



The role of product market regulation for business dynamics and productivity: evidence from firm-level data

Sara Calligaris (STI/PIE) and Peter Gal (ECO/SPAD)

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Presentation based on the work of: Dan Andrews, Matej Bajgar, Sara Calligaris, Flavio Calvino, Chiara Criscuolo, Peter Gal, Luca Marcolin, Carlo Menon, Cyrille Schwellnus, Jonathan Timmis, Rudy Verlhac



Multiple trends point to a reduction in competition

Several OECD works and the academic literature document number of trends suggesting changes in the overall competition environment:

- ↑ **Concentration** (Autor et al., 2020; Bajgar et al., 2019; Bessen, 2017; De Loecker et al., 2022).
- ↑ **Mark-ups and mark-ups dispersion** (Calligaris et al., 2018, De Loecker et al. 2022, De Ridder et al. 2022)
- ↓ **Entry and exit rates** (Akcigit and Ates, 2021; Calvino et al., 2020; Decker et al., 2017)
- ↓ **Productivity growth and greater divergence** (Andrews et al., 2016; Berlingieri et al., 2020, Criscuolo et al., 2022; De Loecker et al., 2022)

Each of them has limitations in capturing the degree of competition. However, most of them seem to point in the same direction, i.e., suggest a reduction in competition.



PMR widely used in our firm-level analysis over the past 10-15 years

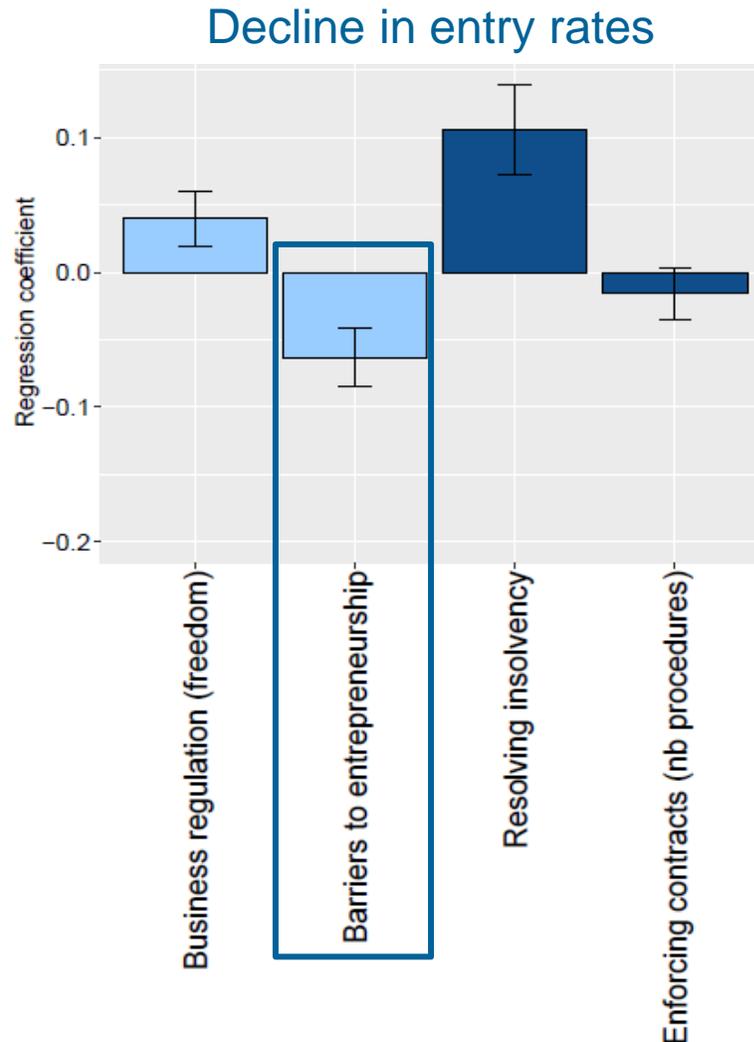
- Lower PMR typically thought as a more **pro-competitive** stance of regulation.
- Weakening competition would call for continued reforms in this area.
- Today we provide an overview of how the PMR indicators have been instrumental in our works to get policy-relevant conclusions on these matters:
 1. Business dynamism
 2. Market power
 3. Wages
 4. Innovation (patents)
 5. Productivity catch-up of lagging firms



1. DECLINING BUSINESS DYNAMISM AND THE ROLE OF REGULATIONS



The decline in entry rates is stronger when barriers to entrepreneurship are more restrictive



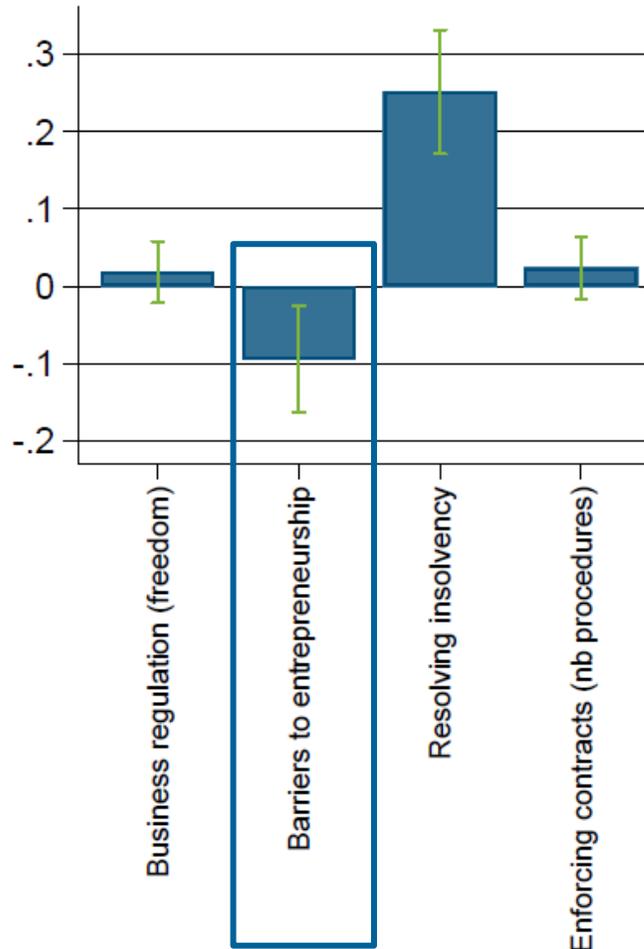
- Among the policy variables: **barriers to entrepreneurship**, sourced from the PMR database.
- A high value of the index indicates stronger barriers to entrepreneurship.
- A negative coefficient indicates that the decline in entry rates is faster where the relevant factor is high.

→ **Main result:** *High regulatory barriers to entrepreneurship amplify declines in entry rates.*



The decline in job reallocation rates is stronger when barriers to entrepreneurship are more restrictive

Decline in job reallocation rates



- **Job reallocation rate:** a measure of the simultaneous job creation and job destruction occurring within an industry.
- Defined as job creation in cell c plus job destruction in the cell, over average of total employment in the cell in period t and total employment in period $t-1$

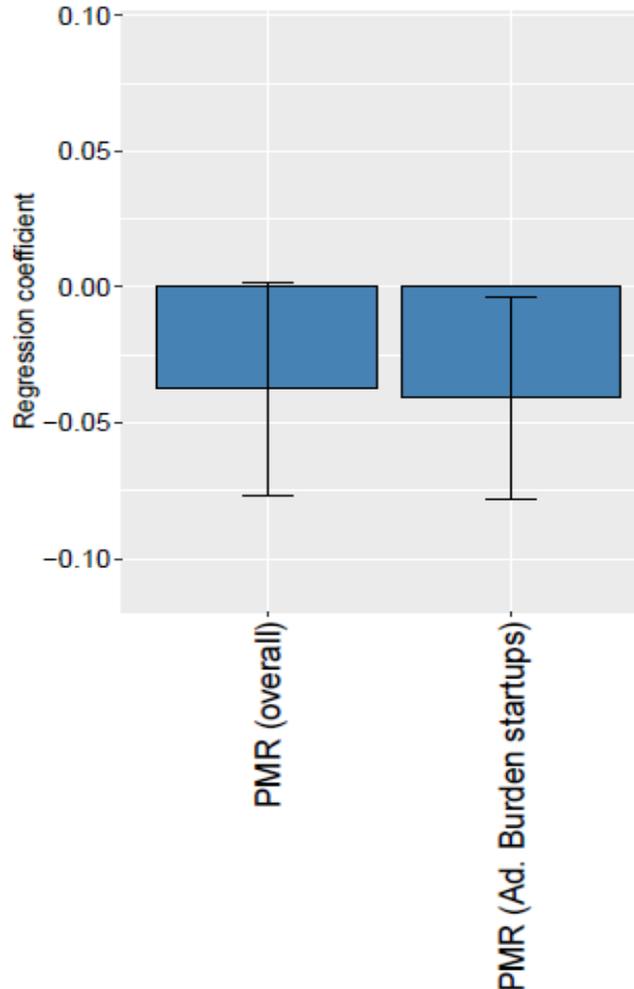
$$Job_realloc_rate_{c,t} = \frac{JC_{c,t} + JD_{c,t}}{\frac{1}{2}(E_{c,t} + E_{c,t-1})} \times 100$$

→ **Main result:** High regulatory barriers to entrepreneurship are associated with stronger declines in job reallocation.



Entry rates are lower in digital intensive sectors when regulatory barriers are more restrictive

Entry rates in digital intensive sectors



- Among the policy variables, from the PMR database:
 - PMR (overall)
 - Administrative burdens on start-ups

- A negative coefficient indicates that PMR is negatively related to entry rates in more digital intensive sectors.

→ **Main results:**

- *Importance of reducing regulatory barriers, especially those related to administrative burdens for start-ups*
- *This is particularly relevant in digital intensive sectors.*



The net job contribution is lower when when regulatory barriers to entrepreneurship are more restrictive

| Policy / Var. dep. | (1) Net job contribution |
|--|-----------------------------|
| Industry variable: volatility | |
| PMR: barriers to entrepreneurship | Incumbents -0.102*** |
| | Entrants -0.143*** |
| | Diff. -0.041 |
| Industry variable: growth dispersion | |
| PMR: barriers to entrepreneurship | Incumbents -0.0668*** |
| | Entrants -0.0517* |
| | Diff. 0.015 |
| Industry variable: financial dependency | |
| PMR: barriers to entrepreneurship | Incumbents -0.102*** |
| | Entrants -0.143*** |
| | Diff. -0.041 |

- Net job contribution: contribution of new firms in terms of new jobs
- Volatility: average within-firm variation of employment growth rates over time
- Growth dispersion: measure of between-firm (cross-sectional) variation of employment growth rates at a given time
- Financial dependency: measures the degree to which a sector relies on financial input.

→ Main results:

- *More stringent PMR has a negative association with net job contribution in volatile, growth-dispersed, and financially dependent industries.*
- *The strength of the association is similar for entrants and incumbents.*



2. INCREASING MARKET POWER AND THE ROLE OF REGULATIONS



Regulatory barriers in network industries decrease the mark-ups of firms operating in downstream industries (I)

In an updated version of the paper "[Mark-ups in the digital era](#)" (Calligaris, Criscuolo and Marcolin, 2018), we mainly look at the correlation between mark-ups, a widely used proxy for market power, and intangibles.

We find that:

- Mark-ups have increased over time, especially in the top half of the mark-up distribution.
- Mark-ups are higher in digital-intensive industries.
- The intangible components of the digital transformation matter above all others for mark-up dynamics.

However, there are other mechanisms that might affect firm mark-ups, such as regulatory barriers. → To check for this mechanism, we relied on:

- the indicator for PMR in network industries - electricity, gas, telecom, post and air, rail and road transports - and in retail and professional services;
- Information in these industries on PMR is then fed into an input-output matrix to measure how intensively a downstream industry relies on the inputs produced by the regulated upstream industries (Bourlès, Cette, Lopez, Mairesse and Nicoletti, 2013).

→ *The resulting indicator measures how anti-competitive regulation in input markets affects production in downstream output industries.*



Regulatory barriers in network industries decrease the mark-ups of firms operating in downstream industries (II)

| | (1) | (2) | (3) |
|--------------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Software investment (t-1) | | 0.013*** (0.003) | 0.012*** (0.004) |
| Online market access (t-1) | | -0.002*** (0.001) | -0.001** (0.001) |
| ICT patent stock (t-1) | | 0.001** (0.000) | 0.001** (0.000) |
| Fixed cost (t-1) | | 0.045*** (0.015) | 0.033*** (0.012) |
| Upstream PMR (t-1) | -0.013** (0.007) | -0.019*** (0.006) | -0.054*** (0.020) |
| Regulated#Software investment (t-1) | | | -0.007 (0.006) |
| Regulated#Online market access (t-1) | | | -0.002 (0.002) |
| Regulated#ICT patent stock (t-1) | | | 0.000 (0.001) |
| Regulated#Fixed cost (t-1) | | | -0.007 (0.018) |
| Regulated#Upstream PMR (t-1) | | | 0.036** (0.018) |
| Observations | 1,021,377 | 1,021,377 | 1,021,377 |
| Controls | age, capital intensity | age, capital intensity | age, capital intensity |
| Fixed effects | firm, country-year, sector-year | firm, country-year, sector-year | firm, country-year, sector-year |
| Cluster | industry-country | industry-country | industry-country |

- Outcome variable: log mark-ups
- “Upstream PMR”: measures the extent to which the output of the regulated industries is used as intermediate input in other industries.
- “Regulated”: 1 for firms in regulated industries, 0 otherwise.
- Cross product: captures the direct link between regulatory barriers in regulated industries and mark-ups of firms operating in those very same industries.

→ Main results:

- *In industries where the output of the regulated industries is used as intermediate input the most, mark-ups are lower.*
- *More regulated industries have on average higher mark-ups.*



3. TRANSMISSION OF PRODUCTIVITY GAINS TO WAGES AND THE ROLE OF REGULATIONS



Competition-friendly product market policies support the transmission of productivity gains to average wages

| | Ratio of average wages to labour productivity | Ratio of median to average wages or ratio of bottom to top firm-level wages |
|--|---|---|
| | Labour share ¹ | Inverse measure of wage inequality ² |
| Technological change | ↘ | ↘ |
| Trade integration | ↘ | ↘ |
| High skills | ↗ | ↗ |
| Competition-friendly product market reform | ↗ | ↘ |
| Loosening of employment protection | ↗ | ↘ |
| Minimum wage reduction | ↗ | ↘ |
| Collective bargaining decentralisation | ⊘ | ↘ |
| ALMP spending increase | ↗ | ? |

- N.B: Downward-pointing arrows indicate decoupling of low/middle wages from productivity, in the sense of lower real wage growth of low/middle wage workers relative to productivity growth. Upward-pointing arrows the opposite effect.

→ **Main results:**

- *Competition-friendly product market policies support the transmission of productivity gains to average wages.*
- *Indeed, in response to such reforms:*
 - *Labour share increases*
 - *Wage inequality decreases*

Source: C. Criscuolo, C. Schwellnus (2018), “[Decoupling of wages from productivity: What implications for public policies](#)”, OECD Economic Outlook, Chapter 2.



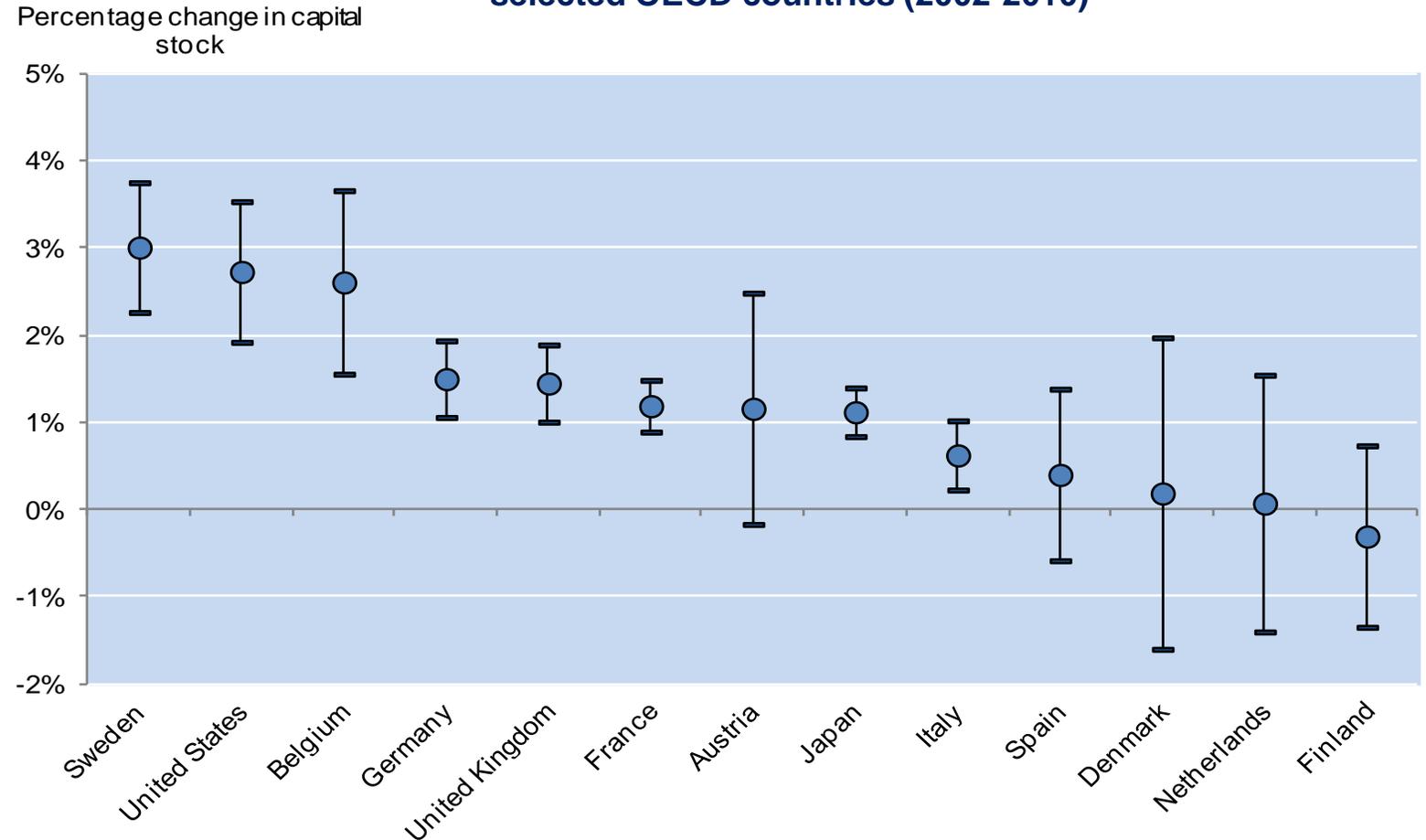
4. UPSCALING OF INNOVATIVE FIRMS AND THE ROLE OF REGULATIONS



How successful are **innovative firms** in attracting capital and labour so that they can grow?*

- Innovativeness at the firm level is captured by **patenting**
- These innovative firms need to **upscale**, expand and attract resources
- Key finding: large cross-country heterogeneity, some countries are better at channelling resources to more innovative firms
- But what drives this heterogeneity? What can **public policy** do?

Change in firm inputs associated with a 10% change in patent stock; selected OECD countries (2002-2010)

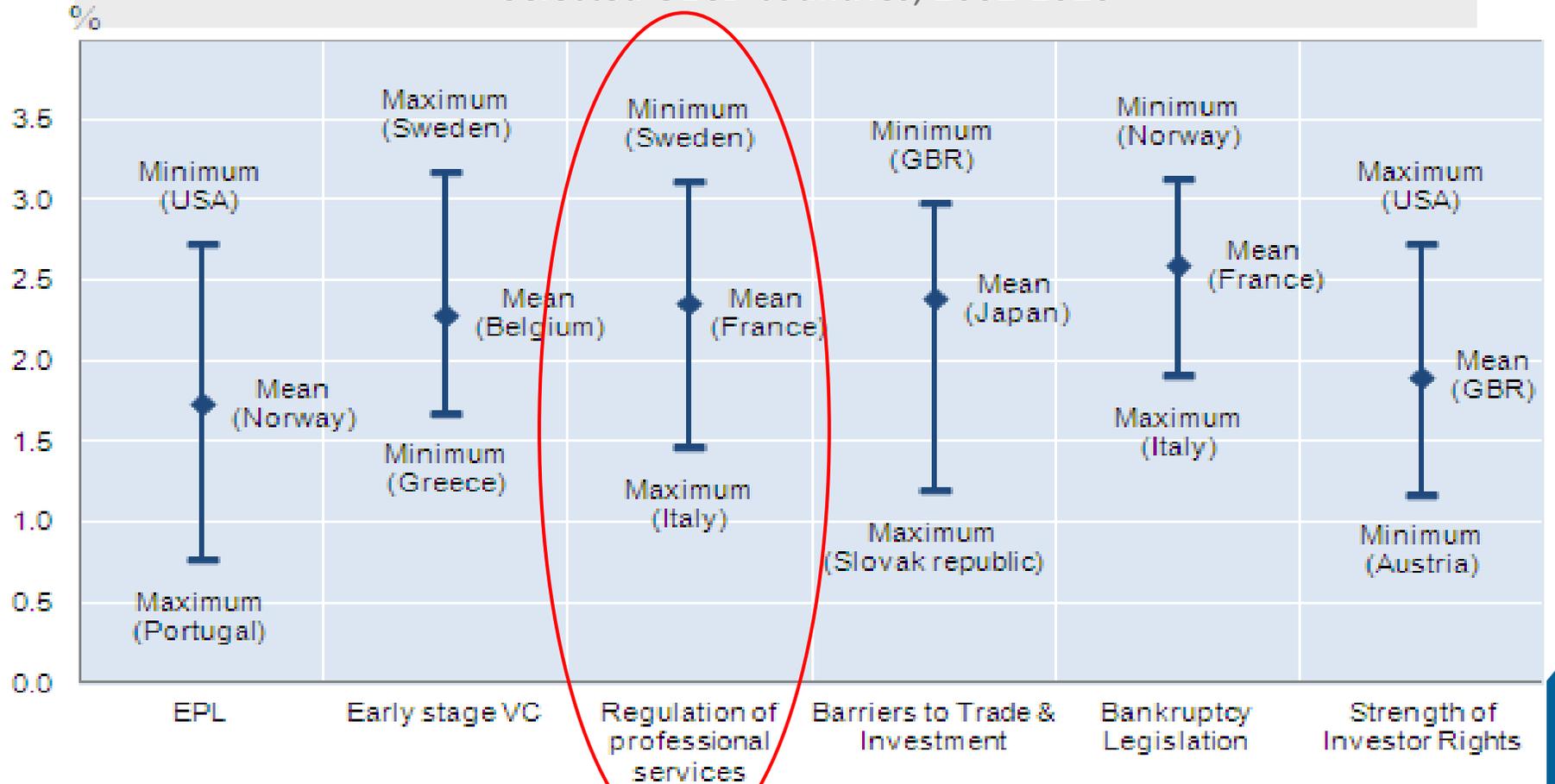


*Based on joint ECO-STI work by Andrews, Criscuolo and Menon (2013) "[Do Resources Flow to Patenting Firms? Cross Country Evidence from Firm Level Data](#)"



The ability of innovative firms to upscale depends on **regulatory burden** as well as on other framework policies

Change in firm **capital** associated with a 10% change in the patent stock
Selected OECD countries; 2002-2010



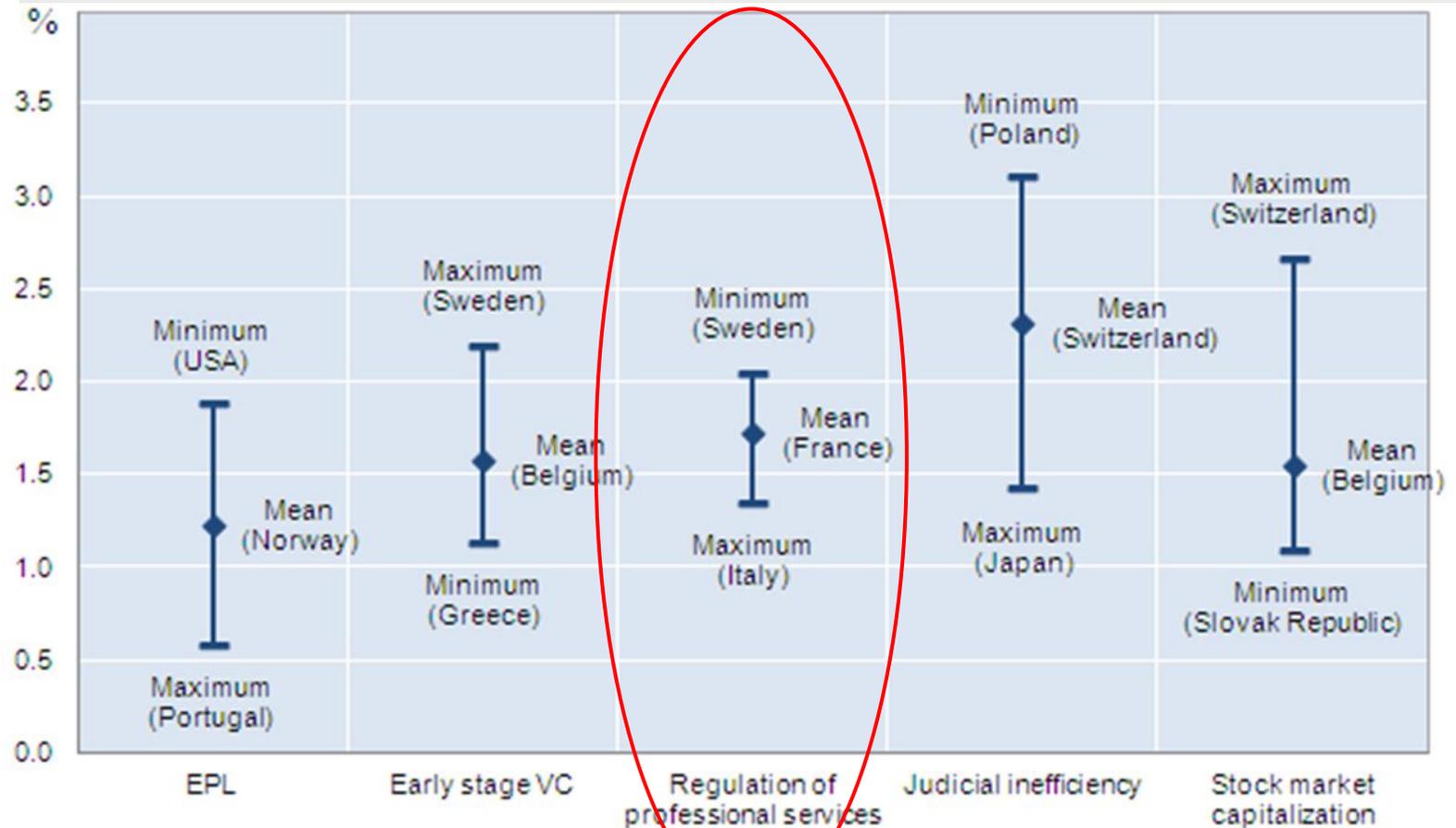
- Cumbersome PMR in business services may raise the cost of expanding the firm
- Indeed they are found to be negatively associated with **capital flows** to patenting firms



The ability of innovative firms to upscale depends on **regulatory burden** as well as on other framework policies

- Cumbersome PMR in business services may raise the cost of expanding the firm
- Indeed they are found to be negatively associated with **employment growth** of patenting firms

Change in firm **employment** associated with a 10% change in the patent stock
Selected OECD countries; 2002-2010



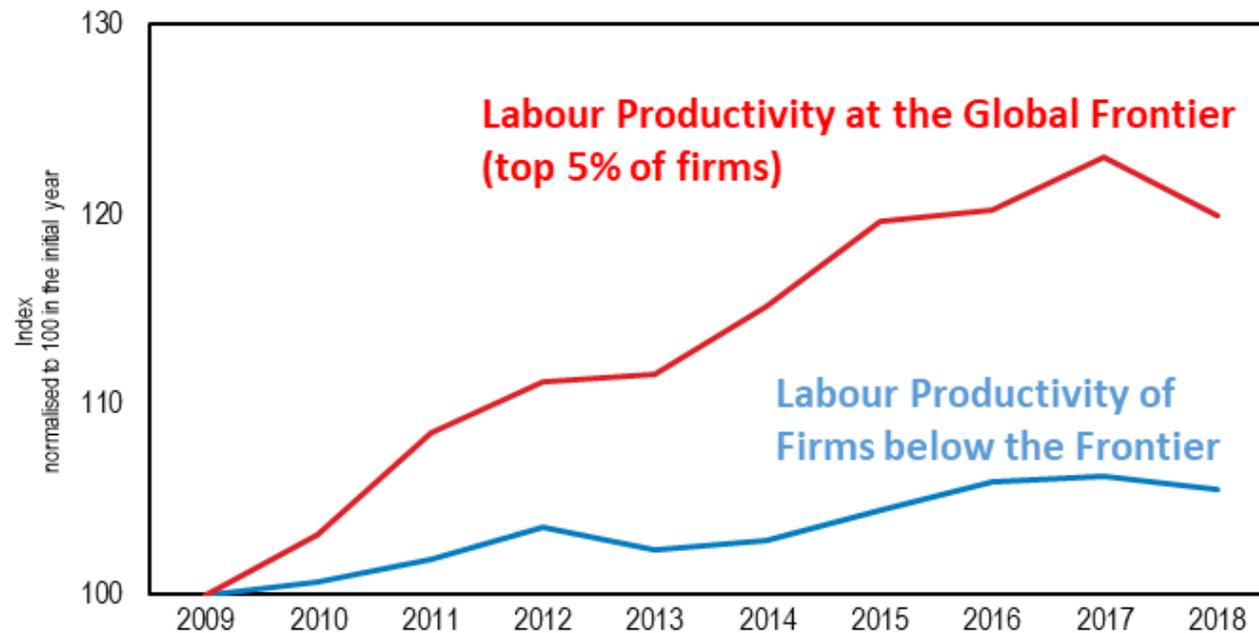


5. PRODUCTIVITY CATCH-UP OF LAGGING FIRMS AND THE ROLE OF PRO-COMPETITIVE REFORMS



Competition and productivity gaps across firms

- OECD work identified an **increasing productivity gap** between firms at the frontier and other firms (Andrews, Criscuolo, Gal, 2015 and 2016; Berlingieri et al., 2020, Criscuolo et al., 2022)



Note: Updated calculations by Natia Mosiashvili, building on work by Valentine Millot and methodology in Andrews, Criscuolo and Gal (2016)
Source: Moody's/BvD Orbis database

- What drives this? Role for **policies**, through promoting competition ?

*Based on joint ECO – STI work by Andrews, Criscuolo and Gal (2016): "[The Best vs the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy](#)"



Pro-competitive PMR as an incentive for lagging firms to boost their productivity – a few key channels

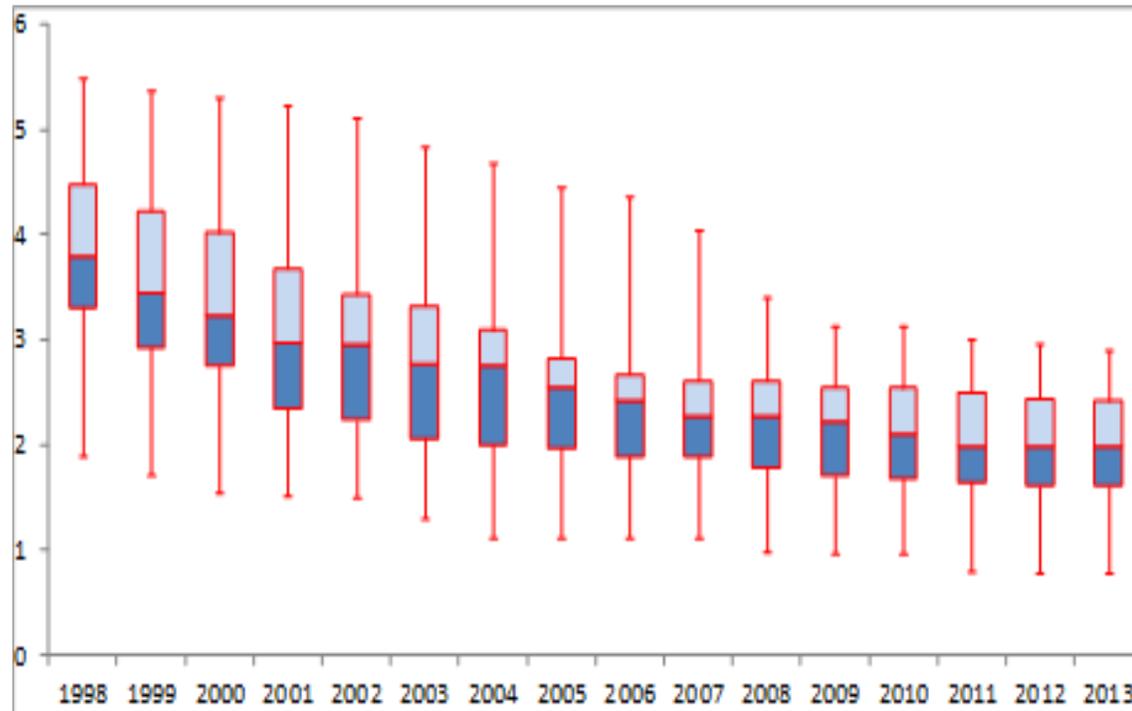
1. Sharpening the **incentives** for incumbent firms to adopt better technologies (Bloom, Draca and Van Reenen., 2015; Perla, Tonetti and Waugh, 2015; Steinwender, 2015; Baily, 1993; Baily et al., 2005)
2. Raising **managerial quality**, which is complementary to adoption (Bloom and Van Reenen, 2010; Bloom et al 2012)
3. Reducing **entry barriers**: young firms possess a comparative advantage in commercialising leading technologies (Henderson, 1993; Baumol, 2002)
4. Raising returns to technology upgrade in downstream manufacturing sectors via **input-output linkages** (Bourlès, Cette, Lopez, Mairesse and Nicoletti, 2013)



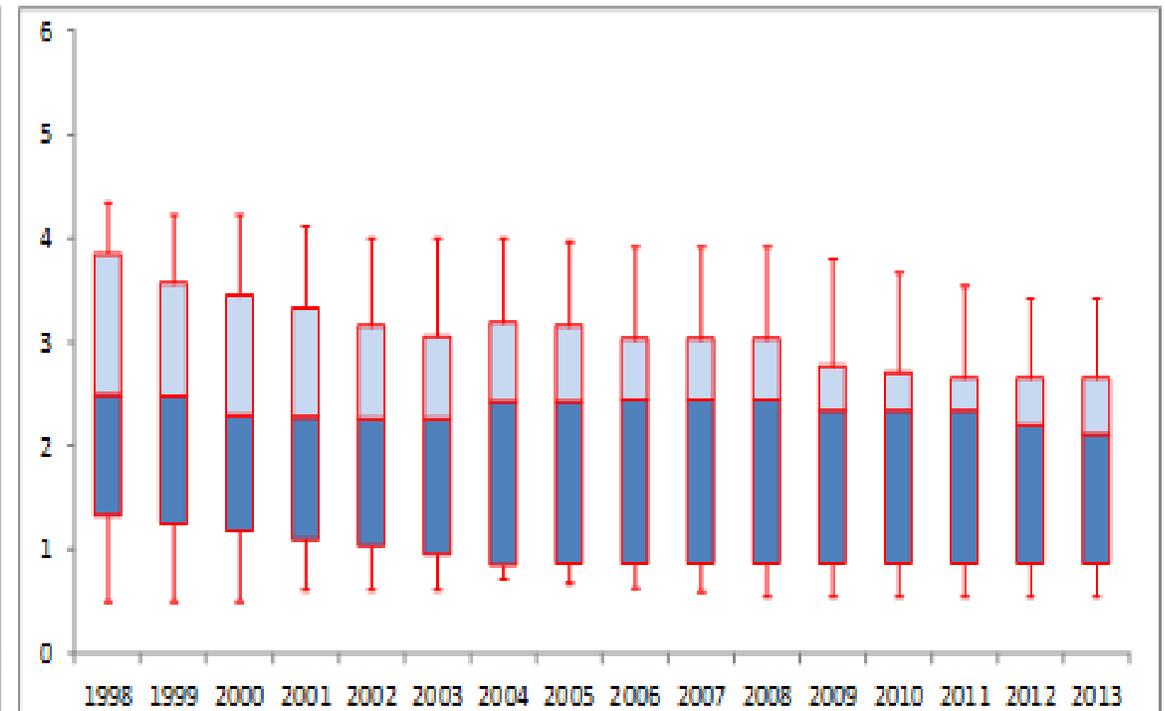
Measuring pro-competitive regulatory reforms by the **PMR subindices** for specific sectors

PMR subindices for two broad sectors

A: Network industries (transport, energy, comm.)



B: Professional Services (legal, accounting, etc.)



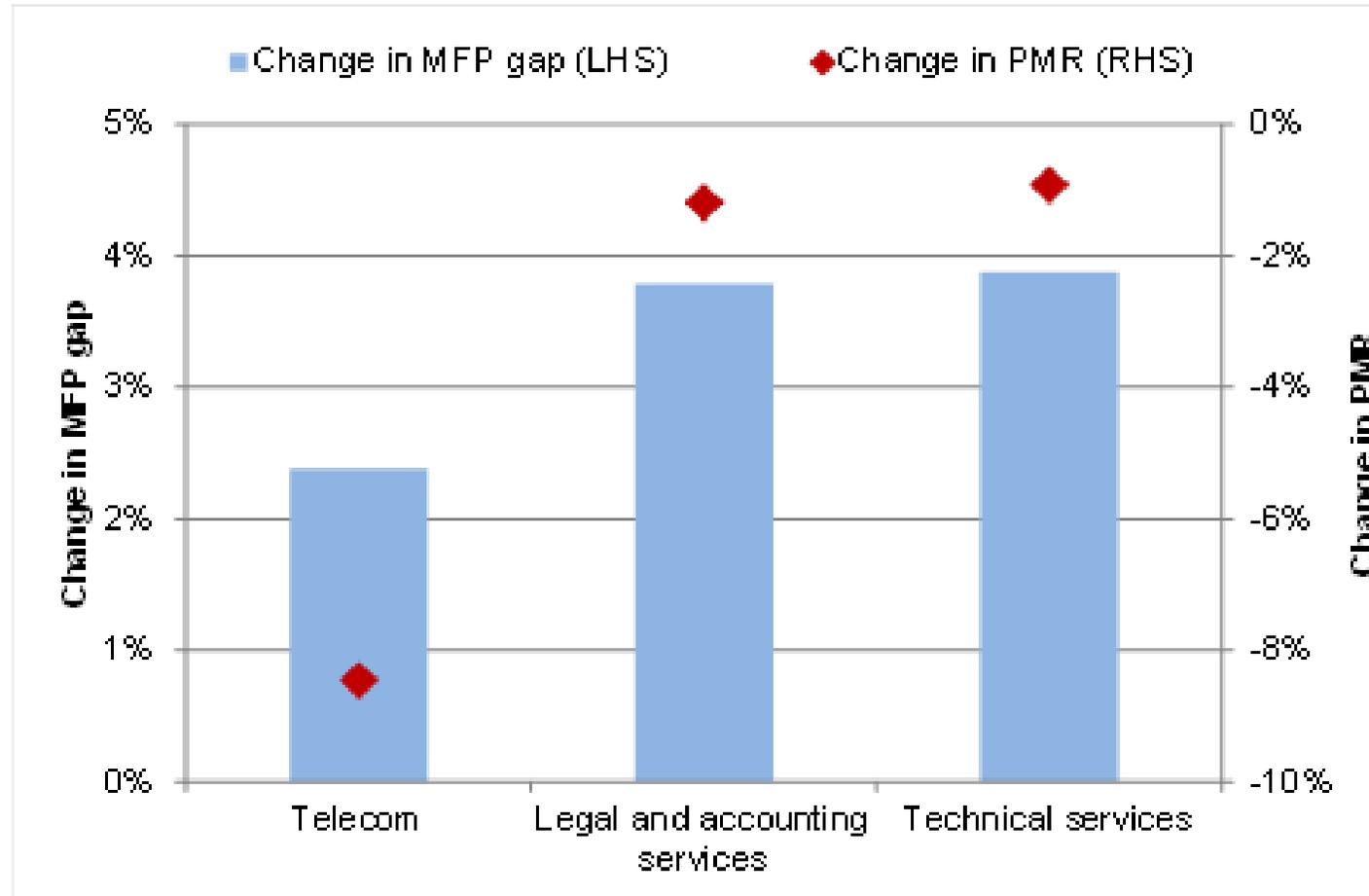
Notes: The horizontal line in the boxes represents the median, the upper and lower edges of each boxes reflect the 25th and 75th percentiles and the markers on the extremes denote the maximum and the minimum across countries.

Source: Calculations by Gal and Hijzen (2016) based on OECD indicators on product market regulation (PMR; Conway and Nicoletti, 2006; Koske, Wanner, Bitetti and Barbiero, 2015) and additional information on the timing of reforms for retail and professional services (Duval, Furceri, Jalles and Nguyen, 2016).



Slower reform goes hand in hand with a larger increase in the productivity gap

Selected industries; annual average change over time and across countries



Note: The figure shows the annual change in the (log) MFPR gap between the frontier and laggard firms and the change in the (log) PMR indicator. Technical services refer to architecture and engineering.



Faster growing productivity gaps where reforms were slower

MFP divergence and product market regulation in services

Five-year long differences on *country x sector* panel (1998-2013)

| | Y: Δ MFP gap | | Y: Δ Mark-up corrected MFP gap | |
|---|---------------------|---------------------|---------------------------------------|--------------------|
| | (1) | (2) | (3) | (4) |
| Δ Product Market Regulation _{s,c,t} | 0.205*** (0.065) | 0.231*** (0.083) | 0.332*** (0.103) | 0.311** (0.132) |
| Country fixed effects | YES | NO | YES | NO |
| Industry fixed effects | YES | YES | YES | YES |
| Year fixed effects | YES | NO | YES | NO |
| Country X year fixed effects | NO | YES | NO | YES |
| Observations | 458 | 458 | 376 | 376 |
| R-squared | 0.201 | 0.323 | 0.327 | 0.463 |

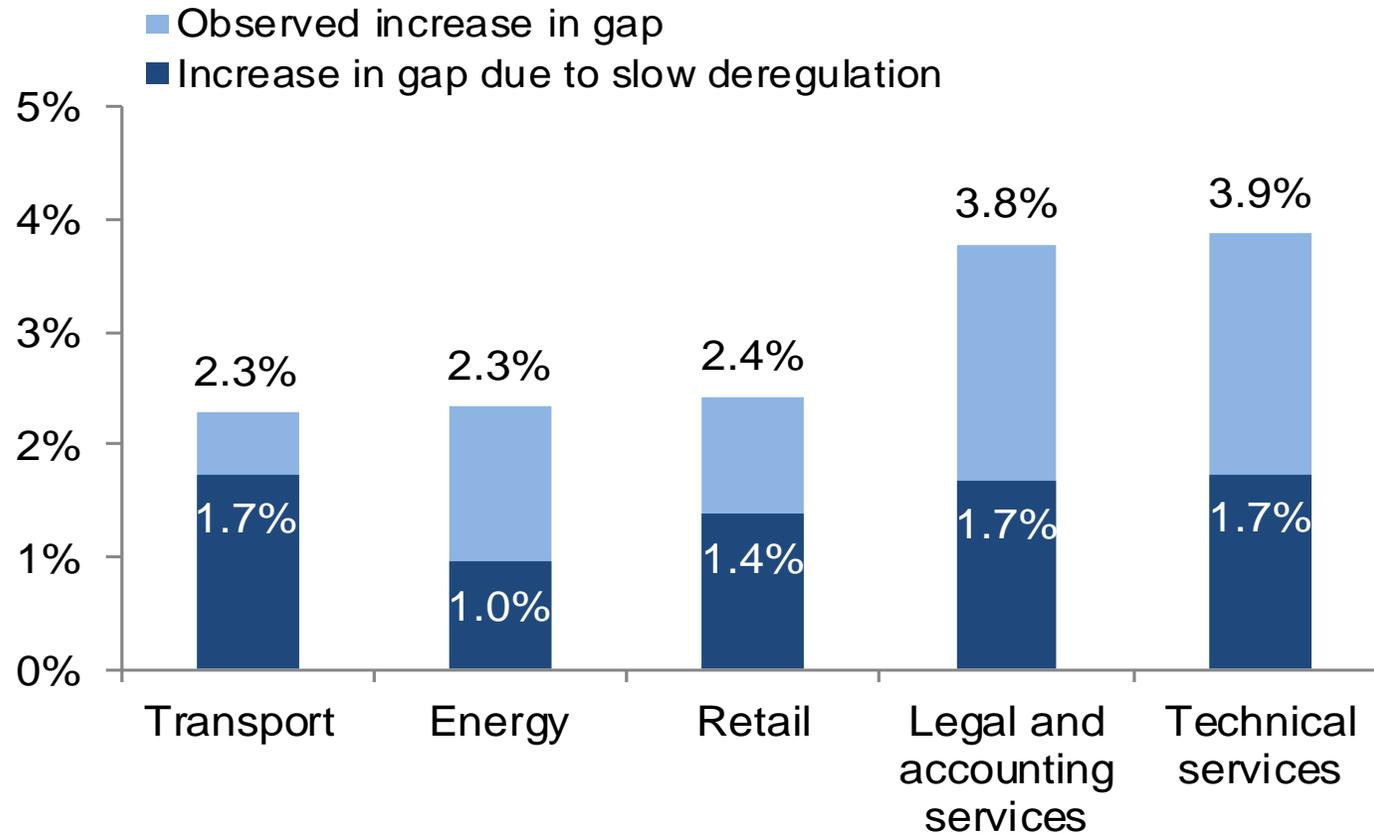
Finding is robust to **instrumenting PMR with reform waves** from neighbouring countries

Notes: Cluster robust standard errors (at the industry-year level) in parentheses. *** p<0.01, ** p<0.05, * p<0.1 Both the MFP gap and the PMR indicator are measured in log terms. The MFP gap is calculated at the country-industry-year level, by taking the difference between the global frontier and the average of log productivity of non-frontier firms.

$$\Delta^{ld} MFPgap_{s,c,t} = \beta_0 + \beta_1 \Delta^{ld} PMR_{s,c,t} + \beta_2 \Delta^{ld} E_{s,c,t} + \delta_c + \delta_s + \delta_t + \varepsilon_{s,c,t}$$

Counterfactual: faster market reform would have mitigated productivity divergence

Estimated contribution to the annual change in the MFP gap of the slower pace of reform *relative to the fastest reforming industry (telecoms)*



MFP divergence was perhaps inevitable due to structural changes in the global economy...

but policy could have worked harder to counter such forces



THANK YOU!

sara.calligaris@oecd.org

peter.gal@oecd.org

Stronger increases in industry concentration are associated with stronger reductions in the intensity of PMR

| | (1) | (2) |
|--|----------------------|---------------------|
| Outcome variable: | 4-year Change in CR8 | |
| Intangible Investment (II) | 0.243*** (0.043) | 0.239*** (0.042) |
| 4 Year Change in Product Market Regulation (Δ PMR) | -0.047** (0.019) | -0.047** (0.019) |
| Δ PMR x Initial II | | 0.454 (0.307) |
| 4-year Growth in Real Output | yes | yes |
| Tangible investment | yes | yes |
| Country-year FE | | |
| Industry-year FE | yes | yes |
| N | 3825 | 3825 |

→ Main results:

- *Negative relationship between changes in product market regulations and concentration.*
- *Countries with stronger increases in industry concentration seem to have seen stronger reductions in the intensity of product market regulations.*
- *However, the estimated coefficient is not very large.*
- *These results do not indicate excessive regulations as a likely factor behind concentration increases observed.*