

# European Economic Policies

## Productivity and competitiveness

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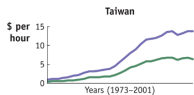
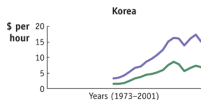
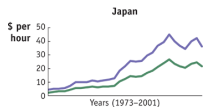
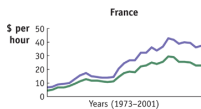
## What did we learn ?

- ▶ Clustering (agglomerating) activities triggers productivity
- ▶ Higher productivity implies higher returns to labor factor

## What are we learning today ?

- ▶ Does higher productivity entails also competitiveness ?

# Evidence



## Background: Ricardo Model

Consider a world economy with two countries: **Home and Foreign.**

*Asterisk* denote variables related to the Foreign country.

- ▶ Ricardian models differ from other neoclassical trade models in that there only is one factor of production.

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Consider a world economy with two countries: **Home and Foreign.**

*Asterisk* denote variables related to the Foreign country.

- ▶ Ricardian models differ from other neoclassical trade models in that there only is one factor of production.
- ▶ If a factor is perfectly mobile then its return will be equalized across countries (and hence not generate comparative advantage)

## Ricardo Model (I)

► We denote by:

$L$  and  $L^*$  the endowments of labor (in efficiency units) in the two countries.

$w$  and  $w^*$  the wages in the two countries.

## Ricardo Model (II)

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- ▶ We order goods such that  $A(z) \equiv \frac{a^*(z)}{a(z)}$  is decreasing.
- ▶ Hence Home has a comparative advantage in the low- $z$  goods. For simplicity, we'll assume strict monotonicity.

## Ricardo Model (III)

- ▶ Previous supply-side assumptions are all we need to make qualitative predictions about pattern of trade.

Let  $p(z)$  denote the price of good  $z$  under free trade.

Profitt-maximization requires:

$$p(z) - wa(z) \leq 0, \text{ with equality if } z \text{ is produced at Home}$$

$$p(z) - w^* a^*(z) \leq 0, \text{ with equality if } z \text{ is produced Abroad}$$

### Theorem

*Proposition: There exists  $\tilde{z} \in [0, 1]$  such that Home produces all goods  $z < \tilde{z}$  and Foreign produces all goods  $\tilde{z} > z$*

# Fundamentals

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- ▶ *Labour productivity vs unit labor costs*

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- ▶ Its level is proportional to the efficient use of the inputs in the production process.
- ▶ TFP growth is usually measured by the Solow residual.

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- ▶ The Solow residual is defined as

$$TFP = g_Y - \alpha g_K - (1 - \alpha)g_L$$

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  - ▶ (i) the production function is neoclassical,
  - ▶ (ii) there is perfect competition in factor markets,
  - ▶ (iii) the growth rates of the inputs are measured accurately.
- ▶ Problem: empirically it is very complicated to get an accurate measure of the capital. See alternative strategies as those introduced by Levinsohn and Petrin (2003).

## Labor productivity

Labor productivity measures the capacity of one unit of labor (in one unit of time) to produce output:

$$\frac{Y}{L}$$

when working time varies, we compute the labor productivity per-hour worked:

$$\frac{Y}{L * H}$$

## Labor productivity

In the growth analysis labor productivity is important because of the following relationship:

$$\text{GDP per-capita} =$$
$$\mathbf{\text{Productivity per hour worked}} \times$$
$$\textit{Total hours worked} \times \textit{Participation rate} \times \textit{Share of adult}$$
$$\textit{population to be able to work}$$

## Fundamentals: unit labor costs

The unit labor costs are the costs of one unit of production and their change is inversely proportional to that of productivity.

There are several way to compute them: the most natural one is:

$$ULC = \frac{\textit{Compensation}}{Y}$$

# Fundamentals: productivity and competitiveness

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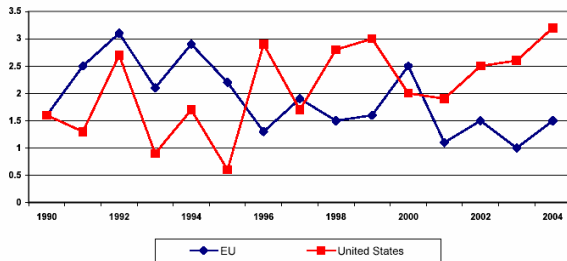
1. Productivity is a measure of the efficiency in production
2. That efficiency drives competitiveness either on international and national markets (see Helpman, Melitz, Yeats, 2004 or Melitz and Redding (2012)
3. What's happens to Europe ?



# Productivity: evidence

## How does productivity changed in the EU and US in time ?

Figure 1: Annual labor productivity growth (%) in the European Union (13 countries) and the United States, 1990-2004. (Source: OECD)



# Productivity: evidence

## D. Jorgenson et al. (2008)

*Table 1*

### Sources of U.S. Output and Productivity Growth 1959–2006

*(average annual growth rates)*

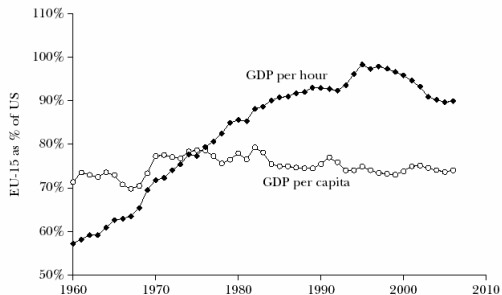
	1959– 2006	1959– 1973	1973– 1995	1995– 2000	2000– 2006
<b>Private output</b>	<b>3.58</b>	<b>4.18</b>	<b>3.08</b>	<b>4.77</b>	<b>3.01</b>
Hours worked	1.44	1.36	1.59	2.07	0.51
Average labor productivity	2.14	2.82	1.49	2.70	2.50
<b>Contribution of capital deepening</b>	<b>1.14</b>	<b>1.40</b>	<b>0.85</b>	<b>1.51</b>	<b>1.26</b>
Information technology	0.43	0.21	0.40	1.01	0.58
Non-information technology	0.70	1.19	0.45	0.49	0.69
<b>Contribution of labor quality</b>	<b>0.26</b>	<b>0.28</b>	<b>0.25</b>	<b>0.19</b>	<b>0.31</b>
<b>Total factor productivity</b>	<b>0.75</b>	<b>1.14</b>	<b>0.39</b>	<b>1.00</b>	<b>0.92</b>
Information technology	0.25	0.09	0.25	0.58	0.38
Non-information technology	0.49	1.05	0.14	0.42	0.54
<b>Share attributed to information technology</b>	<b>0.32</b>	<b>0.11</b>	<b>0.43</b>	<b>0.59</b>	<b>0.38</b>

# Productivity: evidence

van Ark et al. (2008)

*Figure 1*

**Total Economy GDP per Hour Worked and GDP per Capita in EU-15, 1960–2006**  
(relative to the United States)



# Productivity: evidence

Inklaar et al. (2008)

**Table 1. Growth rates of GDP per hour worked in European countries and the US, 1980–2006 (average annual growth in %)**

	1980–1995	1995–2006
EU-15	2.3	1.4
United States	1.3	2.2
Austria	2.4	2.3
Belgium	2.0	1.4
Denmark	2.5	1.2
Finland	3.0	2.5
France	2.5	1.8
Germany	2.4	1.7
Greece	0.9	2.5
Ireland	3.6	4.2
Italy	2.1	0.4
Luxembourg	2.6	1.9
Netherlands	1.7	1.5
Portugal	2.1	1.7
Spain	3.0	-0.2
Sweden	1.3	2.5
United Kingdom	2.6	2.0
Average of 15 EU countries	2.3	1.8
Standard deviation	0.7	1.0

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**Table 2. Share in GDP and average annual labor productivity growth in European countries and the US, market services, 1980–2004 (%)**

	Share of market services in GDP (%)			Growth of value added per hour worked	
	1980	1995	2004	1980–1995	1995–2004
Austria	37	40	43	2.1	0.7
Belgium	32	40	44	1.4	1.2
Denmark	34	38	40	3.0	0.9
Finland	30	34	36	2.5	1.7
France	36	38	41	1.9	1.3
Germany	32	38	40	2.3	0.8
Italy	36	40	42	0.6	0.3
Netherlands	34	42	46	0.3	2.4
Spain	31	38	41	1.0	0.4
UK	33	41	49	1.9	2.5
US	37	41	44	1.4	3.3
Average	34	39	42	1.7	1.4
Standard deviation	2.4	2.2	3.3	0.8	1.0

# Productivity: evidence

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**Table 5. The share of high-skilled workers in market services employment (%)**

	1980	1995	2004
Austria	3.3	7.6	10.9
Belgium	6.7	12.0	15.5
Denmark	2.7	5.8	8.5
Finland	14.6	29.8	30.7
France	6.3	11.9	16.1
Germany	3.7	6.6	8.0
Italy	4.7	7.4	14.1
Netherlands	3.8	8.6	11.2
Spain	5.3	12.1	19.4
UK	8.0	12.8	18.0
US	19.4	26.9	30.6
Average	7.1	12.9	16.6
Standard deviation	5.2	8.1	7.8

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- ▶ Economic growth has been supported with increasing labor.
- ▶ Remark: remember data in class 1 (Spain lost part of their international competitiveness)

## Productivity: Spanish case

**Table 3. Average annual growth rate in employment by sector (%)**

	Industry		Services	
	1990–1995	1995–2001	1990–1995	1995–2001
Spain	-2.9	5.4	1.2	5.0

*Source:* EUROSTAT – calculus: author.

## Productivity: Spanish case

**Table 9. Correlation between labour productivity and share of employment in industry and services**

Industry	pi7786	pi8693	pi9502
ei7786	-0.2420 0.3494		
ei8693		-0.7868*** 0.0002	
ei9502			-0.7706*** 0.0003
Services			

## Productivity: Management practices

Evidence: Bloom and van Reenen (2007, QJE)

- ▶ Persistent evidence of differences in productivity across countries (and firms). It is argued it is due to differences in management.

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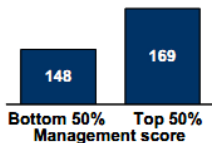
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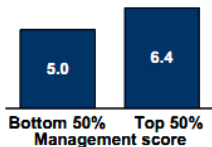
- ▶ Persistent evidence of differences in productivity across countries (and firms). It is argued it is due to differences in management.
- ▶ They develop a measure on management performance for a sample of US and European firms
- ▶ They take care details about characteristics of the firms: market competition and firm ownership are important differences in management practices (here ownership matters because they are referring to medium size firms)

## Productivity: Management practices

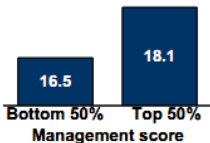
### Labour Productivity



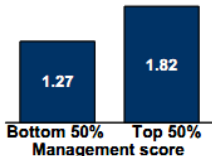
### Sales Growth, (% pa)



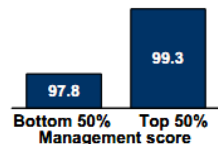
### Profit Rate, (%)



### Stock Market Value



### Survival Rates, (%)



(source: ERS, Lectures)

## Productivity: Management practices

Dependent variable	Sales (in Ln)	Sales (in Ln)	Sales (in Ln)
Estimation <sup>1</sup>	OLS	OLS	OLS
Firms	All	All	All
Management <sub><i>t</i></sub>	<b>0.085</b> (0.025)	<b>0.034</b> (0.011)	<b>0.042</b> (0.012)
Ln(Labor) <sub><i>it</i></sub>	0.999 (0.014)	0.539 (0.021)	0.540 (0.021)
Ln(Capital) <sub><i>it</i></sub>		0.103 (0.013)	0.104 (0.013)
Ln(Materials) <sub><i>it</i></sub>		0.362 (0.020)	0.354 (0.020)
Controls <sup>1</sup>	No	Yes	Yes
Noise controls	No	No	Yes
Observations	6,267	5,350	5,350
Firms	732	709	709

(source: ERS, Lectures)

## Productivity: Management practices

### COUNTRY LEVEL MANAGEMENT SCORES\*



(source: ERS, Lectures)

## Productivity: Management practices

### US FIRMS ARE ALSO BETTER IN EUROPE

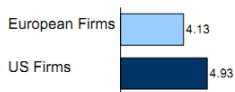
Average management score by firm type  
in UK, France and Germany\*



(source: ERS, Lectures)

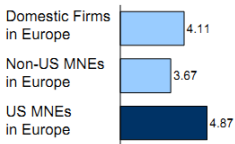
# Productivity: Management practices

## Organizational devolvement

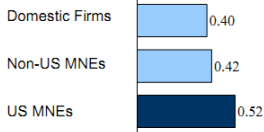


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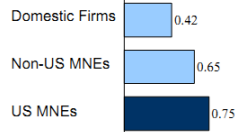
*(firms located in Europe)*



## Organizational change (UK establishments, 1981-1990)



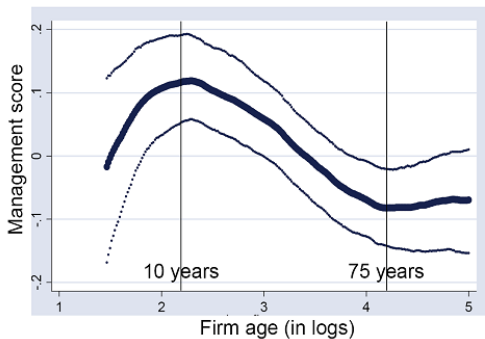
## Organizational change (UK establishments, 1998-2000)



(source: ERS, Lectures)

## Productivity: Management practices

### AGE AND MANAGEMENT PRACTICES (KERNEL<sup>1</sup>)



(source: ERS, Lectures)

## Productivity: Organization of tasks

Referring to Caliendo and Rossi-Hansberg (2012, QJE)

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- ▶ Empirical studies identify that the good management practices are useful to increase firms' productivity and sales
- ▶ This factor is as much important as we are considering large firms
- ▶ The capacity to well organize the production within a firm may impact on firms' productivity and trade.

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- ▶ There is a ladder of problem solving: higher skill workers solve more complicated problems.
- ▶ **Managers specialized in solving problems**

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- ▶ Equilibrium solutions: it is optimal and incentive compatible a situation in which each worker solves problems compatible with his/her learning intervals
- ▶ (International) competition pushes a firm to better its internal organization matching workers to tasks.
- ▶ In an open economy situation: non-exporters loses efficiency and the quantity they produce decreases

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- ▶ If changes in quantity are quite important, productivity of exporters increases.
- ▶ Calibration of the model: the task organization grants productivity but trade option has a double effect (big novelty).
- ▶ Selection made not only by the competition effect, but also on the internal capacity to organize tasks.

## Productivity: Organization of tasks

### Evidence from the French case (C-M-RH, 2012)

Table 1: Distribution of average hourly wage by occupation in 2005 euros

	CEO, directors	Senior staff	Supervisors	Clerks	Blue collars
Mean	75.60	47.91	26.30	19.06	20.83
p5	22.33	19.56	13.14	9.74	9.67
p10	26.99	23.07	15.01	11.00	10.94
p25	38.86	28.93	18.14	13.03	12.88
p50	54.62	35.96	21.87	15.63	15.24
p75	75.07	44.62	26.44	19.01	18.34
p90	106.04	56.95	32.76	23.73	22.58
p95	132.17	69.01	38.94	28.33	26.94

# Productivity: Organization of tasks

Table 13: Change in firm-level outcomes

	All	Increase $L$	No change in $L$	Decrease $L$
$d \ln$ total hours	-0.014***	0.056***	-0.011***	-0.093***
- detrended	-	0.070***	0.003***	-0.079***
$d \ln \sum_{\ell=0}^L n_L^{\ell}$	-0.011***	1.366***	0.012***	-1.408***
- detrended	-	1.377***	0.023***	-1.396***
$d \ln VA$	-0.008***	0.032***	-0.007***	-0.049***
- detrended	-	0.039***	0.001	-0.040***
$d \ln$ avg wage	0.018***	-0.001	0.018***	0.038***
- detrended	-	-0.020***	-0.000	0.020***
- common layers	0.020***	-0.117***	0.018***	0.156***
- - detrended	-	-0.137***	-0.002***	0.136***
% firms	100	12.75	73.48	13.78
% $VA$ change	100	39.21	65.65	-4.87

\*\*\* significant at 1%.



## Productivity: Organization of tasks

Table 17: Description of exporters

	Average			
	VA	Hours	Wage	# of layers
Non-exporters	800	29,026	23.03	1.23
Exporters	5,343	141,615	23.39	1.96

See the footnote in Table 2. The difference in wages is significant at 1%.

## Productivity: Organization of tasks

Table 21: Behavior of firms that enter the export market

	All	Increase $L$	No change in $L$
$d \ln$ total hours	0.021***	0.126***	0.015***
- detrended	0.035***	0.141***	0.029***
$d \ln \sum_{\ell=0}^L n_L^\ell$	0.008	1.237***	0.024***
- detrended	0.019**	1.248***	0.035***
$d \ln VA$	0.038***	0.116***	0.033***
- detrended	0.046***	0.125***	0.041***
$d \ln$ avg wage	0.018***	0.000	0.021***
- detrended	-0.000	-0.018**	0.003
- common layers	0.018***	-0.119***	0.021***
- - detrended	-0.002	-0.139***	0.001
% firms	100	14.62	70.61
% VA change	100	18.62	73.66

# Productivity: Organization of tasks

## Results:

- ▶ Firms that expand (also increase competitiveness) are those that add layers and pay lower average wages to existing layers.

## Productivity: Organization of tasks

### Results:

- ▶ Firms that expand (also increase competitiveness) are those that add layers and pay lower average wages to existing layers.
- ▶ Less performing firms do not reorganize their production (do not hire new layers) and pay higher wages to existing layers.