Product and labour market regulations, production prices, wages and productivity

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Outline

- 1. Introduction**
- 2. Model and estimates**
- 3. Structural reforms**
- 4. Impact of the structural reforms**
- 5. Some conclusive remarks**

Outline

- 1. Introduction**
  - 1.1. Purpose**
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1. Introduction

1.1. Purpose of the paper

- **Anticompetitive regulations: negative impact on productivity and macroeconomic equilibrium**
(Abundant literature, cf. survey from Cette, Lopez and Mairesse, 2013)
- Usually, studies focus on **direct impact** of regulations on regulated industries
- Some studies look at **indirect impact** of regulations in upstream industries on productivity in downstream industries (inspiration from Aghion et Howitt, 2009),
  - From country level data
Allegra *et al.* (2004) ; Forlani (2010); Arnold *et al.* (2011); ..., or
  - From country*industry level data
Faini *et al.* (2006);
Bourlès, Cette, Lopez, Mairesse, Nicoletti (2013);
Barone and Cingano (2013);
Cette, Lopez and Mairesse (2013)...

1. Introduction

1.1. Purpose of the paper

- **This study evaluates the MFP (and CPI) global direct and indirect impact of regulations and structural reforms, through...**
  - Their impact on production prices or wages (one originality of the paper)
- **Empirical approach**
  - A large unbalanced panel country (14)*industry (18)*year(20)
- **Few econometric evaluations of the price impact of regulations**

Inspiration from Askénazy, Cette and Maarek (2013), in the spirit from Blanchard-Giavazzi (2004):

  - **Product market regulations impact price** – Rent building process
  - **Labour market regulations impact the labour share** – Rent sharing process

1. Introduction

1.1. Purpose of the paper

➤ 2 steps: Estimation et simulation

➤ Estimation step

- Estimation of the impact of **upstream and downstream production prices** and of **high and low skill wages** on MFP
- Estimation of the impact of **production prices** on CPI
- Estimation of the impact of:
product market anticompetitive regulations on production prices
and of
labour market anticompetitive regulations on wages

➤ Simulation step

- Of product and labour market **structural reforms**
- Implemented in once
- Structural reforms: adoption of the '**best practices**' regulations
'*best practices*': average of regulation levels in the 3 countries where they are the lowest

1. Introduction

1.2. Originality of the paper

- Compared to Bourlès *et al.* (2013) and Cetté *et al.* (2013):
  - Elasticities do not depend on the distance from the frontier (no interaction)
=> results easier to use
  - Evaluation of regulation impact through the production prices and wages impact
=> model more 'structural'
  - **Model more complete:**
    - Evaluation of indirect but also direct impact of regulations
    - Evaluation of non manufacturing industry regulation impact but also of manufacturing industry regulation impact
    - Evaluation of product market regulation impact but also of labor market regulation impact

1. Introduction

1.3. Main results

- Results confirm that **anticompetitive regulations**
  - **Impact production prices** on the product market
  - **Impact wages** on the labour market
- **Long term impact of structural reforms vary**
  - **Impact on MFP** (or GDP): from 1% for the UK to 7% for the Czech Rep. France, Germany and Italy: about 6%, Spain: about 5%
  - **Impact on CPI**: from -0.2% for the UK to -1.9% for the Czech Rep. France, Germany and Spain: about -1.2%, Italy: about -1.4%
- **Progressive impact**
  - **Maximum impact**: years 5 to 7
  - **Impact on MFP**: 0.3pp to 0.4pp in France, Germany, Italy and Spain
  - **Impact on CPI**: -0.05pp to -0.06pp in France, Germany, Italy and Spain

Outline

1. Introduction

2. Model and estimates

2.1. Data

2.2. Impact of production prices and wages on MFP

2.3. Impact of production prices on CPI

2.4. Impact of regulations on production prices and wages

3. Structural reforms

4. Impact of the structural reforms

5. Some conclusive remarks

2. Model and estimates

2.1. Data

- **MFP:** own calculation, usual CD hypothesis
  - Value added, employment: OECD, STAN
  - Capital: Own calculation, PIM
    - Investment: OECD, STAN
    - Depreciation rate: Non-residential structures 5%;
non-ICT equipments: 10%; ICT equipments: 20%; R&D: 25%
  - Ponderations: US industry factor cost share averages, 1987-2007
- **Production prices:** OECD, STAN
- **High and low skill wages:** EU-KLEMS
- **Direct regulation indicators:** OECD, HT, NMR, EPL
- **Indirect regulations indicators:** Own calculation, from
  - Direct regulation indicators HT, NMR
  - US IO coefficients, year 2000, OECD, STAN

2. Model and estimates

2.2. Impact of production prices and wages on MFP

Signs indicate expected direction of impacts

→ : Impact of the rents and their sharing on productivity

2. Model and estimates

2.2. Impact of production prices and wages on MFP

➤ The model

○ Direct price indicators

$$DM\_p_{cit} = p_{cit} \text{ with } i \in M \quad DNM\_p_{cit} = p_{cit} \text{ with } i \in NM$$

D: Direct; *M*: Manuf; *NM*: Non manuf,

p_{cit} : log of production price index, in country *c*, industry *i* and year *t*

○ Indirect price indicators

$$IM\_p_{cit} = \sum_{j \in M \text{ \& } j \neq i} p_{cjt} * USE_i^j \quad INM\_p_{cit} = \sum_{j \in S \text{ \& } j \neq i} p_{cjt} * USE_i^j$$

I: Indirect;

USE_i^j : intensity-of-use of intermediate inputs, defined as the ratio of the intermediate consumption from industry *j* to industry *i* over the production of industry *i* and measured on the basis of the 2000 input-output table for the USA, taken as country of reference in our analysis

2. Model and estimates

2.2. Impact of production prices and wages on MFP

- **Low and high skill wage indicators**

$$JL\_w_{cit} = w_{ct}^L * SHARE_i^L \quad JH\_w_{cit} = w_{ct}^H * SHARE_i^H$$

w_{ct}^L and w_{ct}^H : log of country wage indices, for the low and high skill workers of country c ; $SHARE_i^L$ and $SHARE_i^H$: corresponding labor costs shares in the production value of industry i for the USA in 2000

- **Regression model**

$$\begin{aligned} mfp_{cit} = & \alpha DM\_p_{ci(t-1)} + \beta DNM\_p_{ci(t-1)} + \gamma IM\_p_{ci(t-1)} + \delta INM\_p_{ci(t-1)} \\ & + \lambda JL\_w_{ci(t-1)} + \mu JH\_w_{ci(t-1)} \\ & + \theta mfp_{US\ i(t-1)} + \eta_c + \eta_i + \eta_t + \eta_{ci} + \eta_{ct} + \varepsilon_{cit} \end{aligned}$$

mfp_{cit} log MFP for country c , industry i and year t

$mfp_{US\ i(t-1)}$ log USA MFP for industry i and year $(t-1)$

2. Model and estimates

2.2. Impact of production prices and wages on MFP

➤ Data and estimates

- 13 countries (US as reference), 18 industries, 1986-2007, 2820 observations
- Fixed effects: country, industry, year, country*year, country*industry
- DOLS estimates
- Estimates in two steps: long term impact and ECM

2. Model and estimates

2.2. Impact of production prices and wages on MFP

Table 1

Impact of Production Prices and Wages on Productivity

DOLS estimations with one lag and one lead (their coefficients are not presented)

Dep. Var. : MFP		(1)	(3)	(4)	(4)
US MFP ₋₁	0.688***	0.821***	0.704***	0.808***	0.720***
	[0.014]	[0.013]	[0.014]	[0.012]	[0.014]
Direct prices ₋₁	-0.513***		-0.523***		-0.441***
	[0.034]		[0.033]		[0.033]
Indirect prices ₋₁		-0.486***	-0.546***		-0.479***
		[0.074]	[0.070]		[0.068]
Country wages ₋₁ * industry labor share (US 2000)				-2.338***	-2.091***
				[0.165]	[0.170]
Observations	2820	2820	2820	2820	2820
R-squared	0.779	0.760	0.785	0.774	0.798
Country*industry fixed effects	Y	Y	Y	Y	Y
Country*year fixed effects	Y	Y	Y	Y	Y

*** significant at 1%; ** significant at 5%; *significant at 10%

Standard errors in brackets

2. Model and estimates

2.2. Impact of production prices and wages on MFP

Table 1

Impact of Production Prices and Wages on Productivity

DOLS estimations with one lag and one lead (their coefficients are not presented)

Dep. Var. : MFP		(1)
US MFP ₋₁		0.756*** [0.015]
Direct prices - Manuf		-0.379*** [0.037]
Direct prices ₋₁ – Non-Manuf		-0.827*** [0.090]
Indirect prices ₋₁ - Manuf		-0.446*** [0.069]
Indirect prices ₋₁ – Non-Manuf		-5.060*** [0.898]
Country wages ₋₁ * industry labor share (US 2000)	High skill workers	-3.043*** [0.329]
	Low skill workers	-1.743*** [0.215]
Observations		2820
R-squared		0.804
Country*industry fixed effects		Y
Country*year fixed effects		Y

*** significant at 1%; ** significant at 5%; *significant at 10%
Standard errors in brackets

2. Model and estimates

2.3. Impact of production prices on CPI

Signs indicate expected direction of impacts

- : Impact of the rents and their sharing on productivity
- : Impact of the rents on consumption price

2. Model and estimates

2.3. Impact of production prices on CPI

- Estimation (level, log-log) of the impact of aggregate production price on CPI
- 14 countries, 1986-2007, 229 observations
- Fixed effects: country, year
- DOLS estimates
- Estimates in two steps: long term impact and ECM

2. Model and estimates

2.4. Impact of regulations on production prices and wage

Signs indicate expected direction of impacts

→ : Impact of regulations on the rent building and the rent sharing

→ : Impact of the rents and their sharing on productivity

→ : Impact of the rents on consumption price

2. Model and estimates

2.4. Impact of regulations on production prices and wages

➤ **Manufacturing production prices**

- Import taxes (HT) impact manufacturing production prices
- Estimates (level, log-log), 14 countries, 13 industries, 1986-2007, 2067 obs.
- Fixed effects: country, industry, year, country*year, country*industry
- DOLS estimates

➤ **Non-manufacturing production prices**

- Non-manufacturing regulation (NMR) impact non-manufacturing production prices
- Estimates (level, log-log), 14 countries, 5 industries, 1986-2007, 753 obs.
- Fixed effects: country, industry, year, country*year, country*industry
- DOLS estimates

➤ **Wages**

- Labour market regulations (EPL) impact High skills wages and Medium + Low skills wages
- Estimates (level, log-log), 14 countries, 1986-2007, 238 obs.
- Fixed effects: country, year

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  - 3.1. Calibration**
  - 3.2. Non-manufacturing industries**
  - 3.3. Manufacturing industries**
  - 3.4. Labour market**
4. Impact of the structural reforms
5. Some conclusive remarks

3. Structural reforms

3.1. Calibration

- **Structural reforms:** adoption of the '*best practices*' regulations
'best practices': average of regulation levels in the 3 countries where they are the lowest
  - ... In the 5 **non-manufacturing industries**, data 2013
  - ... In the 13 **manufacturing industries**, data 2008
  - ... On the **labour market**, data 2013

3. Structural reforms

3.2. Non-manufacturing industries

➤ Regulations in non-manufacturing industries – 2013 (OECD)

3. Structural reforms

3.3. Manufacturing industries

➤ Regulations in manufacturing industries – 2008 (OECD)

Food products (15-16), textiles (17-19), wood products (20), paper (21-22), chemicals products(23-25), non-metallic mineral products (26), metal products (27-28), machinery n.e.c. (29), electrical equipment (30-33), transport equipment (34-35), manufacturing n.e.c. (36-37), construction (45) and hotels & restaurants (55)

3. Structural reforms

3.4. Labour market

➤ Regulations on the labour market – 2013 (OECD)

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1. Introduction
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  - 4.1. Impact on MFP**
  - 4.2. Impact on CPI**
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4. Impact of the structural reforms

4.1. Impact on MFP

➤ Long term impact

4. Impact of the structural reforms

4.1. Impact on MFP

➤ Dynamic impact

4. Impact of the structural reforms

4.2. Impact on CPI

➤ Long term impact

4. Impact of the structural reforms

4.2. Impact on CPI

➤ Dynamic impact

Outline

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5. Some conclusive remarks

- **Original estimates of regulation impact on MFP and CPI**
Through the impact on production prices
- **Large positive MFP impact**
But smaller than what we observed in other countries
(see Aghion, Cetto and Cohen, 2014)
  - **The Netherlands**, following the Wassenaard agreement, 1982
TFP growth: 1977-1983 0.5%, 1983-2002 1.5% => **+ 1pp**
  - **Canada**, reforms from the early 1990s
TFP growth: 1974-1990 0.3 %, 1990-2000 1.1% => **+0.8pp**
  - **Australia**, reforms from the early 1990s
TFP growth: 1971-1990 0.4%, 1990-2002 1.4% => **+1pp**
  - **Sweden**, reforms from the early 1990s
TFP growth: 1976-1992 0.4 %, 1992-2008 1.9% => **+1.5pp**
- **Small negative CPI impact**
But these reforms could go with fiscal devaluations

Appendix

Estimate result tables

Table A1**Analysis of variance of the relation (1) variables controlling for fixed effects**

		(1)	(2)	(3)
Fixed effects	Country*industry	Y	Y	Y
	Country*year	N	Y	Y
	Industry*year	N	N	Y
MFP		0.193	0.163	0.079
USA MFP		0.189	0.164	0.000
Indirect prices	Manuf.	0.041	0.030	0.019
	Non-manuf.	0.009	0.003	0.002
Direct prices	Manuf.	0.070	0.067	0.051
	Non-manuf.	0.032	0.030	0.028
Country wages *industry labour share	High skills	0.013	0.007	0.004
	Low skills	0.025	0.010	0.006
Degree of freedom		2591	2433	2173
Observations		2820	2820	2820

Columns (1), (2) and (3) give the standard deviations of the variables after controlling for fixed effects

Table A2**Analysis of variance of the relation (1) variables in terms of first-differences controlling for fixed effects**

		(1)	(2)	(3)
Fixed effects	Country*industry	Y	Y	Y
	Country*year	N	Y	Y
	Industry*year	N	N	Y
MFP		0.065	0.064	0.052
USA MFP		0.055	0.057	0.000
Indirect prices	Manuf.	0.014	0.011	0.008
	Non-manuf.	0.004	0.002	0.001
Direct prices	Manuf.	0.029	0.028	0.021
	Non-manuf.	0.018	0.018	0.018
Country wages *industry labour share	High skills	0.004	0.003	0.002
	Low skills	0.007	0.003	0.002
Degree of freedom		2575	2432	2172
Observations		2591	2591	2591

Columns (1), (2) and (3) give the standard deviations of the variables after controlling for fixed effects

Table C2**Impact of Regulations on Production Prices and real wages**

DOLS estimations with one lag and one lead (their coefficients are not presented)

Dep. Var.	Production prices		Real wages	
	(1)	(2)	(3)	(4)
	Non-manuf. industries	Manuf. industries	High skills	Low skills
Regulation indicators ⁽¹⁾	0.024***	0.031***	0.030*	0.087*
	[0.005]	[0.005]	[0.017]	[0.017]
Observations	753	2067	238	238
R-squared	0.457	0.201	0.998	0.998
Country fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Country*industry fixed effects	Y	Y	N	N
Country*year fixed effects	Y	Y	N	N

*** significant at 1%; ** significant at 5%; *significant at 10% - Standard errors in brackets

(1): The regulation indicators are the NMR indicators in column 1, the HT indicators in column 2 and the EPL indicator in column 3 and 4

Table 1**Impact of Production Prices and Wages on Productivity**

DOLS estimations with one lag and one lead (their coefficients are not presented)

Dep. Var. : MFP	(1)	(2)	(3)	(4)	(4)
US MFP ₋₁	0.688*** [0.014]	0.821*** [0.013]	0.704*** [0.014]	0.808*** [0.012]	0.720*** [0.014]
Direct prices ₋₁	-0.513*** [0.034]		-0.523*** [0.033]		-0.441*** [0.033]
Indirect prices ₋₁		-0.486*** [0.074]	-0.546*** [0.070]		-0.479*** [0.068]
Country wages ₋₁ * industry labor share (US 2000)				-2.338*** [0.165]	-2.091*** [0.170]
Observations	2820	2820	2820	2820	2820
R-squared	0.779	0.760	0.785	0.774	0.798
Country*industry fixed effects	Y	Y	Y	Y	Y
Country*year fixed effects	Y	Y	Y	Y	Y

*** significant at 1%; ** significant at 5%; *significant at 10%

Standard errors in brackets

Table 1**Impact of Production Prices and Wages on Productivity**

DOLS estimations with one lag and one lead (their coefficients are not presented)

Dep. Var. : MFP		(1)
US MFP ₋₁		0.756*** [0.015]
Direct prices - Manuf		-0.379*** [0.037]
Direct prices ₋₁ – Non-Manuf		-0.827*** [0.090]
Indirect prices ₋₁ - Manuf		-0.446*** [0.069]
Indirect prices ₋₁ – Non-Manuf		-5.060*** [0.898]
Country wages ₋₁ * industry labor share (US 2000)	High skill workers	-3.043*** [0.329]
	Low skill workers	-1.743*** [0.215]
Observations		2820
R-squared		0.804
Country*industry fixed effects		Y
Country*year fixed effects		Y

*** significant at 1%; ** significant at 5%; *significant at 10%
Standard errors in brackets

Table 1B**Impact of Production Prices and Wages on Productivity****Robustness to estimators and fixed effects**

DOLS estimations with one lag and one lead (their coefficients are not presented)

Estimator	DOLS		OLS
Dep. Var. : MFP	(1)	(2)	(3)
US MFP ₋₁	0.720***	-	0.687***
	[0.014]		[0.013]
Direct prices ₋₁	-0.479***	-0.278***	-0.392***
	[0.068]	[0.090]	[0.064]
Indirect prices ₋₁	-0.441***	-0.248***	-0.460***
	[0.033]	[0.030]	[0.031]
Country wages ₋₁ * industry labor share (US 2000)	-2.091***	-0.499*	-1.650***
	[0.170]	[0.285]	[0.157]
Observations	2820	2820	2820
R-squared	0.798	0.872	0.783
Country*industry fixed effects	Y	Y	Y
Country*year fixed effects	Y	Y	Y
Industry*year fixed effects	N	Y	N

*** significant at 1%; ** significant at 5%; *significant at 10%

Standard errors in brackets

Table 1C**Impact of Production Prices and Wages on Productivity****Robustness to estimator and fixed effects**

DOLS estimations with one lag and one lead (their coefficients are not presented)

Estimator		DOLS		OLS
Dep. Var. : MFP		(1)	(2)	(3)
US MFP ₋₁		0.756***	-	0.717***
		[0.015]		[0.014]
Direct prices - Manuf		-0.446***	-0.271***	-0.359***
		[0.069]	[0.091]	[0.064]
Direct prices ₋₁ – Non-Manuf		-5.060***	-0.798	-4.838***
		[0.898]	[0.872]	[0.844]
Indirect prices ₋₁ - Manuf		-0.379***	-0.130***	-0.406***
		[0.037]	[0.033]	[0.034]
Indirect prices ₋₁ – Non-Manuf		-0.827***	-0.719***	-0.785***
		[0.090]	[0.080]	[0.080]
Country wages ₋₁ * industry labor share (US 2000)	High skill workers	-3.043***	-2.162***	-2.412***
		[0.329]	[0.477]	[0.292]
	Low skill workers	-1.743***	-0.112	-1.327***
		[0.215]	[0.339]	[0.202]
Observations		2820	2820	2820
R-squared		0.804	0.877	0.788
Country*industry fixed effects		Y	Y	Y
Country*year fixed effects		Y	Y	Y
Industry*year fixed effects		N	Y	N

*** significant at 1%; ** significant at 5%; *significant at 10%

Standard errors in brackets

Table 3

Impact of Production Prices on the Consumer Price index

DOLS estimations with one lag and one lead (their coefficients are not presented)

Dep. Var. : CPI	(1)
Production Prices	0.762***
	[0.020]
Observations	229
R-squared	0.989
Country fixed effects	Y
Year fixed effects	Y

*** significant at 1%; ** significant at 5%; *significant at 10% - Standard errors in brackets

Table D

Short-term effects

ec: error correction term from the DOLS estimates

Dep. Var. :	MFP growth	Production price growth		Real wage growth		CPI growth
		Non-manuf	Manuf	High skills	Low skills	
	(1)	(2)	(3)	(4)	(5)	(6)
Error correction term (ec)	-0.215***	-0.235***	-0.025**	-0.119***	-0.066**	-0.215***
	[0.013]	[0.027]	[0.010]	[0.036]	[0.033]	[0.013]
Observations	2820	753	2067	225	225	2820
R-squared	0.095	0.088	0.004	0.056	0.039	0.095

*** significant at 1%; ** significant at 5%; *significant at 10% - Standard errors in brackets