

Labor market regulation, capital intensity and productivity

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Outline

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1. Introduction

➤ Question raised

- Which impact from labor regulation on capital intensity? On capital quality?
On labor quality?

➤ Some literature

Impact on capital intensity: non consensual

- Theoretical approaches:
Janiak and Wasmer (2014): positive impact for low EPL, negative impact for high
- Empirical approaches:
Autor *et al.* (2007), Cingano *et al.* (2014): positive impact
Cingano *et al.* (2010); Calcagnini *et al.* (2013): negative impact

Impact on capital ICT investment - Empirical approaches:

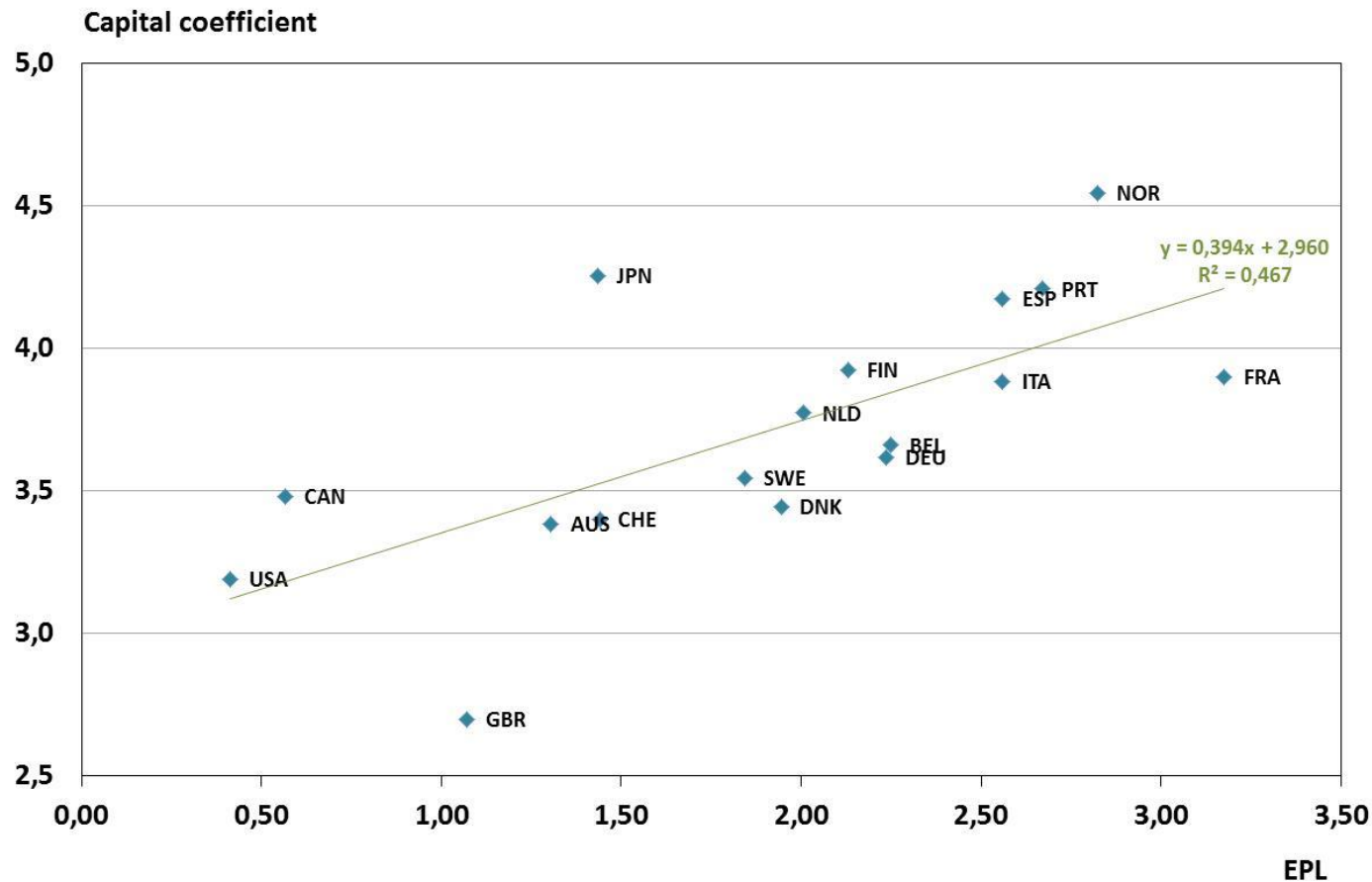
- Aghion *et al.* (2009), Guerrieri *et al.* (2011), Cette and Lopez (2012):
negative impact

1. Introduction

- **This paper**
 - Empirical
Country*industry*time dataset
- **What's new?**
 - EPL impact on: capital intensity, capital quality and labor quality
Evaluated on the same dataset
- **Results**
 - Capital intensity: Positive impact
 - Capital quality (ICT and R&D): Negative impact
 - Labor quality: Positive impact

2. At the country level

- **Capital coefficient (capital / GDP, in current value) and Employment Protection Legislation (EPL) – 2013** – Data: OCDE and Cette, Bresson and Clerc (2015)
(EPL: scale 0-6, 0 for the most flexible regulation)

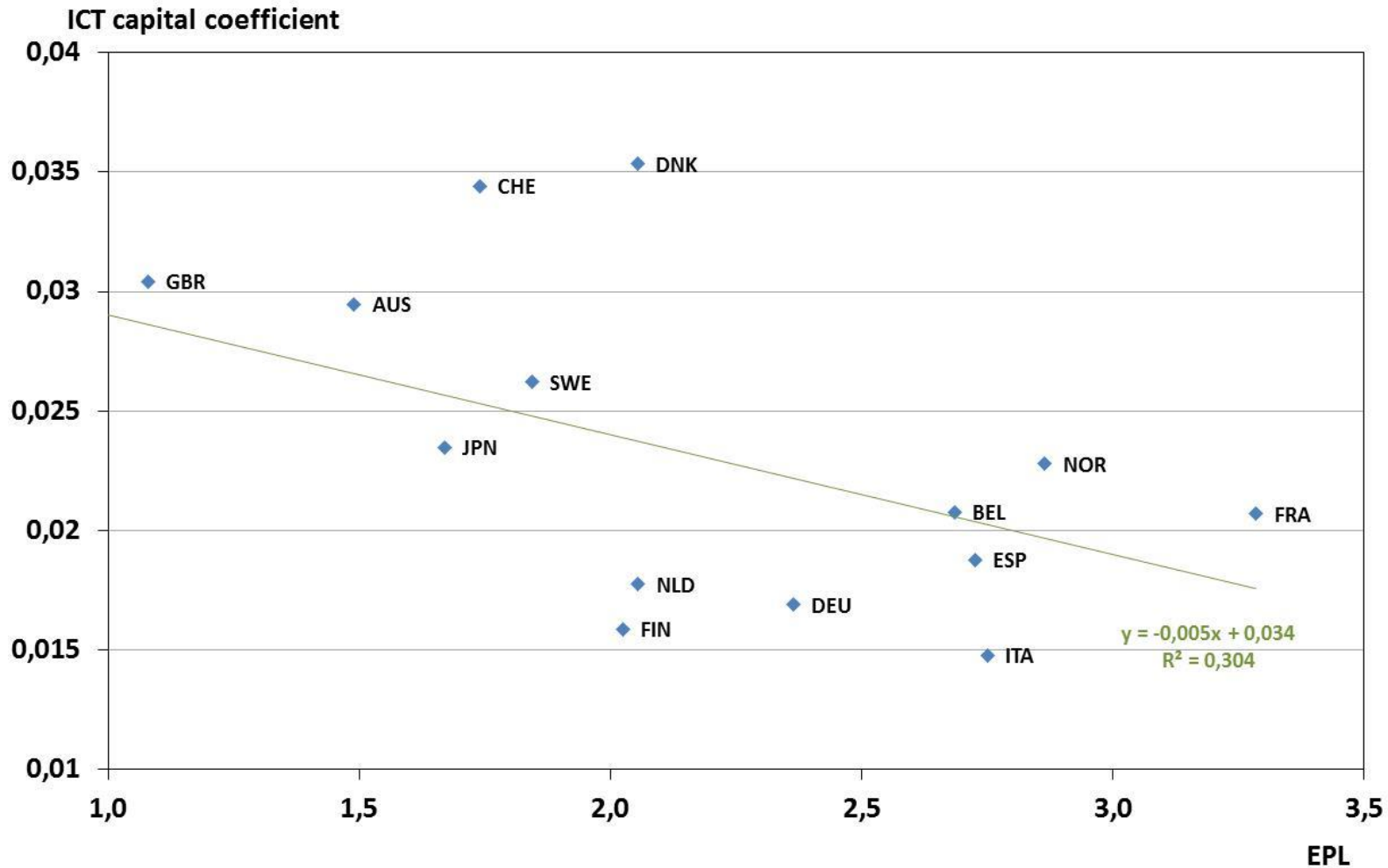


2. At the country level

➤ ICT capital coefficient (ICT capital / GDP, in current value) and EPL – 2013 –

Data: OCDE and Cette, Bresson and Clerc (2015)

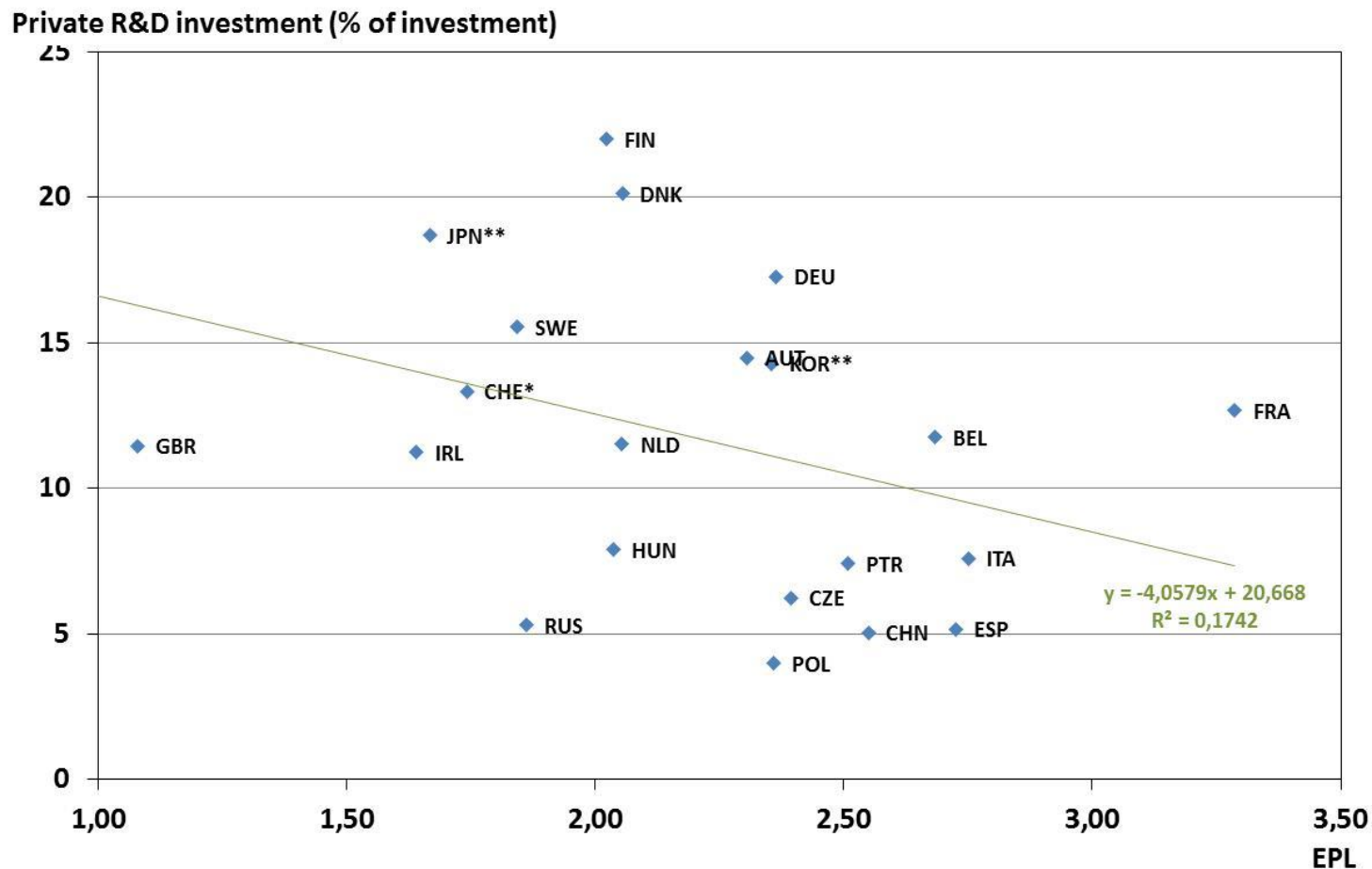
(EPL: scale 0-6, 0 for the most flexible regulation)



2. At the country level

- **R&D share in investment (R&D investment / Investment, in current value) and EPL – 2013** – Data: OCDE and Cette, Bresson and Clerc (2015)

(EPL: scale 0-6, 0 for the most flexible regulation)



3. The model

➤ **Main specification** (with small letters for logarithm)

$$(x_{c,i,t} - l_{c,i,t}) = \theta \cdot (uc_{c,i,t}^x - w_{c,i,t}) + \beta \cdot \lambda_i \cdot EPL_{c,t} + \alpha_{c,i} + \alpha_{c,t} + \epsilon_{c,i,t}$$

➤ **With:**

- $v = \text{Log}(V)$
- c : country, i : industry and t : time
- X : capital stock (Total, ICT eq., non-ICT eq., R&D ...) or high skill employment
- L : total employment
- UC^x : user-cost per unit of capital X
- W : labor compensation per worker
- λ : industry labor-share (USA 2000)
- EPL : Employment Protection Legislation OECD indicator
- Some estimates assume $\theta = -1$

4. Data & Sample

➤ Data sources and calculations

- Capital stocks: PIM

$$X_t = (1 - \delta_x)X_{t-1} + I_{t-1}$$

With δ : depreciation rate of capital, by product

Non-residential structures 5%; non-ICT equipments: 10%;

ICT equipments: 20%; R&D: 25%

- User-cost of capital: Jorgenson (1964)

$$UC_t^X = p_{t-1}^X (\delta_x (1 + \Delta \ln(p_t^X)) + r_t)$$

with: p^X the price of investment X and r the long-term interest rate

- 3 labor skill levels: low, medium, high
- Sources of original data: OECD (Stan, Anberd...); EU-KLEMS

➤ The estimation sample (unbalanced)

- 18 manufacturing and market service industries
6 are not investing in R&D so are excluded from the R&D estimation sample
- 20 years: 1988-2007
- 14 countries
- 3 625 observations (2 537 for the R&D estimation sample)

5. Results

Factor	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Total Cap.	Non-cons Non-ICT Non-R&D	Cons.	ICT	R&D	High- skilled	Low- skilled
Relative cost ($c_f - w$)	-0.449*** [0.0310]	-0.606*** [0.0400]	-0.369*** [0.0432]	-0.477*** [0.0226]	-0.474*** [0.144]	-0.233*** [0.0537]	-0.212*** [0.0317]
EPL impact ($\lambda_i \cdot EPL$)	0.0474 [0.0557]	0.176*** [0.0595]	0.122* [0.0642]	-0.0738 [0.0914]	-1.106*** [0.249]	0.347*** [0.0682]	-0.219*** [0.0428]
Observations	3,625	3,625	3,625	3,625	2,537	3,200	3,200
R-squared	0.799	0.751	0.662	0.942	0.684	0.792	0.900
rmse	0.0965	0.104	0.112	0.159	0.273	0.111	0.0685

Fixed effects: country*industry; country*time

Standard errors in brackets ; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

5. Results

The elasticity of substitution parameters are constrained to -1 ($\theta = -1$)

Factor	(1) Total Cap.	(2) Non-cons Non ICT Non R&D	(3) Cons.	(4) ICT	(5) R&D	(6) High- skilled	(7) Low- skilled
Relative cost ($c_f - w$)	-1 [0]	-1 [0]	-1 [0]	-1 [0]	-1 [0]	-1 [0]	-1 [0]
EPL impact ($\lambda_i \cdot EPL$)	0.157*** [0.0580]	0.209*** [0.0603]	0.176*** [0.0662]	0.0453 [0.0987]	-1.061*** [0.250]	0.268*** [0.0705]	0.0115 [0.0462]
Observations	3,625	3,625	3,625	3,625	2,537	3,200	3,200
R-squared	0.122	0.146	0.141	0.175	0.125	0.266	0.204
rmse	0.101	0.105	0.115	0.172	0.274	0.115	0.0757

Fixed effects: country*industry; country*time

Standard errors in brackets ; *** p<0.01, ** p<0.05, * p<0.1

5. Results

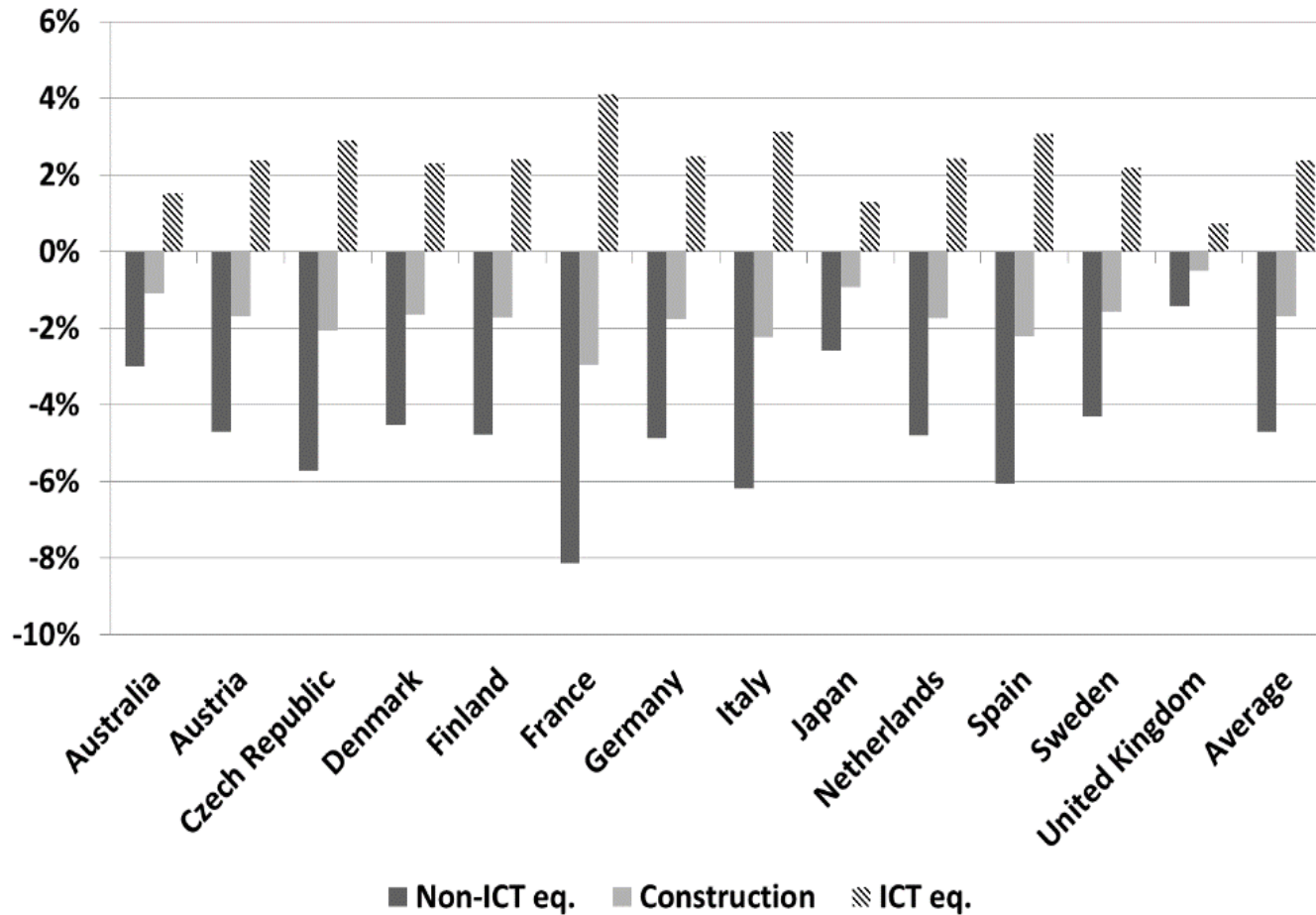
Robust results

- When the industry characteristic (λ_i) is the layoff propensity
- When the reference is medium-skilled employment ($x_f - l_M$)
- For R&D intensities when all industries are included in the sample
- When the estimation samples is reduced to data available on skills
- ...

6. Simulations

Long-term impact of adopting the US EPL

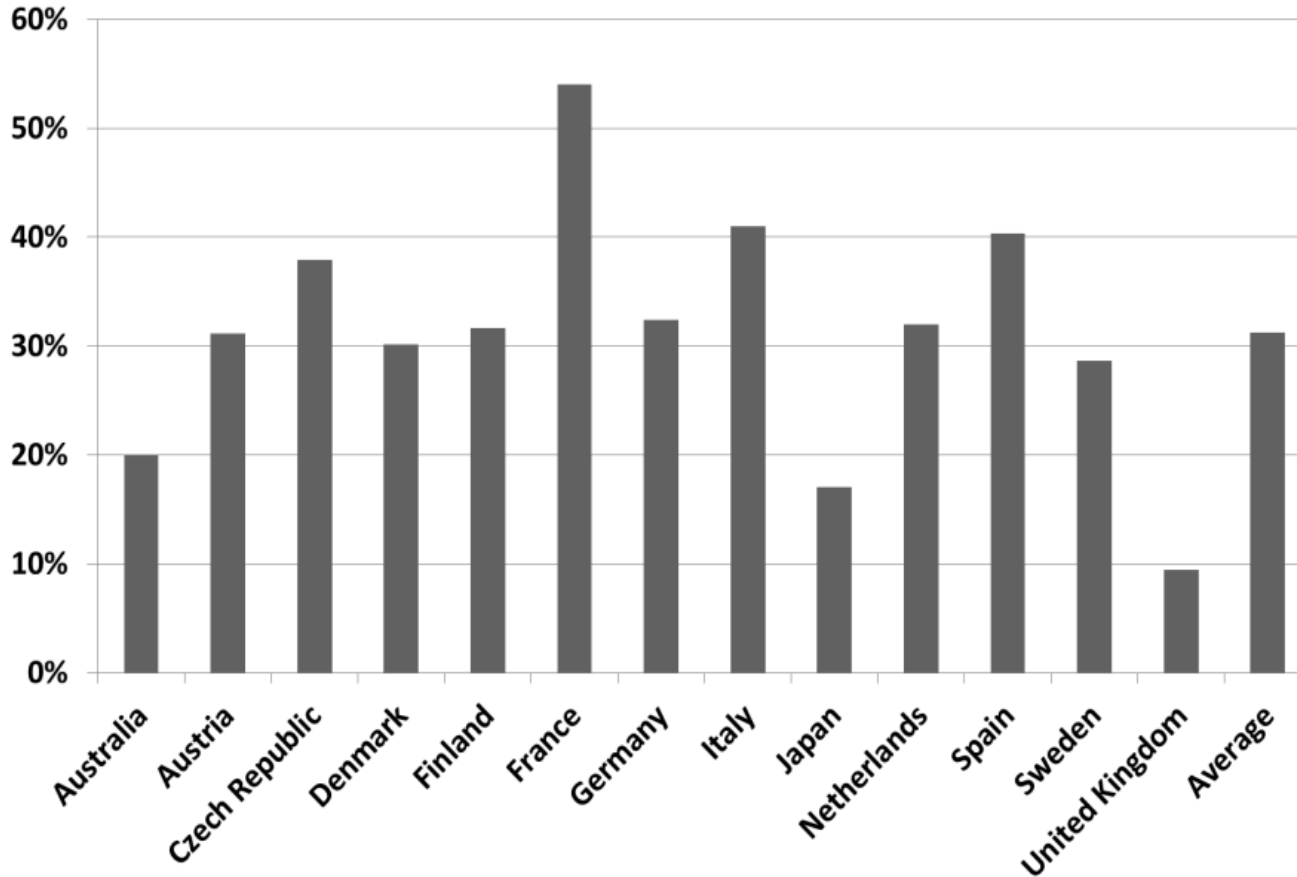
Physical capital intensity



6. Simulations

Long-term impact of adopting the US EPL

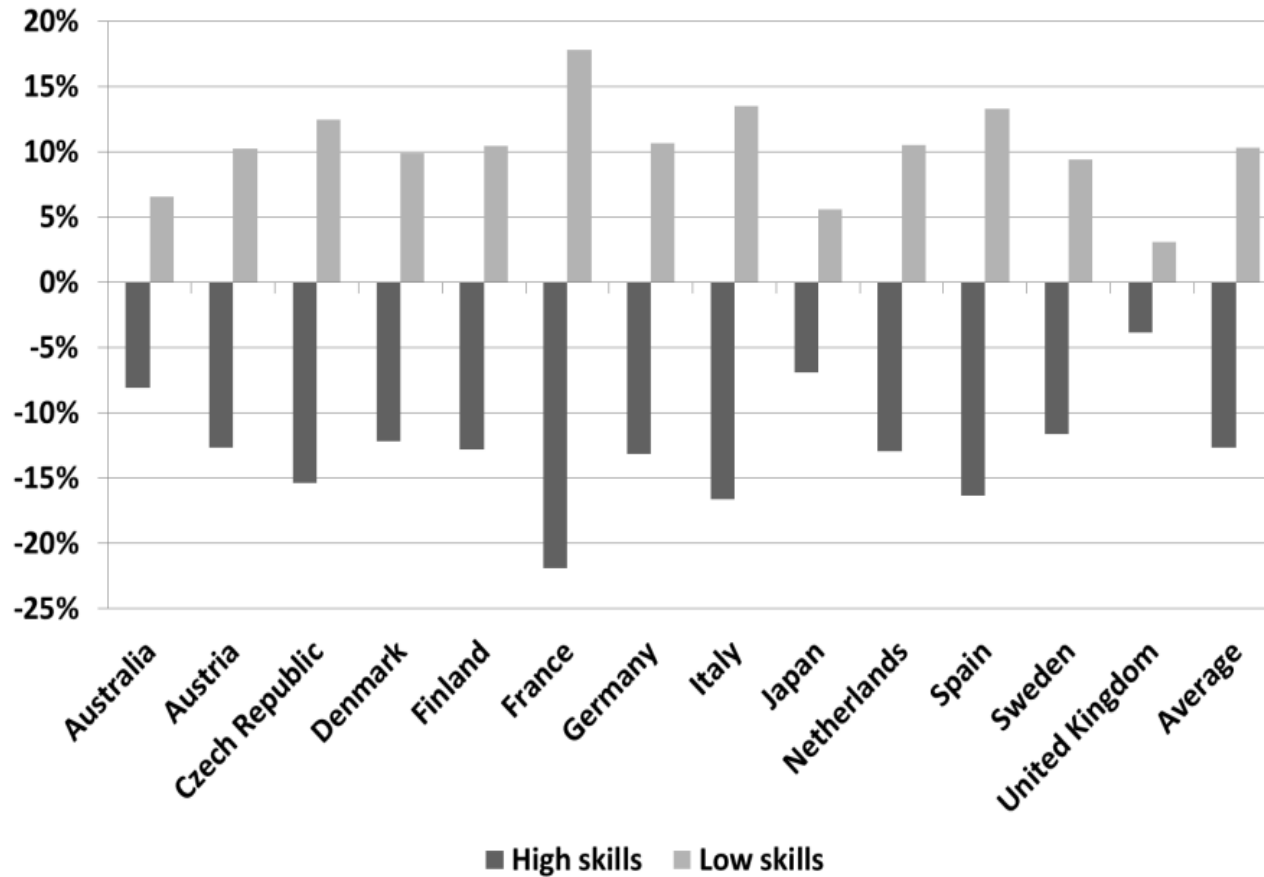
R&D capital intensity



6. Simulations

Long-term impact of adopting the US EPL

Employment share by skill level



7. Takeaways

- **Results: Employment protection legislation impact**
 - Capital intensity: Positive impact
 - Capital quality (ICT and R&D): Negative impact
 - Labor quality: Positive impact
- **Structural reform possible impact**
 - Capital intensity decrease
Employment increase and possible investment decrease
 - Capital quality increase
More ICT and R&D investment
 - Labor quality decrease
More unskilled workers