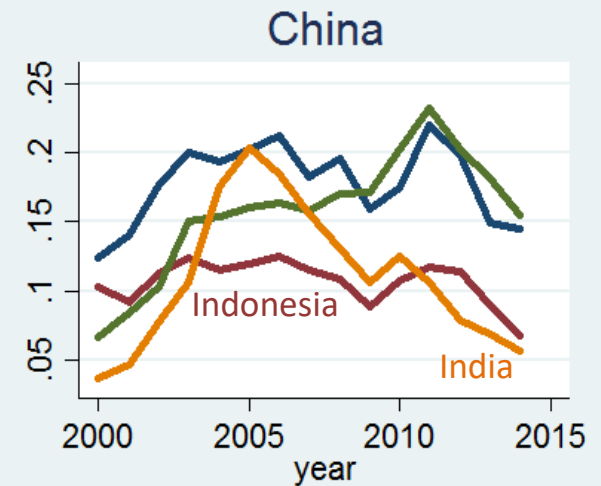
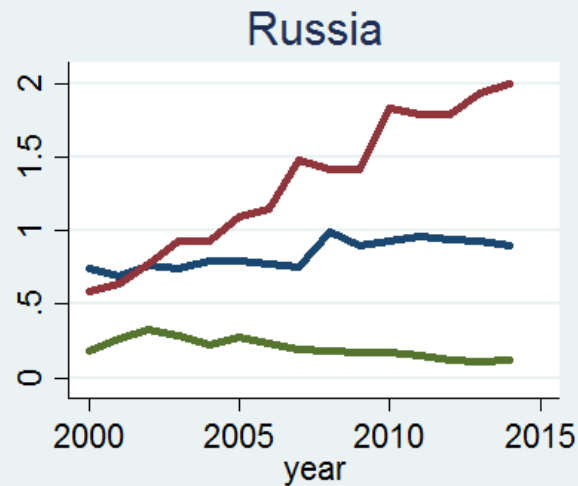
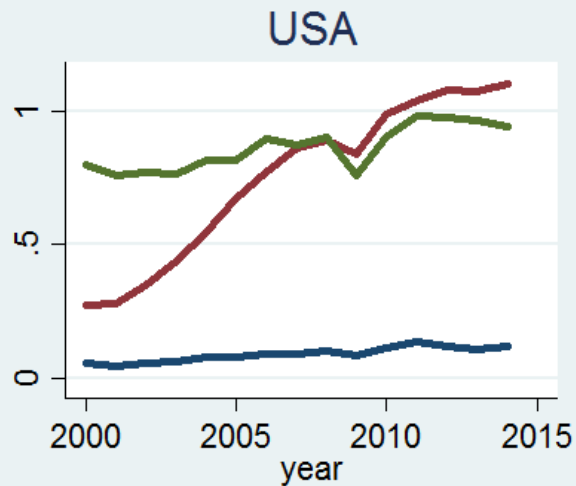


Eastern Europe contains Poland, Czech Republic, Slovakia, Slovenia, Hungary, Ukraine, Croatia, Serbia, Bulgaria, Latvia, Estonia, Lithuania, and Romania.

— Eastern Europe  
 — China  
 — Mexico, Brazil

# Offshoring to Low Wage Countries

## Imported Inputs in Total Inputs in Percent



Eastern Europe contains Poland, Czech Republic, Slovakia, Slovenia, Hungary, Ukraine, Croatia, Serbia, Bulgaria, Latvia, Estonia, Lithuania, and Romania.

- Eastern Europe
- China
- Mexico, Brazil

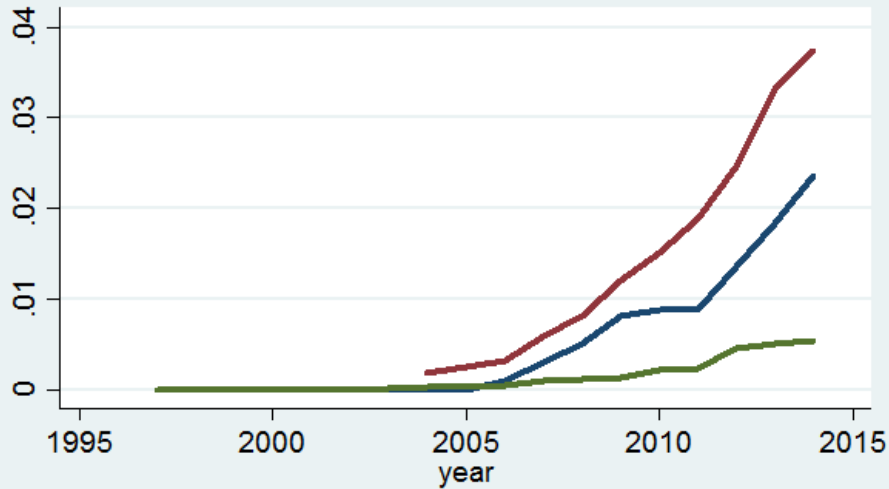
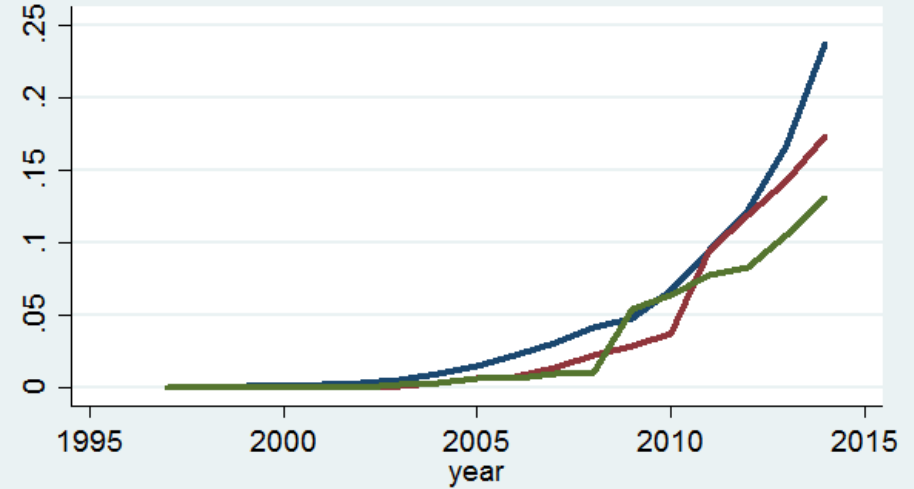
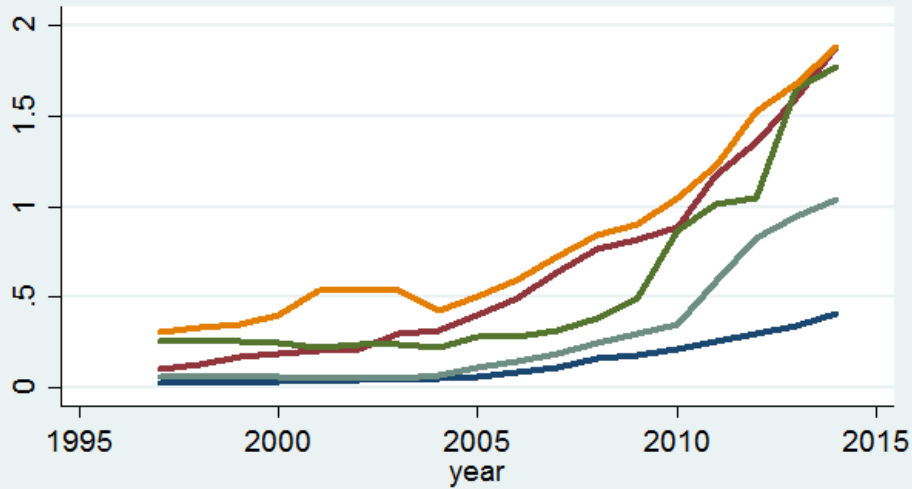
# Question

Industrialized countries have continued to offshore to low wage countries in spite of rising wages.

Why?

# Robots in Eastern Europe and China

## Robots per 1000 Employees



# Findings

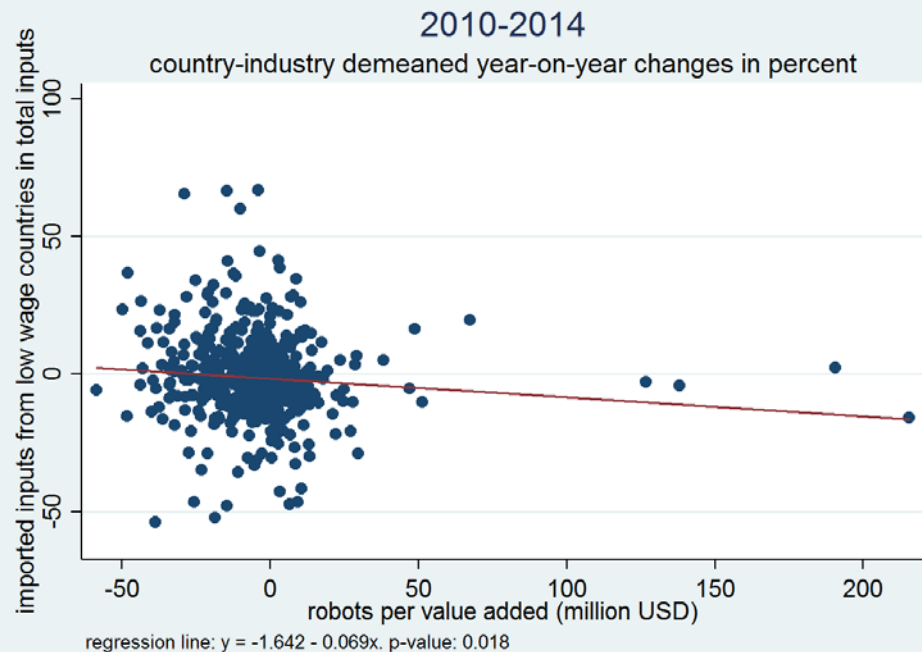
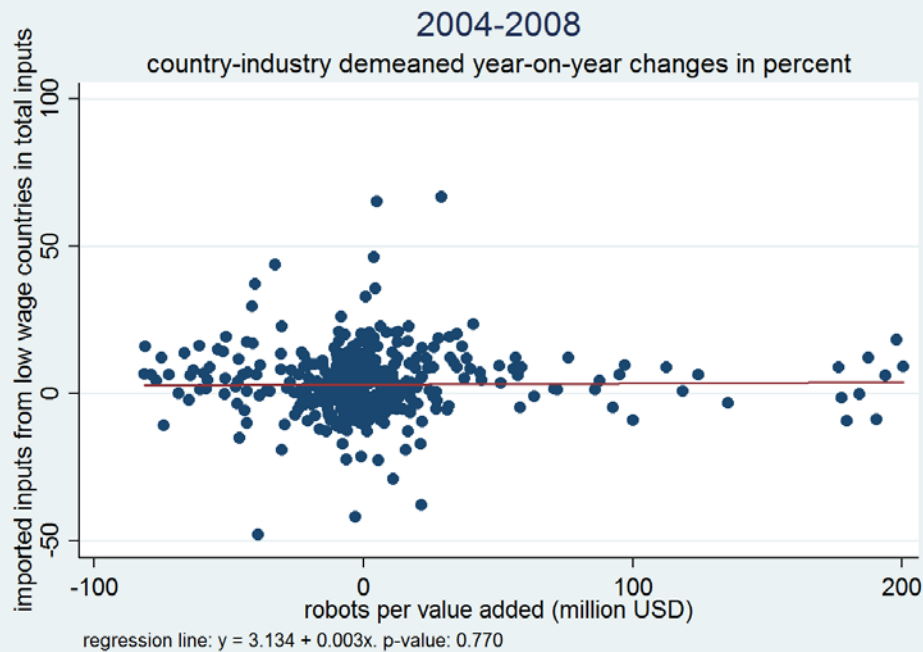
Slovenia, Czech Republic, and Slovakia have more robots per 1000 employees than France, Spain, Austria, USA.

This way, they remain attractive as a location for global value chains in spite of rising wages (they have successfully escaped the middle income trap).

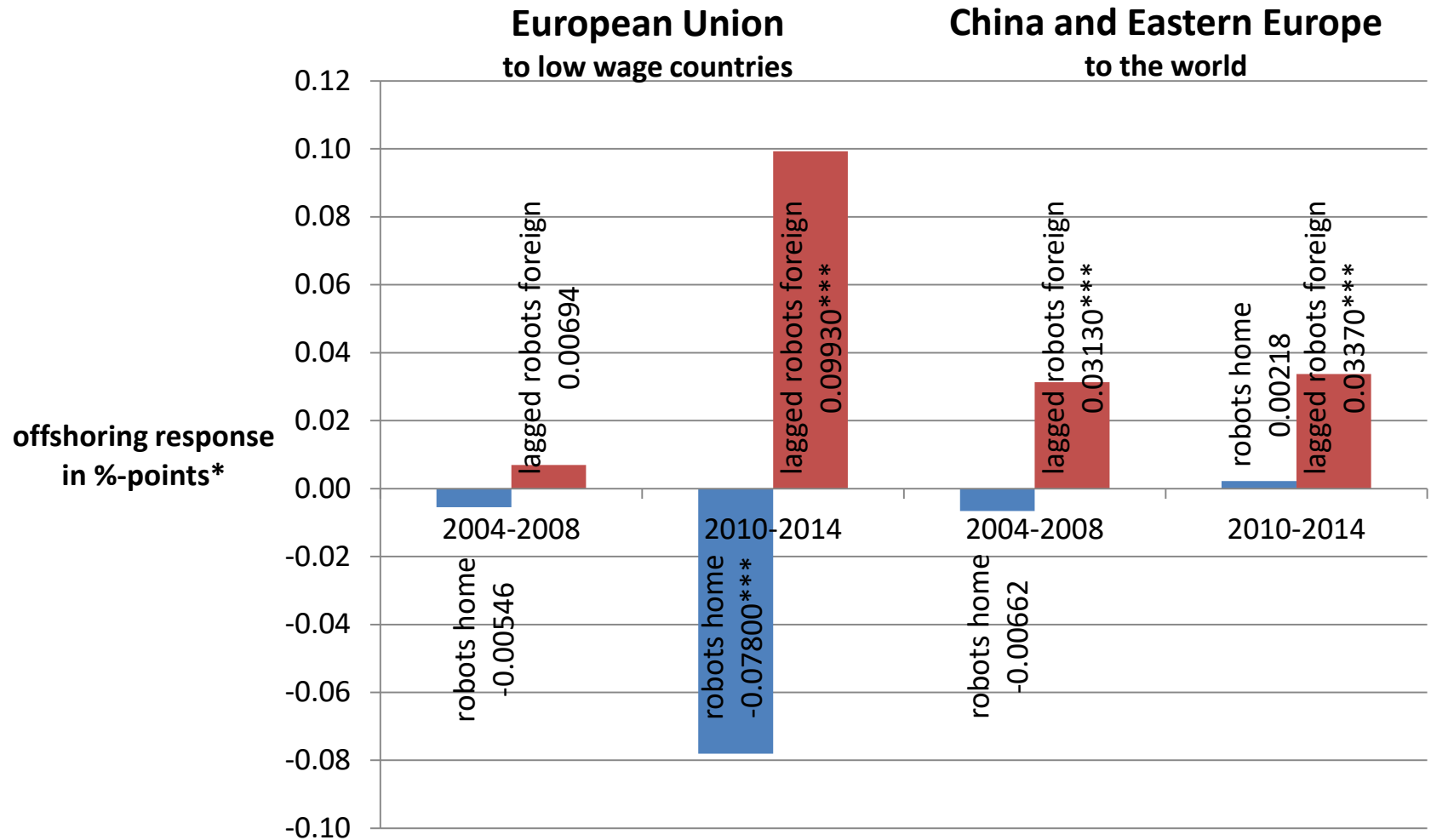
# **Robots and Global Value Chains**



# Robots and Global Value Chains: what is the relationship?



# Reshoring emerges after the Financial Crisis



\*percentage point change in the growth rate of the imported input share from a particular country in percent of total inputs in response to a 1%-point increase in the growth rate of robots per 1000 employees.

**Reshoring is real...**

**Is this good news for labor markets  
in rich countries?**

## Hypothesis 2:

Intelligent machines will **replace** smart people

rather than

increase the demand for skills (**capital bias** rather than **skill bias technical change**)

# Some Examples:

- **Narrative Science, EMMA, robo-advisers** replace **journalists** and **financial analyst**
- **Legal software** searches for precedents in the law, potentially replaces **lawyers**
- **Medical software** which diagnoses diseases, potentially replaces **medical doctors**
- **Online courses, Udacity, MOOC** potentially replaces **professors**

# **Skill-biased Technical Change**

(Acemoglu and Autor 2011)

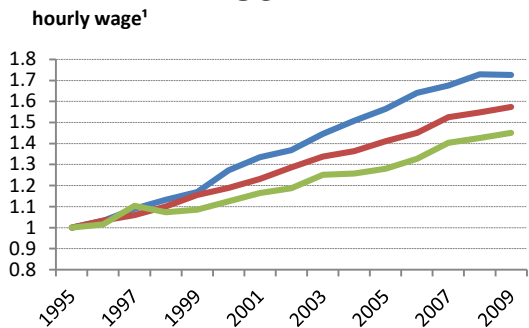
**Technology** requires ever **more skills**,

Technology and skills are **complements**

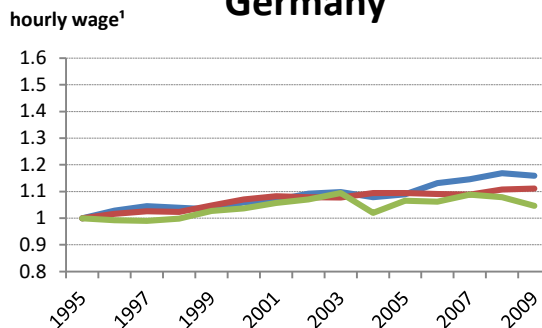
**Prediction:** Rise in the **skill premium**  
(relative wage between university  
graduates and high school graduates)

# Hourly wages by Skill level

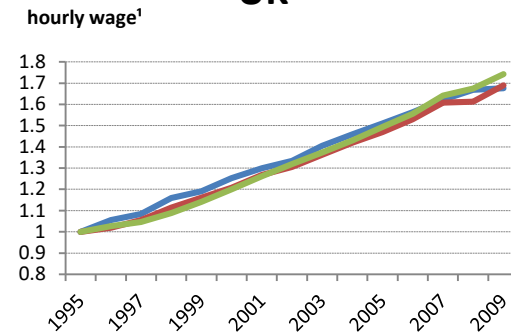
## USA



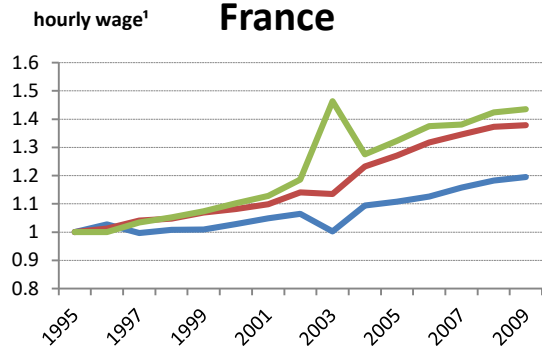
## Germany



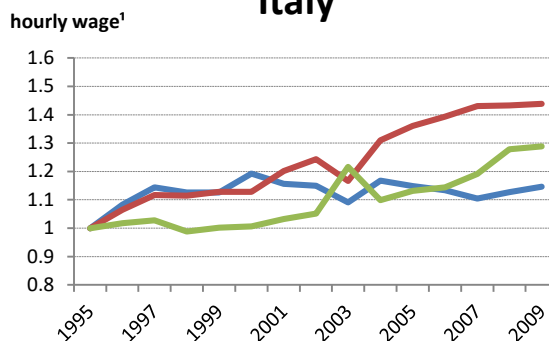
## UK



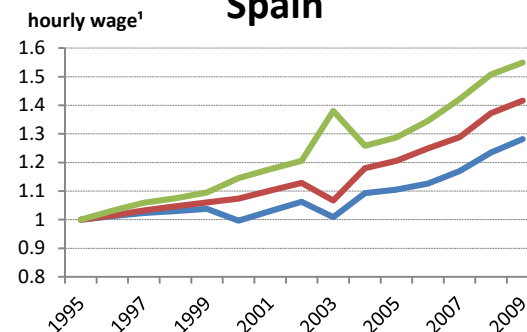
## France



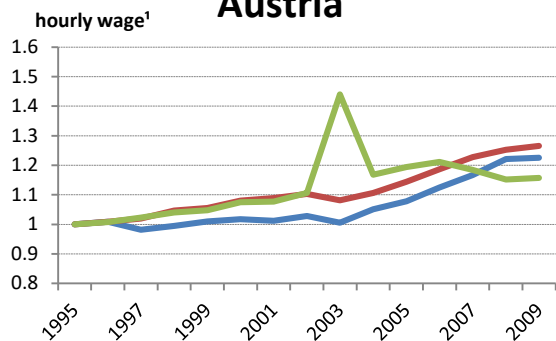
## Italy



## Spain



## Austria

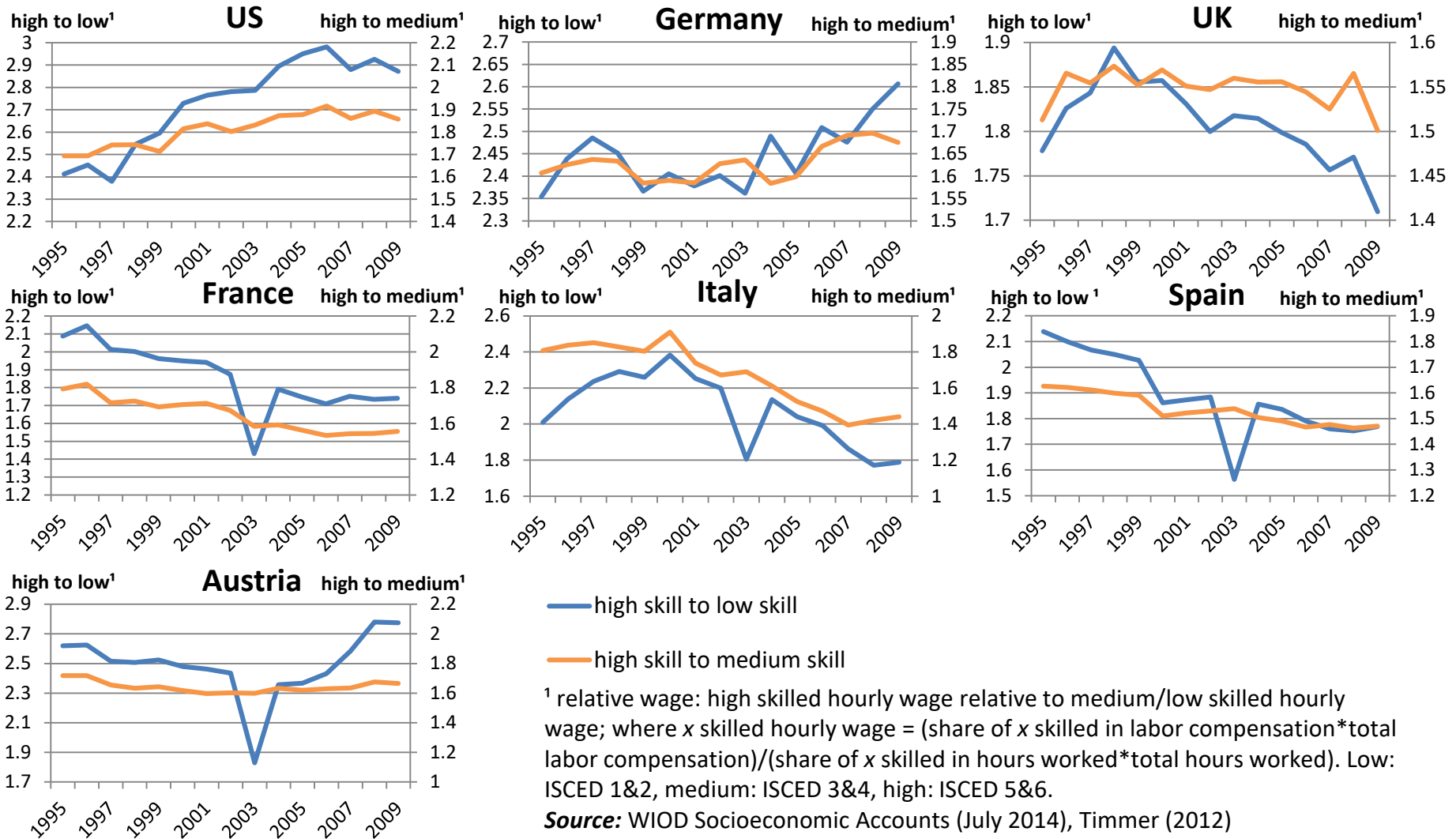


- high skill
- medium skill
- low skill

<sup>1</sup> x skilled hourly wage = (share of x skilled in labor compensation \* total labor compensation) / (share of x skilled in hours worked \* total hours worked); year 1995 is set to 1 for each country

Source: EU KLEMS Database, O'Mahony and Timmer 2009, Socioeconomic Accounts (July 2014 release)

# Skill Premium of tertiary education





# Summing up:

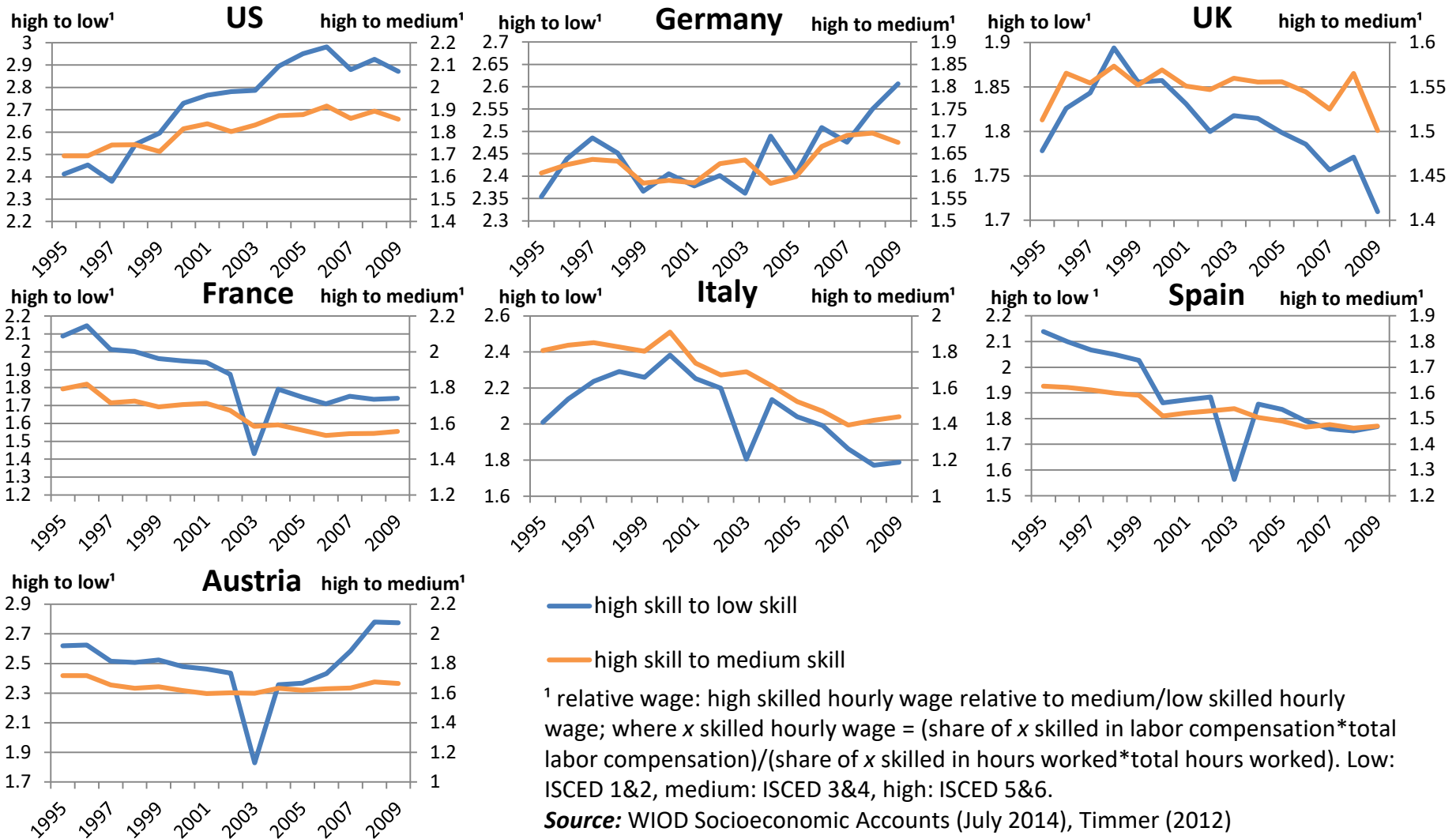
Except may be for Germany since 2005,  
the **skill premium is declining** in Europe.

# Polarization Hypothesis

Information Technology replaces **routine jobs** in the **middle of the income distribution** (technology threatens the middle class)

**Prediction: Complex jobs** with high income (managers) and with low income (nurses) are in high demand and have **high wages, decline in middle income**

# Skill Premium of tertiary education



# Why is the Skill-Premium Declining?

## 2 possibilities

- The **demand** for people with academic degrees has declined (**capital-biased technology**)
- The **supply** of people with academic degrees has increased too much (**expansion of higher education**)

# **Demand Side: Capital-biased Technology**

Production becomes more capital intensive

Technology and Skills are Substitutes

Academic people are replaced by the machines;  
the demand for people with academic degrees  
declines

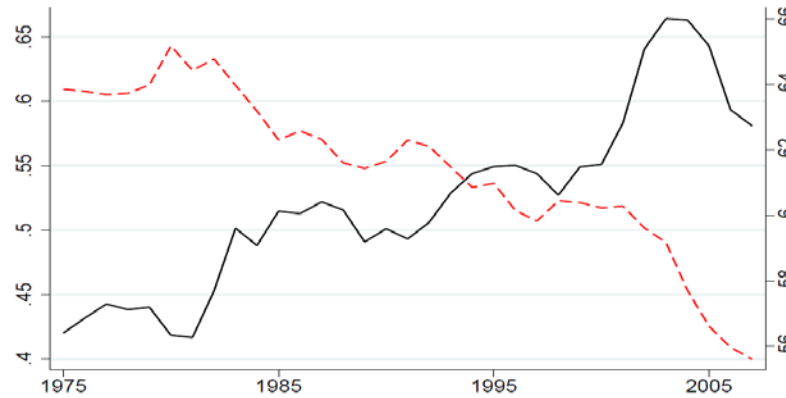
Intelligent robots replace lawyers, doctors,  
professors, journalists, financial analysts,  
financial advisers

# Evidence

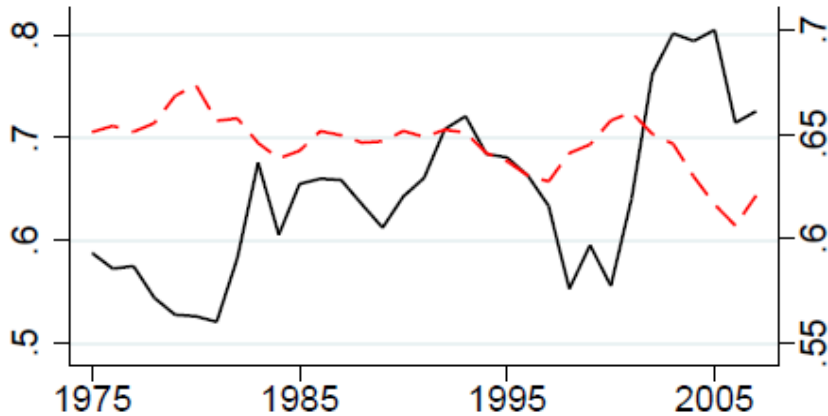
- Constant skill premium in the US since 2000
  - Global decline of the labor share in GDP since 1980
- Karabarbounis and Neiman QJE 2014** decline is due to lower prices for technology, explains 50 % of the decline
- Rising skill unemployment in particular among the young

# The Global Decline in the Labor Share in percent of GDP

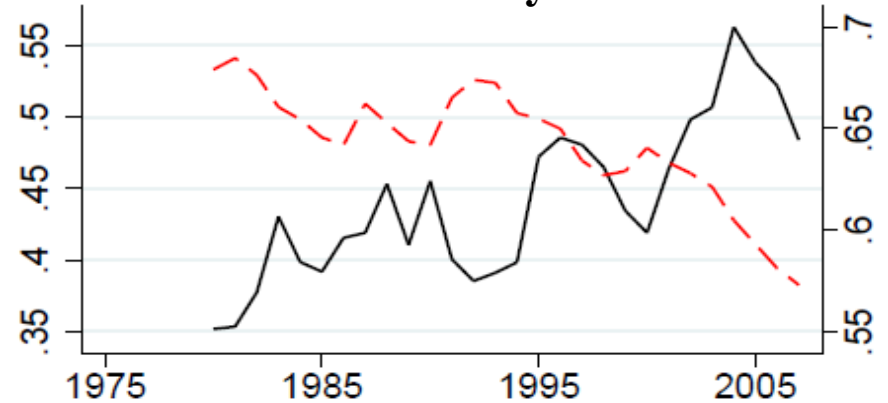
## OECD



## US



## Germany



— Profit share (left axis)  
- - - Labor Share (right axis)

# Unemployment Rates workers with tertiary education

	25-64 years old		25-34 years old	
	2000	2012	2000	2012
Austria	1.5	2.1		2.7
France	5.1	5.1	6.6	6.8
Germany	4.0	2.4	2.7	2.8
Italy	5.9	6.4	15.5	13.7
Spain	9.5	14.0	14.5	19.8
UK	2.1	3.6	2.0	4.2
USA	1.8	4.6	2.0	4.9

OECD, Education at a Glance, 2014



# **Supply Side: Expansion of Higher Education**

The expansion of Higher Education in Europe has been faster (supply)

than

the speed of technological advancement  
(demand)

# **Goldin and Katz (2010):**

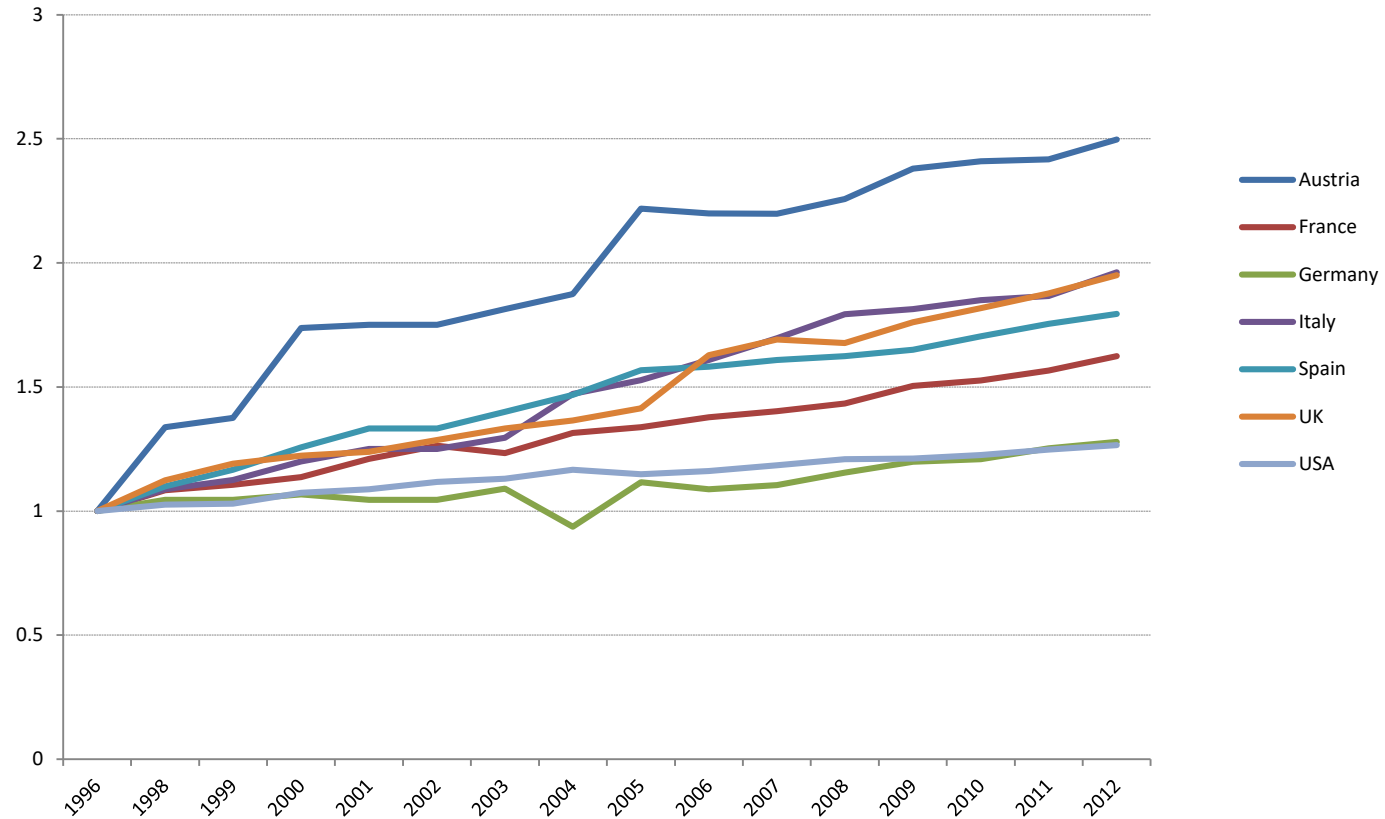
## **Race between Education and Technology**

show that the **skill premium in the US** has risen in the 1980s and 1990s, because education stopped to advance while technology kept advancing.

Is the **skill premium in Europe declining** because **higher education is outpacing technological change?**

# Evidence

## Tertiary Education of 25-64 year-olds in percent of population <sup>1</sup>



<sup>1</sup> tertiary education: International Standard Classification of Education (ISCED) categories 5&6.

# Fazit

Except for Germany,

the share of the population with tertiary education has increased in Europe

by 60-250 percent in the last 15 years.

**Are we fighting the wrong battle?**

# Policy Implication

Scarcity of education and talent may lie behind us

The push for more higher education may be the wrong way to go.

# **New Issue**

## **Capital vs Labor**

rather than

## **Human Capital vs Labor**