OECD Economics Department Working Papers

Product market regulation and services productivity in the European Union

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No. 1850

OECD

OECD Economics Department Working Papers

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ABSTRACT / RÉSUMÉ

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This paper studies how product market regulation (PMR) affects firm-level labour productivity growth and within-sector labour reallocation across EU countries and service sectors from 2000 to 2021. Using productivity shocks to U.S. parent firms as instrument for productivity spillovers, it finds that stricter PMR weakens the positive impact of US shocks on EU subsidiary productivity growth and hampers within-sector labour reallocation. In highly regulated countries and sectors, productivity spillovers are diminished, and employment growth in more productive firms slows. The findings suggest that pro-competition reforms and greater market integration could strengthen productivity and reallocation in the EU service sector.

JEL classification codes: D61; F23; L51; L80; O47; O52

Keywords: Product market regulation, services, productivity, labour reallocation, Single Market

This Working Paper relates to the 2025 OECD Economic Survey of the European Union and euro area, https://www.oecd.org/en/topics/sub-issues/economic-surveys/european-union-euro-area-economic-snapshot.html.

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La réglementation des marchés de produits et la productivité des services dans l'Union européenne

Cet article examine comment la réglementation des marchés de produits (RMP) influence la croissance de la productivité du travail au niveau des entreprises et la réallocation de la main-d'œuvre au sein des secteurs des services de l'UE entre 2000 et 2021. En utilisant les chocs de productivité des maisons mères américaines comme instrument de diffusion de la productivité, l'étude montre qu'une RMP plus stricte affaiblit l'impact positif de ces chocs sur la croissance de la productivité des filiales européennes et freine la réallocation sectorielle de la main-d'œuvre. Les résultats suggèrent que des réformes pro-concurrentielles et une meilleure intégration des marchés pourraient renforcer la productivité et la réallocation dans le secteur des services de l'UE.

Classification JEL: D61; F23; L51; L80; O47; O52

Mots Clés: Réglementation des marchés de produits, services, productivité, réallocation de la main-d'œuvre, marché unique

Ce Document de travail a trait à l'Étude économique de l'OCDE de l'Union européenne et de la Zone euro 2025, https://www.oecd.org/en/topics/sub-issues/economic-surveys/european-union-euro-area-economic-snapshot.html.

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Product Market Regulation and Services Productivity in the European Union

By Alessandro Zona Mattioli and Martin Borowiecki[1]

Introduction

The Single Market for services in the EU remains fragmented due to varying product market regulations across countries (OECD, 2025[1]). Significant differences persist in sectors such as professional services, retail, telecommunications, and transport (Figure 1). These frictions may protect incumbents, restrict entry of innovative firms, and hinder efficient resource reallocation to more productive firms (Sorbe, Gal and Millot, 2018[2]). Regulatory fragmentation disadvantages European businesses, as firms in larger, more integrated markets can scale up more easily and are typically more innovative and productive (Draghi, 2024[3]). Given the services sector's importance for the EU economy, such inefficiencies may reduce aggregate productivity. This study examines how regulatory stringency in services affects firm-level productivity across EU countries and whether these regulations limit efficient labour allocation to the most productive firms.

The analysis focuses on the services sector, which accounts for the largest share of employment and GDP in European economies. Despite significant ICT innovations and the rise of knowledge-intensive industries, productivity growth in this sector remains challenging (Sorbe, Gal and Millot, 2018[2]; Mourougane and Kim, 2020[4]). The study also examines economy-wide effects, including manufacturing, both for comparison and because of increasing 'servitisation', where manufacturing firms increasingly offer services (Baines et al., 2009[5]).

Enhancing productivity requires both improvements within firms and the efficient reallocation of resources from less to more productive enterprises. This reallocation is crucial for aggregate productivity growth, ensuring resources are used where they create the most value. Resource misallocation can hinder aggregate productivity, even with positive firm-level productivity growth (Bartelsman, Haltiwanger and Scarpetta, 2013[6]). Weak allocative efficiency may stem from industry-specific factors. In services sectors with low capital deepening, firms may struggle to scale up despite productivity advantages, due to limited access to capital-intensive technologies. Additionally, restrictive regulations on entry, labour mobility, or investment can hinder productive firms from expanding, limiting gains from reallocation.

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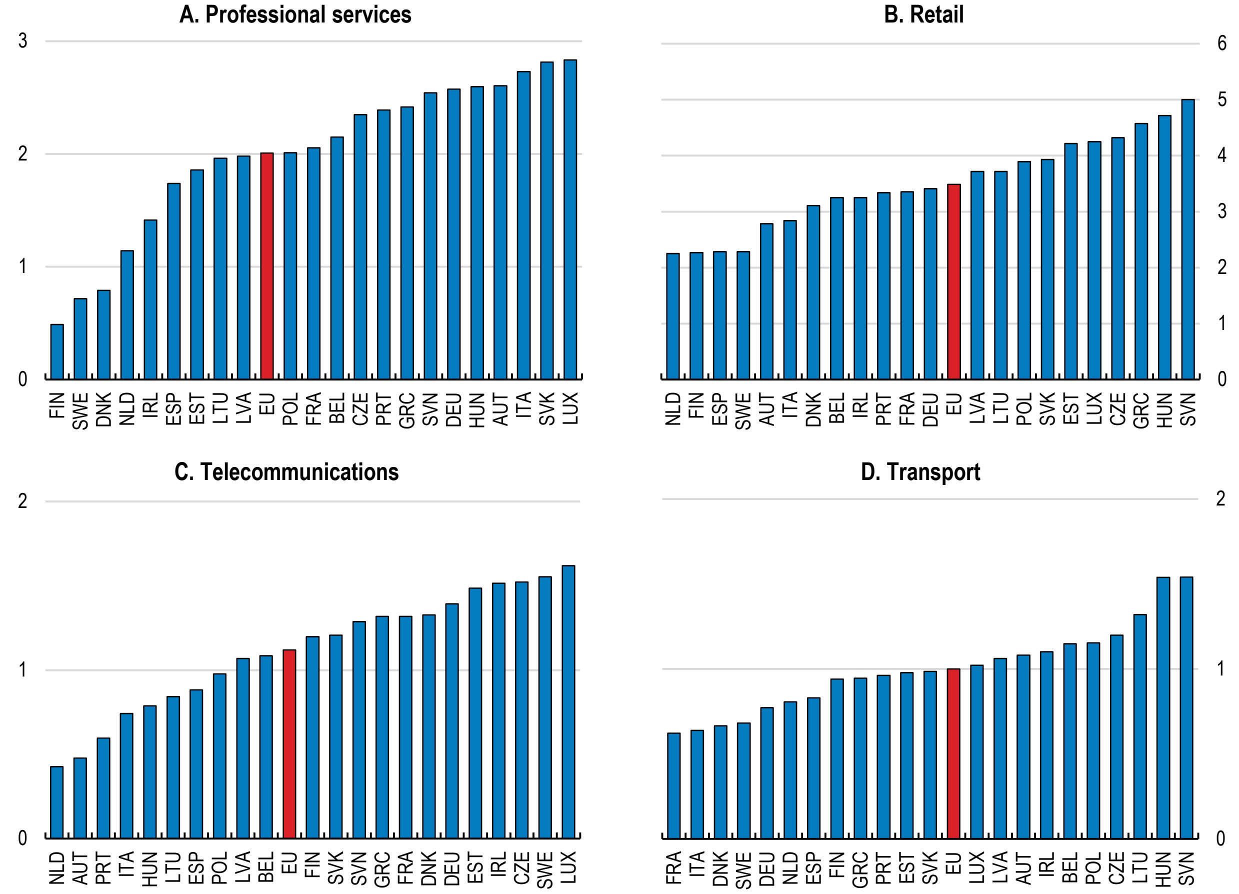
[1] The analysis informed policy recommendations of the 2025 OECD Economic Survey of the European Union and the euro area. Martin Borowiecki is a member of the OECD Economics Department. Alessandro Zona Mattioli is member of Vrije Universiteit Amsterdam. The corresponding author is Martin Borowiecki (Martin.Borowiecki@oecd.org). The paper has benefited from comments and suggestions from Mame Fatou Diagne, Jan Stráský, Dan Andrews, Balázs Egert, Peter Gal, Luca Marcolin, Valentine Millot (with the OECD Economics Department), Andrew Green, Martin Reinhard and Rudy Verhac (with the OECD Directorate for Science, Technology and Innovation). Federico Giovannelli offered statistical and research support. Robin Houng Lee provided valuable editorial assistance.

Figure 1. Stringency of services sector regulations differs across EU countries

Product Market Regulation (PMR) indicator scores, from 0 to 6 (most restrictive), 2023



Note: OECD Member countries that are also Member States of the EU are shown. The Product Market Regulation (PMR) indicator is a composite index that encompasses a set of indicators that measure the degree to which policies promote or inhibit competition in areas of the product market where competition is viable.
Source: OECD Product Market Regulation database.

Regulations may affect services productivity in various ways. Stringent regulations on professional services negatively affect the decision to export and the export volumes of professional services (Crozet, Milet and Mirza, 2016[7]), as well as downstream industries that rely on these inputs (Égert and Wanner, 2016[8]; Andrews et al., 2025[9]; Andrews and Egert, 2025[10]). Regulations may also reduce competition by creating entry barriers, limiting entry of innovative startups, and weakening incumbents' incentives to adopt newest technologies and improve management practices (Aghion et al., 2005[11]; Gal and Hijzen, 2016[12]; Haltiwanger, Jarmin and Miranda, 2013[13]; Andrews, Criscuolo and Gal, 2016[14]). In addition, stringent regulations can create barriers to labour mobility, hindering the growth of productive firms. For example, occupational license requirements have been shown to reduce aggregate productivity growth by limiting labour mobility (Bambalaite, Nicoletti and von Rueden, 2020[15]; Hermansen, 2019[16]; Johnson and Kleiner, 2020[17]). In contrast, deregulatory product market reforms have been shown to improve firms' productivity in the medium term (Andrews and Cingano, 2014[18]; Gal and Hijzen, 2016[12]; Bouis, Duval and Eugster, 2020[19]).

Inefficient resource allocation in services may stem from constraints specific to services, such as the need to be geographically close to consumers. However, advances in IT have enabled many services, including professional services, to be traded across borders. Similarly, productivity improvements in IT have driven productivity growth and enabled economies of scale in the retail sector (Hortaçsu and Syverson, 2015[20]). This suggests many service activities are less constrained, allowing more productive firms to grow and benefit from economies of scale. However, the wide variation in services productivity across EU countries indicates that regulatory policy still plays a significant role (Sorbe, Gal and Millot, 2018[2]).

This study contributes to the literature on regulation and productivity by focusing on the direct effects of services regulations on services productivity in the EU over 2000-2021. Earlier research using cross-country or cross-state variation found that strict labour and entry regulations hinder productivity (Besley and Burgess, 2004[21]; Djankov et al., 2002[22]). While some studies examined occupational licensing (Bambalaite, Nicoletti and von Rueden, 2020[15]) or the indirect effects of upstream regulations (Égert and Wanner, 2016[8]; Andrews et al., 2025[9]; Andrews and Egert, 2025[10]), evidence on direct effects of services regulations on services productivity remains more limited (e.g., retail trade regulations on retail trade sector outcomes). Examples include Castle et al. (2025[23]), analysing product market regulation effects on retail and professional services productivity in nine EU countries (1998-2023), and Gal and Hijzen (2016[12]), assessing product market reforms' influence on services employment, output and capital in 16 EU countries, Korea and Japan (1998-2013). With ICT advancements transforming services trade, examining the direct regulatory impacts is increasingly urgent, raising critical questions for the functioning and integration of the EU Single Market for services:

- Is product market stringency in professional services, retail, telecommunications and transport sectors hindering firm-level productivity growth?
- Is product market stringency in these sectors hindering the reallocation of labour to most productive firms?

This study makes two main contributions. First, it offers a novel way to identify the causal effect of product market regulation (PMR) on productivity: by examining how productivity shocks from US-based parent companies affect their EU-based subsidiaries, and how national regulation moderates this productivity spillover. Simple regressions linking EU firms' productivity to country or industry PMR indicators may suffer from endogeneity concerns and bias due to unobserved factors, such as regulatory reforms driven by productivity trends or lobbying. To address this, the study focuses on an exogenous shock originating from the more productive US economy and investigates how PMR influences the extent of productivity transmission to EU subsidiaries.

A key assumption is that, after controlling for observable firm characteristics, no unobserved factor affects productivity of both US parent companies and their EU subsidiaries. Thus, regressing EU subsidiaries' productivity on that of US parents captures exogenous productivity shocks, such as technology or managerial transfers. We then interact this spillover with PMR data to assess how regulatory stringency shapes EU subsidiaries' response to US parent firm productivity. OLS estimation with country-industry-year fixed effects controls for unobserved factors at the country-industry level, notably lobbying influencing industry PMR levels, regulatory trends, and potential spillovers from US foreign direct investment within a given country and industry.

However, OLS estimates may be biased by reverse causality between parent and subsidiary productivity. System GMM estimation, with year and industry-year fixed effects, addresses these endogeneity concerns by instrumenting the spillover variable with its lagged levels and differences. A drawback of GMM is that it allows for a less saturated set of fixed effects, making it a complementary approach to the OLS baseline results rather than a substitute.

Using sector- and country-level PMR indicators, we find that stricter regulation is associated with weaker productivity spillovers in services, and across all industries (i.e., services and manufacturing). These findings hold even when controlling for other regulatory factors like employment protection legislation and insolvency regimes.

Our second contribution examines the reallocation channel, a key driver of productivity growth (Bartelsman, Haltiwanger and Scarpetta, 2013[6]). Reallocation shifts labour from less to more efficient firms, increasing overall productivity. Decker et al. (2016[24]) highlight that declining responsiveness of employment growth to firm-level productivity growth contributes to reduced business dynamism in the United States. Using the full sample of Orbis services and manufacturing firms, we find that stricter country-level PMR is linked to lower elasticity of employment growth to firm-level productivity in the EU. However, results using sector-level PMR for services firms alone are not significant, suggesting other policy factors such as employment protection may play a role as well. Nonetheless, the findings suggests that overly strict regulation may discourage productive firms from expanding their workforce, limiting reallocation and reducing overall productivity growth.

The remainder of the paper is organized as follows. Section 2 briefly introduces the full Orbis sample, the subsample of US parent firms and their EU subsidiaries, and their representativeness. Section 3 outlines trends in firm-level productivity dynamics and allocative efficiency in the EU. Section 4 describes the empirical methodology. Section 5 presents the results, and Section 6 concludes.

Data

The Orbis dataset

This study uses firm-level data from the Orbis database, a comprehensive cross-country longitudinal dataset maintained by Bureau van Dijk. The data is processed using the methodology adapted from Gal (2013[25]), which includes retaining firms with full calendar year accounts, harmonising at the consolidated account level (across subsidiaries), and excluding observations with missing key variables or implausible outliers.

The main variable of interest is labour productivity, measured as the natural logarithm of value added per worker. This indicator has advantages over other productivity measures such as multi-factor productivity (MFP). It requires minimal assumptions and avoids the data-intensive structural estimation of production functions, which have mainly been applied to manufacturing firms. We choose this approach to maximise our sample size. Moreover, this metric serves as a valid proxy for various production processes and technologies, which are highly heterogeneous in our data. We construct value added by summing Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) and employee costs, instead of using Bureau van Dijk's measure. This approach offers better coverage and avoids issues arising from Bureau van Dijk treating missing components as zero, which can lead to inaccurate or unreasonable results.

The final dataset is an unbalanced panel of 4 202 967 firms (3 470 586 service firms and 732 381 manufacturing firms) across 21 European countries, covering the years 2000–2021. The sample includes Austria, Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, and Sweden. Firms operate in manufacturing and business services (excluding finance). Specifically, business service sectors include Accommodation and Food Services, ICT, Real Estate, Wholesale and Retail Trade, Administrative and Support Services, Professional, Scientific and Technical Services, and Transport (NACE Rev.2 sections G, H, I, J, L, M, and N).

The dataset, not sourced from statistical agencies, may face representativeness challenges. Caution should be used when applying these results to specific countries, although our findings are broadly applicable across the countries in our study (see below). Based on the average number of firms per country in 2005–2020, our sample overrepresents firms from France and Spain compared to official OECD statistics, while it underrepresents Germany and Poland, among other countries (Table 1). Previous studies using Orbis data, such as Kalemli-Özcan et al. (2024[26]), have noted similar limitations.

Table 1. Percentage share of firms, Orbis sample versus OECD official data

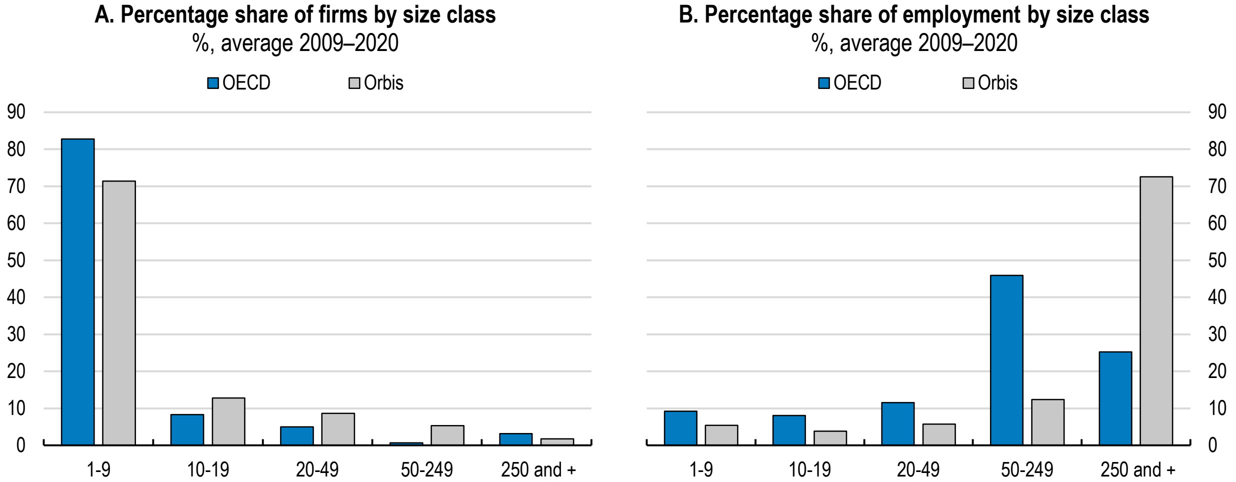
Percentages are averaged over the years 2005–2020

	IT	DE	FR	PL	ES	CZ	PT	GR	NL	SE	HU	SK	BE	AT	FI	SI	DK	IE	LV	EE
Orbis	21.8	1.4	12.7	1.3	27.1	1.1	12.0	0.0	0.1	7.1	6.9	0.8	1.5	0.1	2.3	1.9	0.3	0.2	0.1	1.3
OECD	21.7	10.6	10.5	10.1	9.6	8.7	3.8	3.5	2.9	2.8	2.8	2.6	1.9	1.3	1.1	0.9	0.8	0.7	0.5	0.3

Note: The percentage share of firms for Luxembourg is 0.0 in Orbis and OECD official data.
Source: OECD Structural business statistics by size class and economic activity (ISIC Rev. 4) database; OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

The sample's size-class distribution closely matches official OECD data, although very small (fewer than 10 employees) and large (more than 250 employees) firms are slightly underrepresented (Figure 2, Panel A), particularly small firms in Germany and the Netherlands (Figure A.1-Figure A.5 in the annex). Employment shares are less representative, with large firms overrepresented, as is typical of Orbis data where larger firms more often disclose information (Panel B). While regulatory effects could differ for small firms, results below show that regulation's impact on productivity does not vary by firm size (Table 6 and Table 8), indicating that our estimates likely capture regulation's overall effect accurately despite representativeness issues.

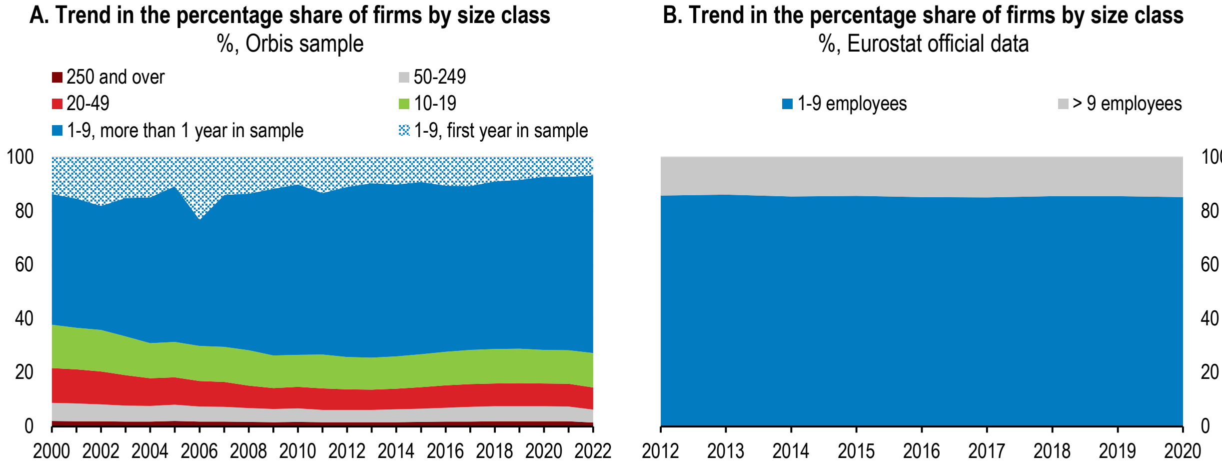
Figure 2. Percentage share of firms and employment by size class, Orbis sample versus OECD official data



Note: Size class is based on the number of employees.
Source: OECD Structural business statistics by size class and economic activity (ISIC Rev. 4) database; OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Smaller firms are underrepresented in the sample, but their share rose until 2005, possibly causing selection issues due to changing sample composition towards smaller, less productive firms. The shift before 2005 may also reflect a general trend toward smaller, less productive firms during that period, although official statistics for that period are unavailable. After 2005, the sample composition stabilises with smaller firms (1-9 employees) accounting for about 70% of our sample. This share went up to 74% in 2008 and remained stable since then, aligning with official Eurostat statistics (Figure 3).

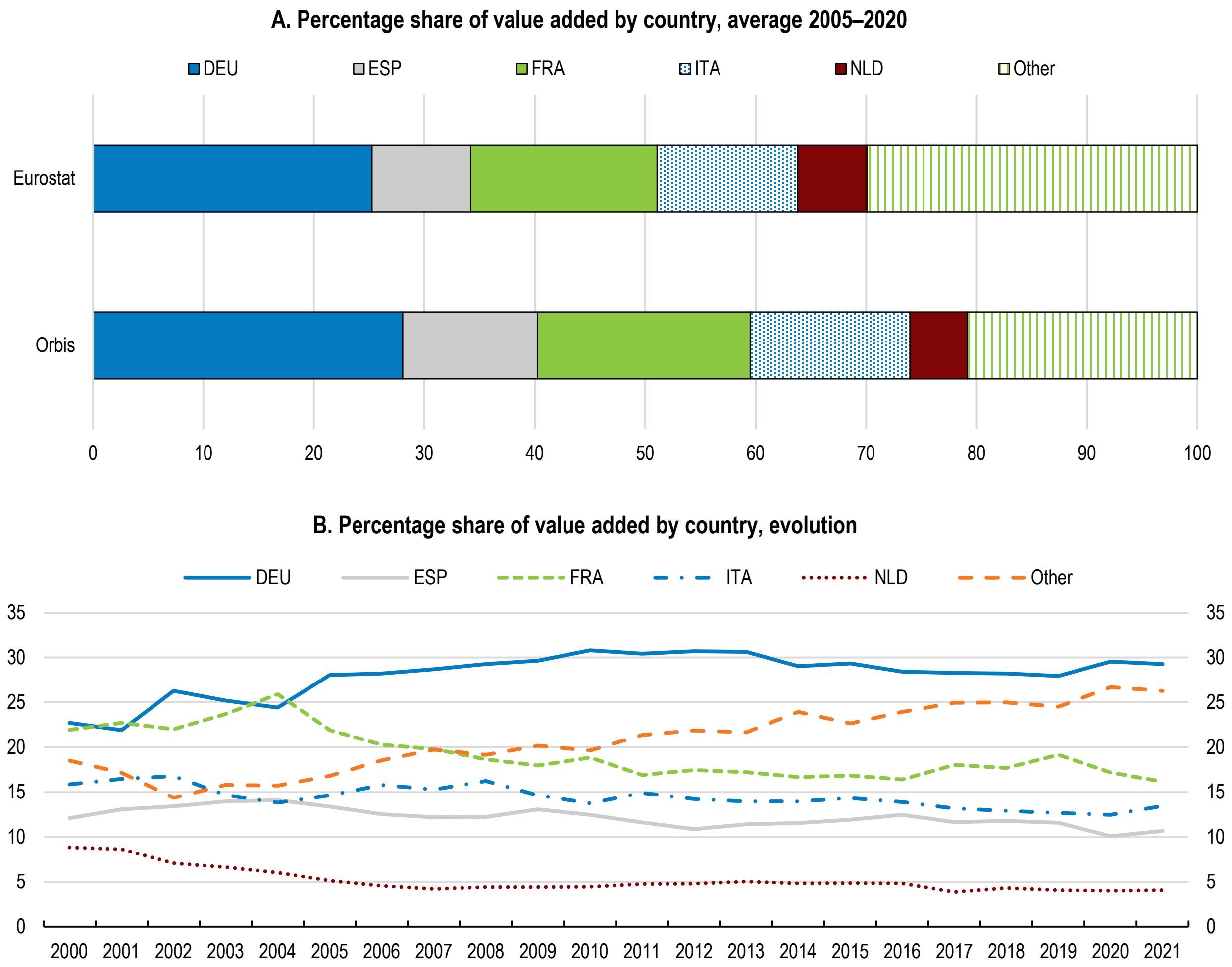
Figure 3. The share of smaller, less productive firms in the sample has been constant since 2005



Note: Size class is based on the number of employees.
Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024), and Eurostat's Business Demography.

Although small firms are underrepresented, this may not be critical, as large firms–well covered in our sample–account for most value added. Comparing the average real value added shares per country with official Eurostat data shows a close match, with France, Germany, Italy, and Spain slightly overrepresented (Figure 4, Panel A). The sample real value added share of these top five economies declined from 82% in 2000 to 74% in 2021, aligning more closely with their real value added shares according to Eurostat figures (Figure 4, Panel B). This consistency suggests our sample accurately reflects broader economic aggregates, despite underrepresenting small firms that contribute less to total value added. Caution is warranted when interpreting results for small firms or individual countries, but findings remain robust for cross-country and firm-size comparisons. The bias towards medium-sized and larger firms aligns with our study's focus on reallocation dynamics, which are mainly driven by these firms.

Figure 4. Percentage share of real value added by country, Orbis sample versus Eurostat official data

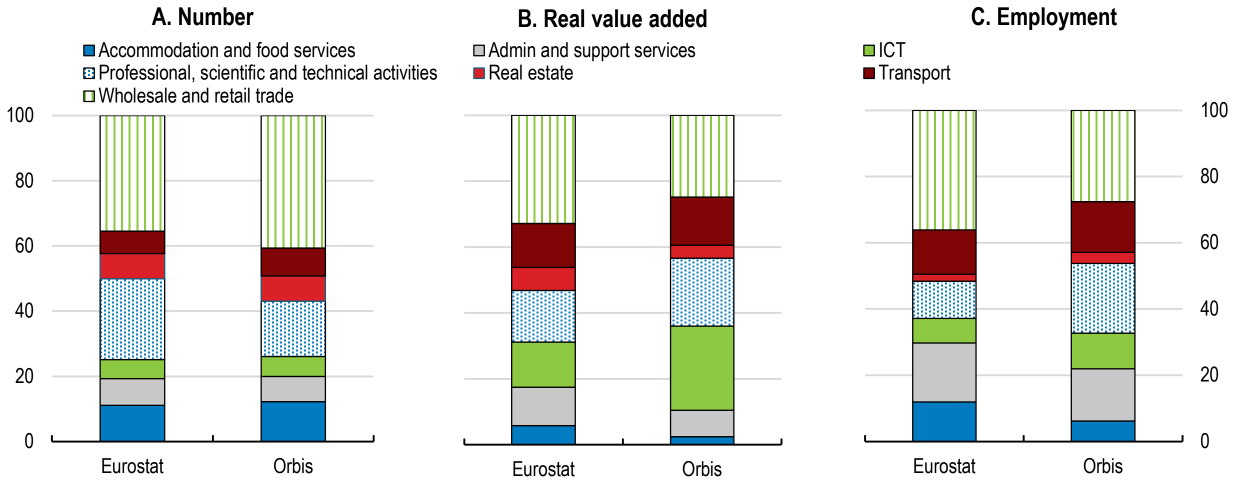


Note: In the Orbis sample, real value added is proxied as Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) plus cost of employees, deflated with industry level value added deflators. Figures for the Orbis sample refer to averages over 2005–2020, while Eurostat averages cover 2021–2023 due to data availability constraints.
Source: Eurostat Quarterly Accounts (2025); OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Overall, our sample is fairly representative for services, with a few exceptions, compared to official Eurostat data for the number of firms, value added, and employment (Figure 5). The less-productive Wholesale and Retail Trade sector is underrepresented in terms of value added and employment, while the more productive ICT sector is overrepresented. Together, this may lead to an overestimation of productivity. These deviations highlight the need to consider sector-specific characteristics, particularly firm size and value-added, when interpreting results.

Figure 5. Representativeness of the services sector, Orbis sample compared to official Eurostat data

Percentage share of firms, value added and employment by sector, %, average 2009–2020



Note: In the Orbis sample, real value added is proxied as Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) plus cost of employees, deflated with industry level value added deflators. Weights are computed as the total of each variable per industry across countries.
Source: Eurostat Structural Business Statistics (2025); OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

The subsample of EU firms owned by US multinationals

The subsample of EU firms owned by US multinationals includes 7 251 EU firms (5 107 service firms and 2 144 manufacturing firms) across 21 European countries from 2000-2021, covering the same 21 EU countries as the full Orbis sample. 30% of EU subsidiaries are in manufacturing, while the remaining 70% operate in service sectors: Wholesale and Retail Trade (31%), Professional, Scientific and Technical Activities (14%), ICT (8%), Administrative and Support Services (7%), Transport (5%), Accommodation and Food Services (4%), and Real Estate (2%).

Compared to OECD data (2005–2020), the subsample overrepresents firms from France, Germany, and western and northern European economies (Belgium. Denmark, Finland, Ireland, the Netherlands, Sweden), while underrepresenting Italy and central and eastern European economies, based on the average number of firms per country (Table 2). However, the sample is more representative when looking at value-added shares (see below).

Table 2. Percentage share of firms, Orbis subsample versus OECD official data

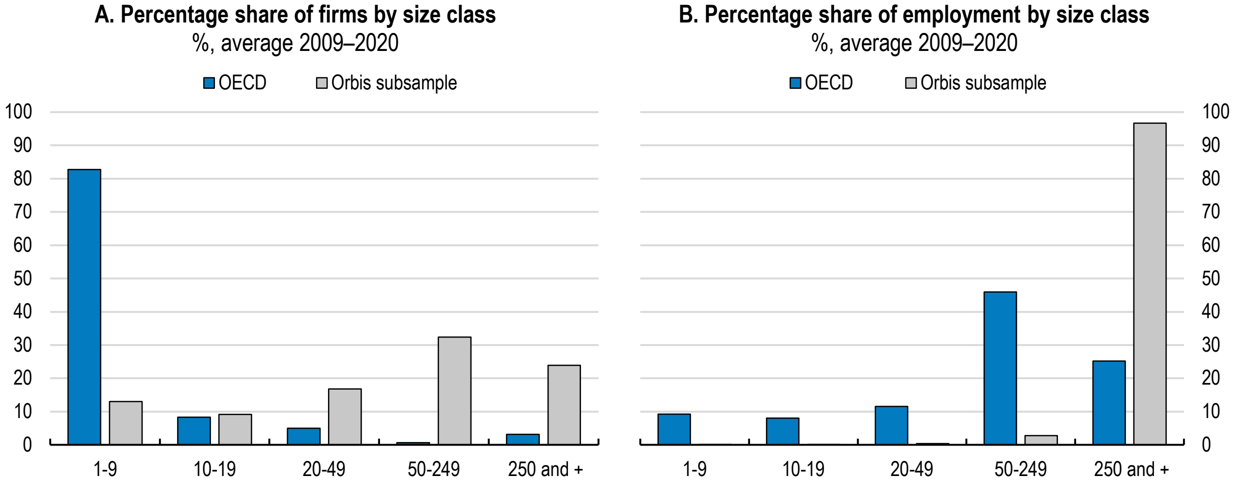
Percentages are averaged over the years 2005–2020

	IT	DE	FR	PL	ES	CZ	PT	GR	NL	SE	HU	SK	BE	AT	FI	SI	DK	IE	LV	EE
Orbis sub-sample	12.2	13.1	15.6	4.1	10.5	3.4	3.7	1.1	5.0	7.5	2.3	0.8	8.4	0.9	2.8	0.6	2.2	4.5	0.4	0.5
OECD	21.7	10.6	10.5	10.1	9.6	8.7	3.8	3.5	2.9	2.8	2.8	2.6	1.9	1.3	1.1	0.9	0.8	0.7	0.5	0.3

Note: The percentage share of firms for Luxembourg is 0.4 in Orbis and 0.0 OECD official data.
Source: OECD Structural business statistics by size class and economic activity (ISIC Rev. 4) database; OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

The subsample overrepresents medium-sized (50-249 employees) and large firms (more than 250 employees) compared to official OECD data (Figure 6, Panel A), with employment shares similarly skewed towards large firms (Panel B). Average firm labour productivity is higher than the full Orbis sample (EUR 38 384 vs. EUR 120 206 per employee), indicating EU subsidiaries of US multinationals tend to be larger, more productive firms. Consequently, measured productivity spillovers reflect impacts on larger, more productive EU firms, while effects on smaller, less productive firms remain captured to a lesser extent.

Figure 6. Percentage share of firms and employment by size class, Orbis subsample versus OECD official data

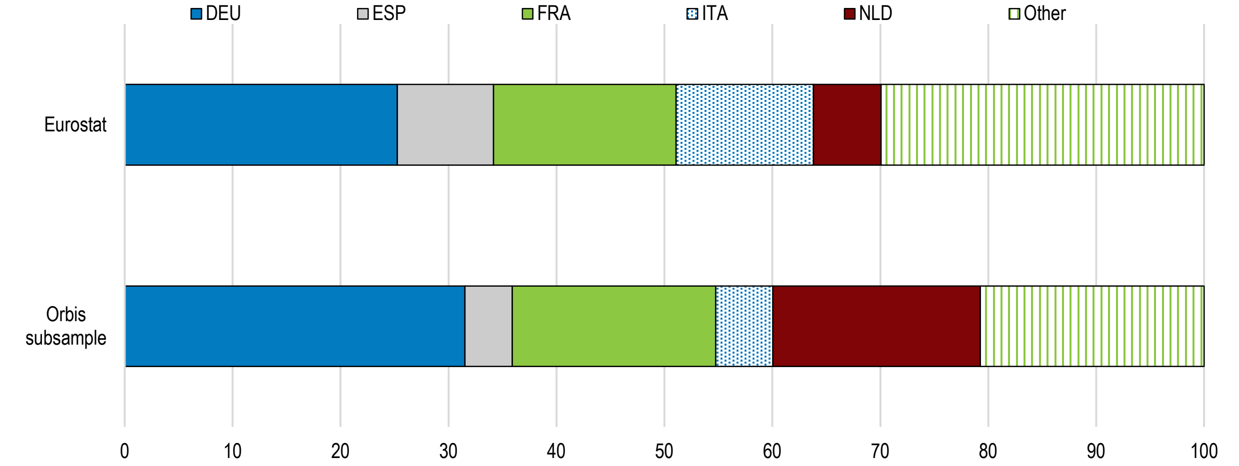


Note: Size class is based on the number of employees.
Source: OECD Structural business statistics by size class and economic activity (ISIC Rev. 4) database; OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Value added shares per country in our subsample align better with official Eurostat data, except for the Netherlands, which is significantly overrepresented, reflecting overrepresentation of large Dutch subsidiaries of US multinationals, while Italy and Spain are underrepresented (Figure 7). This suggests that despite underrepresentation of small firms in the sample of EU subsidiaries, value added is well captured. Still, caution is advised when interpreting results for specific countries or small firms.

Figure 7. Percentage share of real value added by country, Orbis subsample versus Eurostat official data

Percentage share of value added by country, %, average 2005–2020

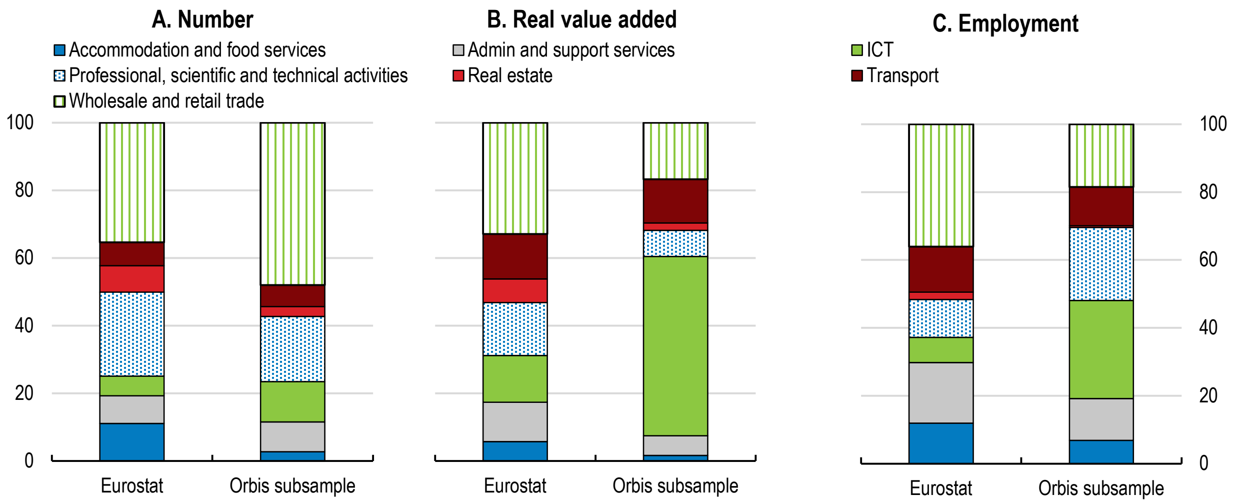


Note: In the Orbis subsample, real value added is proxied as Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) plus cost of employees, deflated with industry level value added deflators. Figures for the Orbis sample refer to averages over 2005–2020, while Eurostat averages cover 2021–2023 due to data availability constraints.
Source: Eurostat Quarterly Accounts (2025); OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Our subsample broadly represents services in terms of firm count, although some sectors differ from official Eurostat data. As for employment and value added, less-productive Wholesale and Retail Trade is underrepresented, while more productive ICT is notably overrepresented, possibly inflating productivity spillovers (Figure 8). These differences highlight the need to analyse within-industry productivity dynamics for more accurate, comparable insights.

Figure 8. Representativeness of the services sector, Orbis subsample compared to official Eurostat data

Percentage share of firms, value added and employment by sector, %, average 2009–2020



Note: In the Orbis sample, real value added is proxied as Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) plus cost of employees, deflated with industry-level value-added deflators. Weights are computed as the total of each variable per industry across countries.

Source: Eurostat Structural Business Statistics (2025); OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Descriptive Evidence

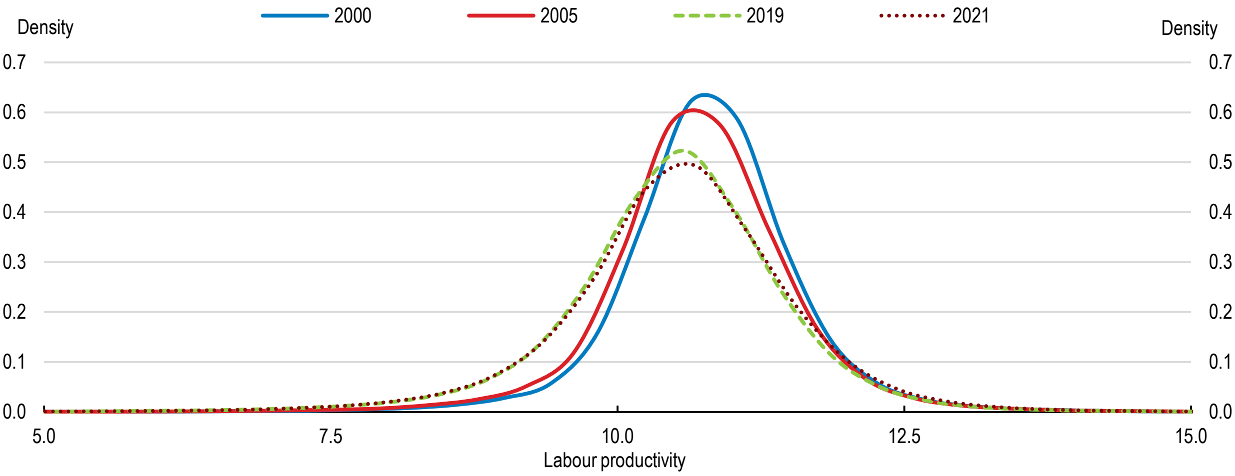
Productivity trends in the EU

This section presents descriptive evidence on EU-wide productivity dynamics using pooled Orbis data across EU countries, for manufacturing and services. While offering an EU perspective, Orbis underrepresents smaller firms, diverging from national accounts and underrepresenting productivity improvements compared to national accounts. The econometric analysis that follows in the next section focuses on within-country-industry productivity to ensure more comparable insights across firms operating in similar markets (Andrews, Criscuolo and Gal, 2015[27]).

While average firm-level labour productivity increased modestly in the Orbis sample, the left tail of the distribution thickened, especially after the 2008 Global Financial Crisis (Figure 9). This indicates an increase in low-productivity firms, which has not been fully offset by a proportional rise in high-productivity firms on the right tail of the distribution. Some left-tail thickening may reflect growing coverage of small, less productive firms in the first five years of the Orbis sample (see above). However, the left-tail thickening remains evident even when those initial years are excluded.

Figure 9. The share of low-productivity firms has increased

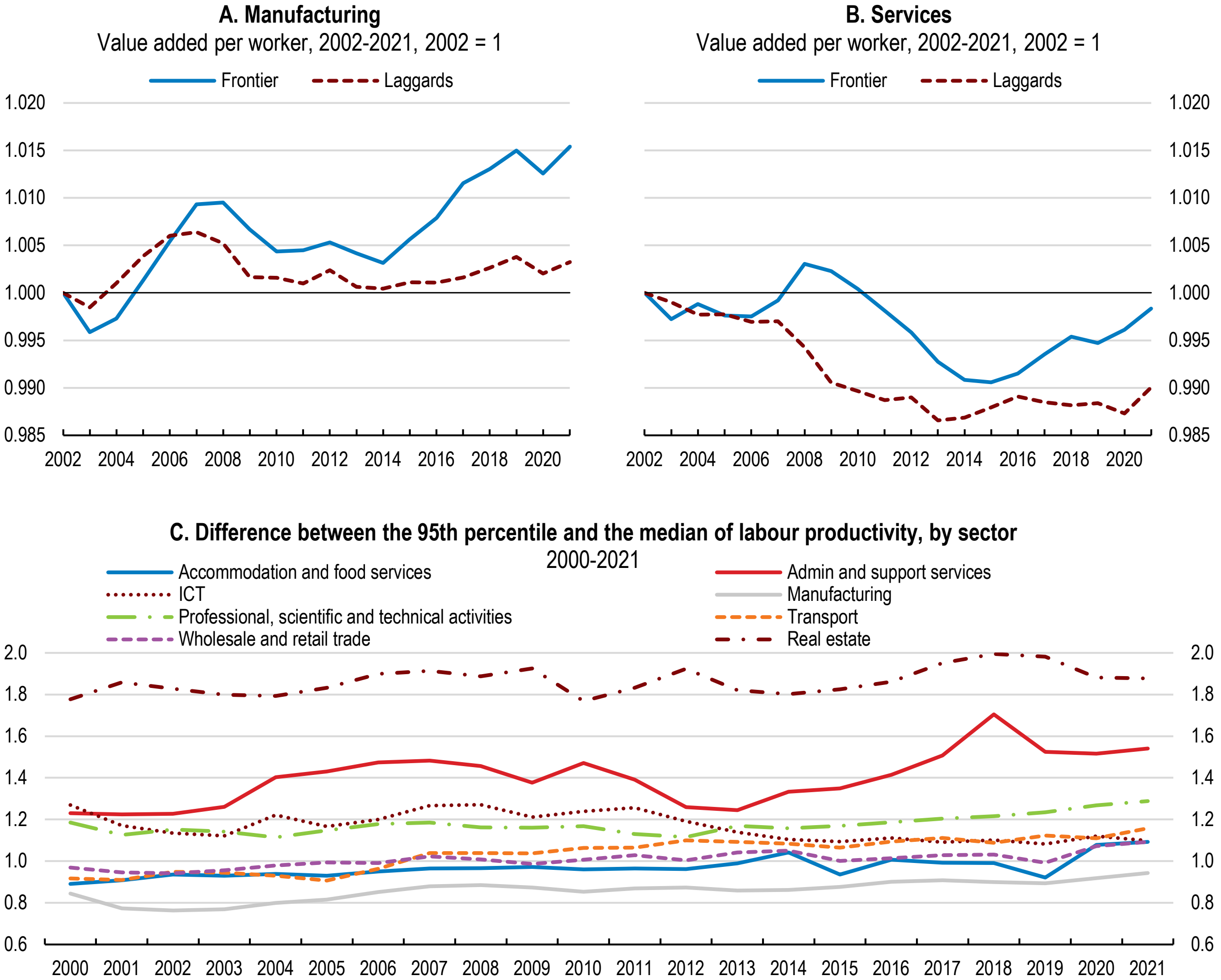
Labour productivity vs density



Note: The Figure reports the fitted k-density of labour productivity defined as log of real value added per worker in the years 2000, 2019 and 2020 for the whole sample. Real value added is constructed as Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) plus cost of employees, deflated with industry level deflators.
Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Productivity dispersion between the most productive EU firms (frontier firms) and less productive firms has increased, mainly within narrowly defined 2-digit sectors (Figure 10). The gap between the 95th percentile (frontier) and the median labour productivity has also risen across major sectors, in line with OECD findings up to 2013 (Andrews, Criscuolo and Gal, 2016[14]). This growing dispersion may signal weak competition, "winner-takes-all" dynamics, and limited services market integration, which restrict EU firms from achieving the economies of scale available to US firms.

Figure 10. Productivity dispersion has increased

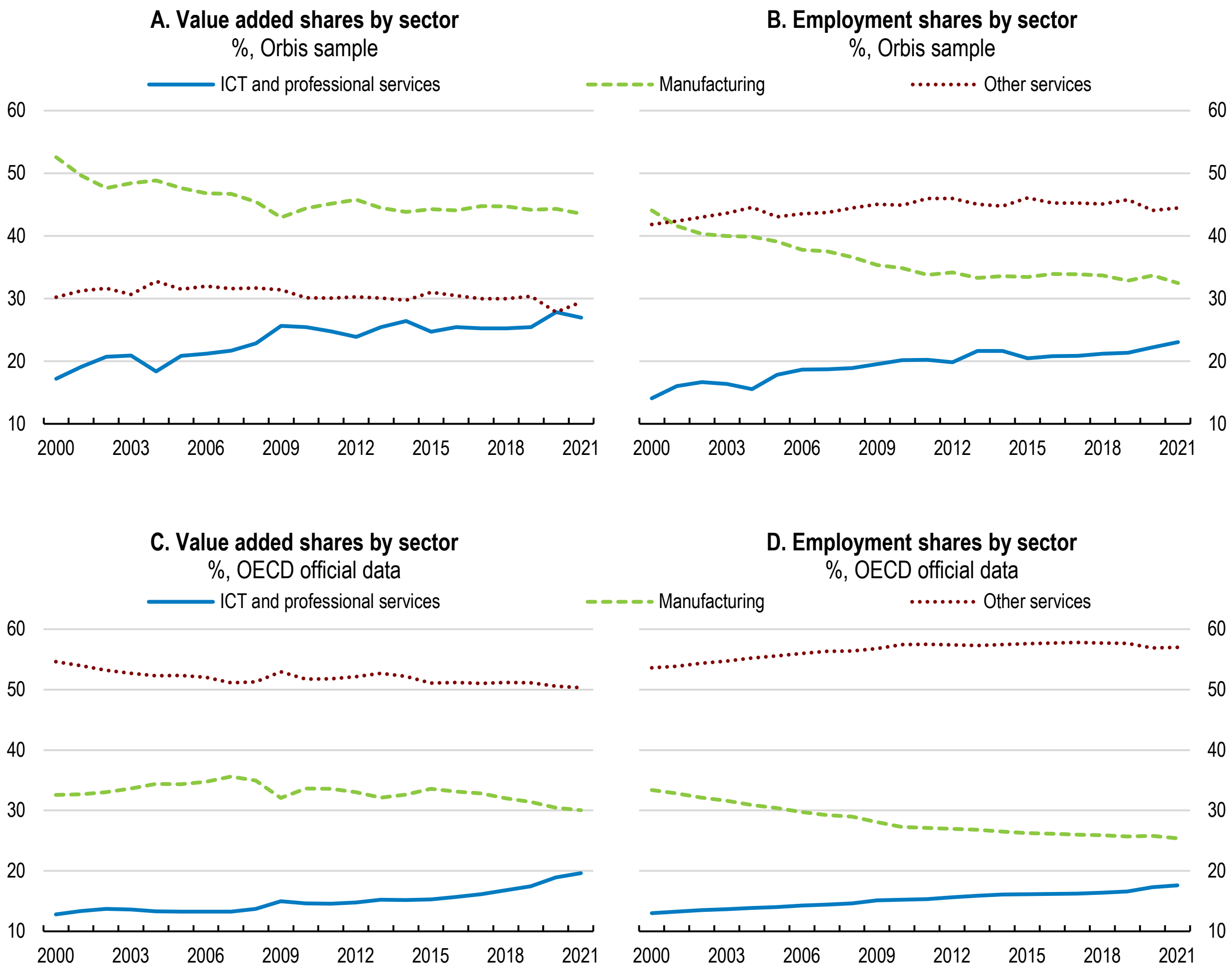


Note: Panels A and B report the frontier as measured by the average of log labour productivity for the top 5% of companies with the highest productivity levels within each 2-digit industry computed at the EU level. Laggards capture the average log productivity of all the other firms. Employment-weighted averages across 2-digit industries are shown for manufacturing and services, normalized to 100 in 2002. Panel C, weighted average of labour productivity at 2-digit sector level, using employment as weight. The 95th percentile is computed at the EU level for a given 2-digit industry. Labour productivity is defined as the log of real value added per worker. Real value added is constructed as Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) plus cost of employees, deflated with industry level deflators.
Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

A positive development has been that industries with dynamic productivity growth, such as knowledge-intensive services, are increasing their value-added shares. However, this is offset by the decline in manufacturing's value-added share, a traditionally high-productivity sector. Moreover, lower-productivity services still employ a large fraction of the labour force, presenting opportunities for reallocation to more productive sectors (Figure 11, Panel A and B). These trends largely mirror official OECD data, giving more confidence to the representativeness of the Orbis sample (Figure 11, Panel C and D). Although Orbis somewhat overrepresents manufacturing in value added, it accurately captures the downward trend in manufacturing's value added share.

Figure 11. Higher value added of knowledge-intensive services has not offset the fall in manufacturing value added share

Real value added and employment shares by sector, %, 2000-2021

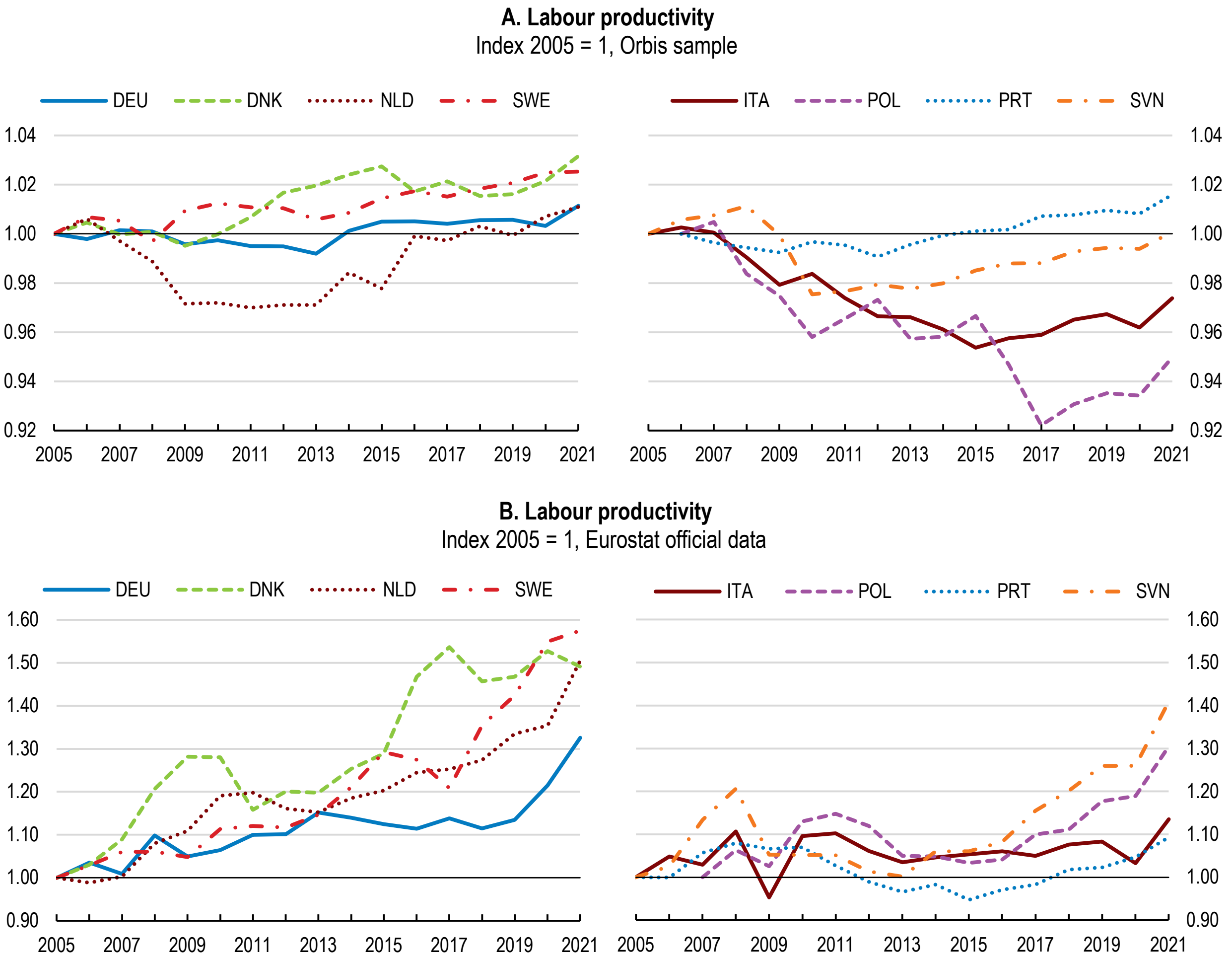


Note: Industries are defined according to NACE Rev. 2 classification. Variables are computed across all the countries available. Real value added is constructed as Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) plus cost of employees, deflated with industry level deflators.

Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024) and the OECD Structural Analysis Database.

Productivity trends in knowledge-intensive services vary across countries, with some showing subdued productivity growth in ICT and professional services (Figure 12, Panel A and B). This occurs despite IT advances that enable cross-border trade and economies of scale. Official Eurostat data confirms these differences, although it also suggests the Orbis sample underrepresents productivity improvements compared to national accounts (Panel C and D).

Figure 12. Productivity growth in ICT and professional services differs across countries



Note: Weighted average of labour productivity in ICT and Professional, Scientific and Technical activities, using employment weights. Labour productivity is defined as the log of real value added per worker. Real value added is constructed as Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) plus cost of employees, deflated with industry level deflators. Averages are plotted by country and normalized to 1 in the first year of the sample. This is set to 2006 for Poland and Portugal in Panel A and 2007 for Poland in Panel B due to small sample size in the prior years.
Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024) and Eurostat.

Allocative efficiency

We assess the role of misallocation in affecting aggregate productivity using the Olley-Pakes (OP) decomposition (Olley and Pakes, 1996[28]) for both services and manufacturing. The OP decomposition measures static misallocation over the cross section of firms, examining whether more productive firms receive a greater share of labour. Given employment share s_{it} of firm i at time t and denoting its level of labour productivity as θ_{it}, we can introduce the OP decomposition as

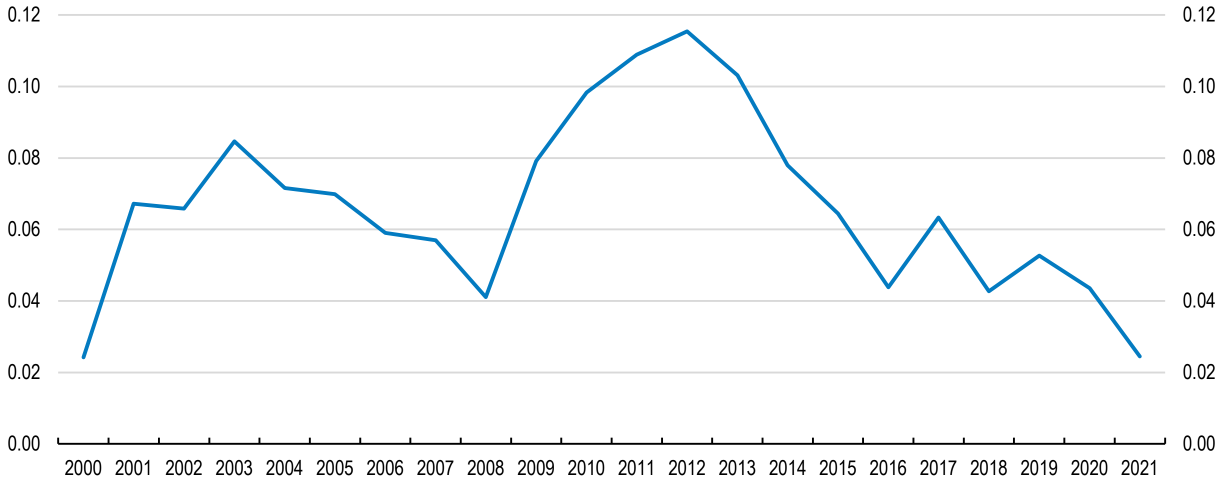
$$\sum_{it} s_{it}\theta_{it} = \bar{\theta}_t + \sum_{it}(s_{it} - \bar{s}_t)(\theta_{it} - \bar{\theta}_t) \quad (1)$$

where $\bar{\theta}_t$ indicates unweighted mean productivity across firms, and $\bar{s}_t$ average employment shares. The key indicator of the OP decomposition is the covariance term (or OP gap) $\sum_{it}(s_{it} - \bar{s}_t)(\theta_{it} - \bar{\theta}_t)$ between firms' employment share and productivity. A positive covariance indicates that more productive firms are larger, a sign of greater static allocative efficiency.

The OP gap is positive for all years, indicating that firms employing an increasing number of workers tend to be more productive. Misallocation declined until the financial crisis, then rose during it, aligning with past studies (Andrews and Cingano, 2014[18]; Berlingieri et al., 2017[29]) (Figure 13). After falling again post-financial crisis, misallocation has increased since 2012, suggesting weakening allocative efficiency in the EU economy. This pattern broadly holds by country, although the OP gap is negative for Germany (some years) and the Netherlands (all years). In these countries, productive allocation may be underestimated due to underrepresentation of productive medium-sized firms in the sample (Figure A.6 in the annex).

Figure 13. Misallocation has increased recently

Olley-Pakes (OP) decomposition, 2000-2021

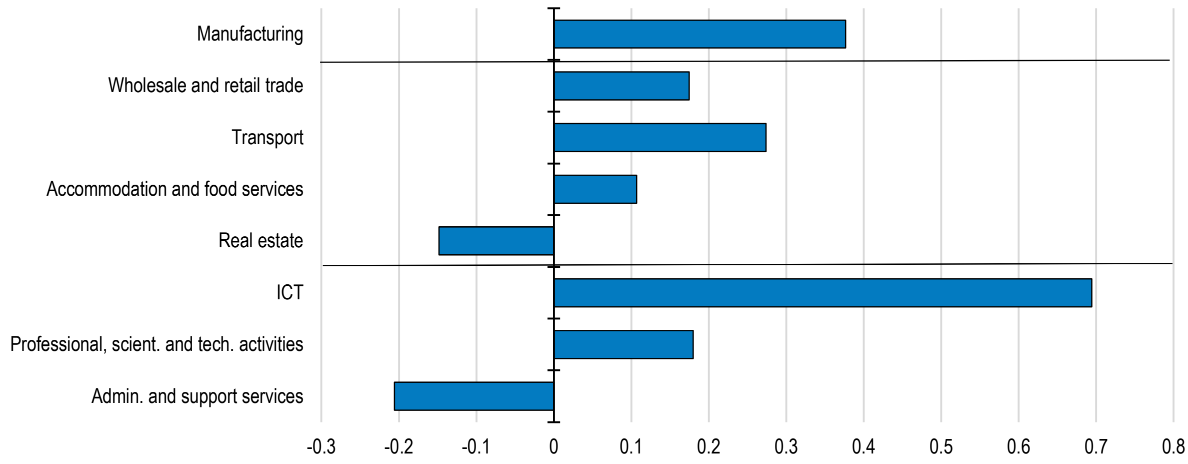


Note: The terms of the composition are calculated at the 2 digit industry level and aggregated across countries and industries using employment weights.
Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

ICT has the highest OP gap, followed by transport and professional, scientific and technical activities (Figure 14). These results suggest that, in these sectors, firms employing more workers tend to be more productive. However, services generally show a less efficient labour allocation than manufacturing, consistent with findings from other studies (Duarte and Restuccia, 2019[30]; Sorbe, Gal and Millot, 2018[31]). Most industries display stable trends in the OP gap, except ICT, which saw a deterioration since 2013 (Figure 15).

Figure 14. In most sectors, more productive firms employ more workers

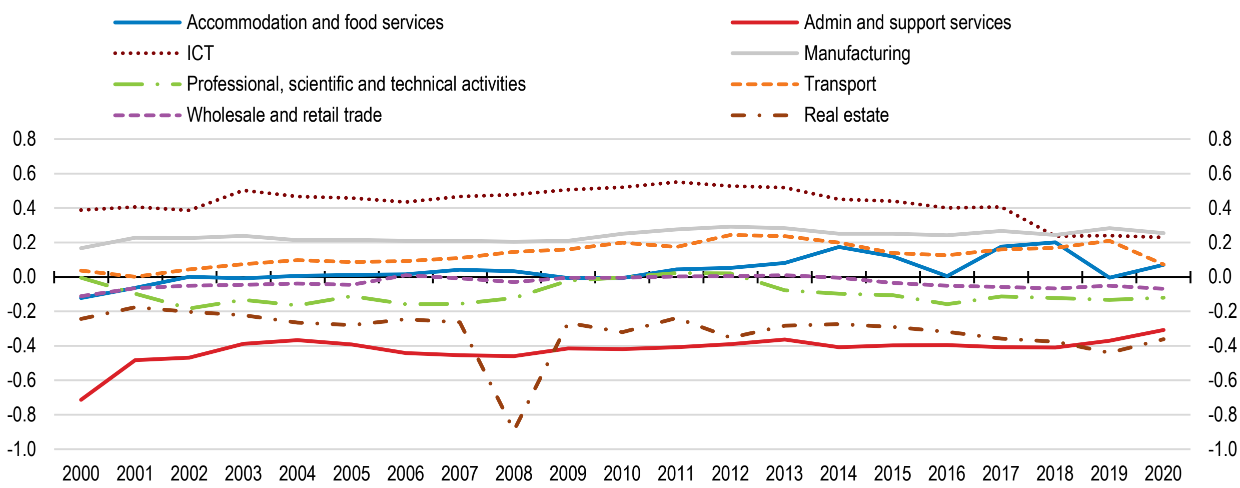
Olley-Pakes (OP) covariance by sector, averages 2000-2021



Note: Sector-level Olley-Pakes covariance or gap, averaged over 2000-2021.
Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Figure 15. Static allocative efficiency has remained stable in many sectors

Olley-Pakes (OP) covariance by sector, 2000-2020



Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Empirical Strategy

Estimation Samples

Using our assembled firm-level database, we construct different estimation samples for i) service sectors and ii) manufacturing and service sectors. First, to estimate productivity spillovers from the US on EU subsidiaries (spillover channel), we restrict our data to EU companies that are subsidiaries of US-based companies. This is done for manufacturing and services, and for service sectors alone. Orbis provides detailed ownership data, including direct shareholders and each firm's Global Ultimate Owner (GUO), i.e., the highest-level entity in the control chain. We retain EU firms either directly owned by a US firm with at least a 25% stake or those with a US-based GUO, using a 50% control threshold. If no GUO is identifiable under this threshold, we lower it to 25%, maintaining independence criteria as defined by Orbis (i.e., companies where none of the shareholders have an ownership share higher than 50%, either directly or through other companies). We then match economic and financial data of these EU subsidiaries with their US parent companies. This process yields a final sample of 7 251 EU subsidiaries (5 107 service firms and 2 144 manufacturing firms) linked to 334 US companies.

A limitation of our strategy is that data for US parent companies come from consolidated accounts, which already include subsidiary activity. This may create a mechanical link between parent and subsidiary productivity. While we cannot address this by using unconsolidated data, since those don't support productivity measurement, we take steps to mitigate the issue. On average, each US parent has over 60 subsidiaries, which dilutes any single subsidiary's effect on consolidated figures. Additionally, our system GMM estimation includes lags of both subsidiary ad parent productivity growth as regressor, helping to control for this mechanical relationship and improve identification (see below).

To investigate the reallocation channel—how employment growth responds to productivity within a sector—we use the full Orbis EU firm dataset but restrict it to those firms with non-missing information for MFP, estimated following Wooldridge (2009[32]). As above, this is done for both for manufacturing and services and for service sectors alone. This results in a sample of over 4.2 million firms (about 3.5 million service firms and 0.7 million manufacturing firms) across 21 EU countries.

To assess the impact of regulation, we use indicators on product market regulation (PMR) from the 2018 PMR Database. These measure regulatory restrictiveness across areas such as state control, barriers to firm entry, and barriers to trade and investment. The index ranges from 0 (least stringent) to 6 (most stringent). Introduced 1998 and updated roughly every five years, the PMR tracks regulatory changes over time. However, a major methodological revision in 2018 limits comparability with earlier versions. For this study, we therefore limit ourselves to the value of the index in 2018, focusing on:

- Country level PMR for manufacturing and services, further disaggregated in PMR due to Barriers to Domestic and Foreign Entry, which is itself composed of Administrative and Regulatory Burden, Barriers in Services and Network Sectors and Barriers to Trade and Investment.
- Industry level PMR for service sectors: Transport, Retail Trade, E-commerce and Professional Services (Table 3). These sector-specific PMR does not distinguish for different domains of product market regulation.

As our focus is on the services sector, our primary interest is on direct effects of industry-level PMR on industry-level outcomes (e.g., the direct effect of regulations in retail trade on retail trade outcomes). Nonetheless, we also include country-level PMR to qualitatively investigate which domain of the regulatory activity has the most significant impact on economy-wide productivity, measured by sub-components of the overall PMR such as barriers to entry. Therefore, we use four different estimation samples to explore different channels through which PMR operate, as summarised in Table 4.

Table 3. Sector-specific PMR indices and corresponding NACE code

PMR Sector	NACE code(s)
Transport	49-53
E-commerce	61
Retail Distribution	451, 4532, 47
Lawyers	6910
Accountants	6920
Architects	7110, 7111

Civil Engineers	42
Real Estate Agents	68

Table 4. PMR impact channels and corresponding samples

Sample	Channel
EU subsidiaries and US parent companies – all industries	Country-level PMR – spillover channel
EU subsidiaries and US parent companies – selected service industries	Industry-level PMR – spillover channel
EU based firms – all industries	Country-level PMR – reallocation channel
EU based firms – selected service industries	Industry-level PMR – reallocation channel

Empirical Strategy

We rely on two different estimation strategies to quantify the spillover channel. First, we use as baseline estimation strategy a panel ordinary least square (OLS) regression with firm fixed effects to quantify the productivity spillover from US parent companies to EU subsidiaries. The regression equation takes the form:

$$\Delta y_{EUt} = \alpha + \alpha_{EU} + \beta_1 \Delta y_{USt-1} + \beta_2 \Delta y_{USt-1} * PMR + \beta_3 X_{EUt} + \beta_4 X_{USt} + FE_t + u_{EUt} \quad (2)$$

where Δy_{EUt} denotes labour productivity growth of EU subsidiary in year t, and Δy_{USt-1} labour productivity growth of its US parent company in year $t-1$. The main independent variables are lagged to address reverse causality concerns. α_{EU} are firm fixed effects and PMR indicates the log of the PMR index for the country or country-industry, depending on the estimation sample (sample 1 or 2 in Table 4). We then control for additional covariates X_{EUt} and X_{USt}, all log transformed, such as firm age, capital stock, depreciation over total assets, total sales, firm size (dummy variables based on number of employees), as well as number of subsidiaries and a dummy for whether a firm is listed for US parent companies. FE_t are industry-year, country-year and country-industry-year fixed effects. Finally, u_{EUt} is an error term, which is clustered at the EU subsidiary level to control for serial correlation.

The main coefficient of interest β_2, measures how product market regulation (PMR) stringency affects productivity transmission from parent firms to subsidiaries. Since PMR is only observed in 2018, the coefficient of the PMR indicator alone is dropped due to collinearity. The key identifying assumption is that no unobserved factor simultaneously influences productivity growth in both US parent firms and their subsidiaries.

Nonetheless, some endogeneity concerns from unobserved factors remain. Lobbying may influence PMR levels, with restrictive economies protecting unproductive industries and limiting spillovers. Another concern is that US foreign direct investment (FDI) could impact EU subsidiaries through domestic spillovers. To address this, we use country-industry-year fixed effects aligned with PMR aggregation. Country-industry-year fixed effects also control for such potential influences from US FDI within a given country and industry.

Other endogeneity concerns, such as productivity persistence or reverse causality, may also bias results. Measurement error in productivity can also bias coefficients downward in fixed effects regressions. To address this, we complement our baseline estimation with a system GMM approach using the xtabond2

Stata package. We begin with a similar baseline equation, controlling the lagged dependent variable, i.e., EU subsidiaries' labour productivity growth:

$$\Delta y_{EUt} = \alpha + \alpha_{EU} + \beta_1 \Delta y_{USt-1} + \beta_2 \Delta y_{USt-1} * PMR + \beta_{1b} \Delta y_{EUt-1} + \beta_3 X_{EUt} + \beta_4 X_{USt} + FE_t + u_{EUt} \quad (3)$$

We first-difference Equation 3 and use the second and third lags of the original equation as instruments for the productivity variables for both parent and subsidiary firms, i.e. Δy_{EUt}, Δy_{EUt-1}, Δy_{USt-1}[2], following the standard Arellano-Bond approach. However, since productivity growth may behave like a random walk, these instruments can be weak. To address this, we apply the Arellano and Bover (1995[33]) method by estimating both the differenced and level equations, using second and third lags of the first differences as instruments for the levels[3]. This system GMM approach uses moment conditions from both equations to improve efficiency. Standard errors are clustered at the subsidiary level and corrected using Windmeijer's (2005[34]) small-sample adjustment to avoid downward bias correction.

We use year and industry-year fixed effects instead of more saturated country-year or country-industry-year fixed effects applied in OLS. Industry fixed effects are also constructed at the 1-digit level instead of the 2-digit level used in OLS. In our data, including country-year or country-industry-year fixed effects causes large efficiency losses, with standard errors 2-3 times higher than the baseline specification and uninformative Hansen J and AR(2) tests (p-values > 0.9). These results indicate instrument proliferation and weak instruments, common when GMM is combined with high-dimensional fixed effects in panels of moderate time length.

Finally, to quantify the reallocation channel, we use an OLS approach based on Decker et al. (2016[24]), applying a similar regression. This estimation is run on the full Orbis dataset, rather than the parent-subsidiary subsample used earlier.

$$\Delta l_{it} = \alpha + \alpha_i + \beta_1 MFP_{it-1} + \beta_2 MFP_{it-1} * PMR + \beta_3 X_{it} + FE_t + u_{it} \quad (4)$$

where Δl_{it} is employment growth of firm i in year t, and MFP_{it-1} is the firms' multifactor productivity (MFP) level in the previous year $t-1$. In line with the literature, we use MFP instead of labour productivity to avoid a mechanical link with employment growth. Other variables follow the same notation as earlier equations. As in the initial fixed effects panel regression, the key coefficient is β_2, capturing how PMR affects the elasticity of employment growth to productivity. Prior studies generally find this relationship to be positive, with more productive firms growing faster by hiring more. A negative and significant estimate of β_2 would suggest that stricter regulation reduces this effect, while a positive one would indicate the opposite.

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[2] We opt for 2nd and 3rd lags based on a Hansen test of instrument validity. While the standard system GMM approach uses all lags for the endogenous variable, in our case *T* is fairly long (21 years), which leads to instrument proliferation. Reducing the number of lags improves the outcome of the test and allows not reject the null hypothesis of weak instruments. Adopting the option to collapse instruments also results in instrument proliferation.

[3] We also replicate the estimations with a simple difference GMM and obtain a high p-value for the Hansen J test and AR(2) Arellano Bond test. Confirming the theoretical expectations, running a system GMM greatly improves the outcomes of the tests.

Results

Main Results – Spillover Channel

Sector-level PMR interacts with the transmission of productivity shocks from US parents to EU subsidiaries in services (Table 5). Using fixed effects panel regression, the baseline effect shows that a 1% increase in US parent productivity leads to a 0.17% productivity gain for the EU subsidiary, statistically significant at the 5% level (column 4). Moreover, the negative and significant interaction term (ranging from –0.18 to –0.24) indicates that a more restrictive PMR stance weakens this productivity spillover. Results suggest that a PMR index above 2.4, on average across service sectors, effectively blocks the productivity transmission, corresponding to the top 25% of the industry-level PMR distribution in the sample, i.e., countries and service sectors with higher sector-level PMR values. It should be noted that this PMR effect averages the effects of different services regulations (retail trade, professional services and transport). There is no statistically significant difference in the effect of PMR by firm size (Table 6).

Table 5. Industry-level PMR and productivity shock, OLS regression

Variables	(1)	(2)	(3)	(4)
	EU subsidiary labour productivity growth			
US parent labour productivity growth	0.192**	0.197**	0.169**	0.169**
	(0.077)	(0.084)	(0.077)	(0.077)
US parent labour productivity growth * PMR	-0.244***	-0.263***	-0.181***	-0.181***
	(0.081)	(0.085)	(0.064)	(0.064)
Capital stock	0.063**	0.055**	0.055*	0.055*
	(0.031)	(0.027)	(0.030)	(0.030)
US parent capital stock	-0.159*	-0.180*	-0.186**	-0.186**
	(0.084)	(0.099)	(0.090)	(0.090)
Observations	2,445	2,445	2,445	2,445
R-squared	0.116	0.164	0.207	0.207
Firm FE:	Yes	Yes	Yes	Yes
Year FE:	Yes	No	No	No
Industry-Year FE:	No	Yes	No	No
Country-Year FE:	No	No	Yes	No
Country-Industry-Year FE:	No	No	No	Yes

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table 6. Industry-level PMR and productivity shock by size class, OLS regression

Variables	(1)
	EU subsidiary labour productivity growth
US parent labour productivity growth * larger firm dummy	-0.011
	(0.120)
US parent labour productivity growth * PMR * larger firm dummy	-0.116
	(0.157)
Larger firm dummy	-0.495***
	(0.143)
Observations	2,445
R-squared	0.221
Firm FE:	Yes

Year FE:	No
Industry-Year FE:	No
Country-Year FE:	No
Country-Industry-Year FE:	Yes

Note: Larger firm dummy refers to firms with 50 or more employees. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

The analysis using country-level PMR for manufacturing and services allows to distinguish between different types of regulation (Table 7). On average, a 1% increase in US parent productivity results in a 0.07% gain for the EU subsidiary. Overall country-level PMR is significant, albeit at lower levels of significance (column 2). PMR related to entry barriers shows a negative and statistically significant coefficient of around -0.17 (significant at the 10% level) (column 4). Other PMR indicators do not significantly affect productivity spillovers. The results suggest that a PMR index related to entry barriers higher than 1.6 blocks the productivity transmission, corresponding to the 80th percentile of the country-level PMR distribution in the sample. The impact of entry barriers on productivity spillovers on incumbent EU subsidiaries may reflect weaker competition: entry barriers may limit entry of more productive firms, and weaken the incentives of incumbent EU subsidiaries to improve productivity and to adopt managerial practices from the US. There is no significant difference of the PMR effect by firm size (Table 8).

Table 7. Country-level PMR and productivity shock, OLS regression

Variables			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			EU subsidiary labour productivity growth									
US parent labour productivity growth			0.072*	0.074*	0.071**	0.069**	0.061*	0.061	0.075**	0.072**	0.044	0.057
			(0.038)	(0.038)	(0.034)	(0.034)	(0.037)	(0.037)	(0.034)	(0.034)	(0.117)	(0.119)
Interaction of US parent labour productivity growth with PMR	PMR	General	-0.169*	-0.176*								
			(0.101)	(0.103)								
		Barriers to domestic and foreign entry			-0.175*	-0.165*						
					(0.091)	(0.094)						
	PMR barriers to entry	Administrative and regulatory burden					-0.073	-0.072				
							(0.055)	(0.056)				
		Barriers in services and network sectors							-0.083	-0.077		
									(0.053)	(0.055)		
		Barriers to trade and investment									0.018	0.036
											(0.160)	(0.162)
Capital Stock			0.037**	0.041***	0.036**	0.040***	0.036**	0.040***	0.037**	0.041***	0.036**	0.040***
			(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Observations			7,344	7,344	7,344	7,344	7,344	7,344	7,344	7,344	7,344	7,344
R-squared			0.130	0.176	0.130	0.176	0.130	0.176	0.130	0.176	0.129	0.176
Firm FE:			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Year FE:			Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Country-Industry-Year FE:			No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table 8. Country-level PMR and productivity shock by size class, OLS regression

Variables			(1)	(2)	(3)	(4)	(5)
			EU subsidiary labour productivity growth				
US parent labour productivity growth * larger firm dummy			-0.001	-0.002	-0.010	-0.012	0.193
			(0.074)	(0.069)	(0.070)	(0.070)	(0.165)
Interaction of US parent labour productivity growth with PMR and larger firm dummy	PMR	General	-0.080				
			(0.212)				
		Barriers to domestic and foreign entry		-0.057			
				(0.198)			
	PMR barriers to entry	Administrative and regulatory burden			0.009		
					(0.119)		
		Barriers in services and network sectors				-0.029	
						(0.103)	
		Barriers to trade and investment					0.306
							(0.236)
Larger firm dummy			-0.286***	-0.180*	-0.262**	-0.055	-0.065
			(0.104)	(0.105)	(0.130)	(0.122)	(0.327)
Observations			7,344	7,344	7,344	7,344	7,344
R-squared			0.186	0.188	0.186	0.188	0.186
Firm FE:			Yes	Yes	Yes	Yes	Yes
Country-Industry-Year FE:			Yes	Yes	Yes	Yes	Yes

Note: Larger firm dummy refers to firms with 50 or more employees. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

The results of the system GMM estimation qualitatively confirm the OLS findings: there is a positive and statistically significant productivity shock from US parent firms to EU subsidiaries, for services alone and for the full sample including manufacturing (Table 9 and Table 10). However, in industries or countries with higher PMR, the spillover effect is weaker. The system GMM estimates show slightly lower magnitudes for the productivity shock coefficient compared to OLS: approximately 0.16 (Table 9, column 2) against 0.17 (Table 5, column 4) for services, and 0.05 (Table 10, column 2) against 0.07 (Table 7, column 2) for the full sample including manufacturing and country-level PMR (barriers to domestic and foreign entry). In contrast, the interaction with PMR is slightly stronger in the GMM estimation: -0.21 against -0.18 for services, while it is weaker with -0.15 against -0.18 in the full sample. This difference likely reflects upward bias in the OLS estimates due to unobservable time-varying factors, such as the persistent nature of productivity. The downward bias in the GMM estimation occurs regardless of whether we use industry-level or sector-level PMR. If we restrict to services firms, results also remain significant (Table B.2 in the appendix). Excluding pre-2005 observations also confirms the robustness of the results for country-level PMR, although not for the industry-level PMR, likely due to the smaller sample (Table B.1 and Table B.3 in the appendix).

The interpretation of PMR's impact on productivity spillovers remains the same. A PMR of 2 reduces productivity spillovers to zero in services, while a PMR of 1.35 does the same in the full sample including manufacturing, both corresponding to the top 40% of the PMR distribution. As above, the services PMR effect averages the effects of different sectoral regulations (retail trade, professional services and transport). Regarding instrument validity, both the Arellano Bond AR(2) and the Hansen test do not reject the null of instrument validity. However, when using country-year, or country-industry-year fixed effects, the Hansen test p-value approaches 1, indicating potential bias from instrument proliferation. As a result, we omit these results from Table 9 and Table 10.

Table 9. Industry-level PMR and productivity shock, system GMM estimation

Variables	(1)	(2)
	EU subsidiary labour productivity growth	
Lagged EU subsidiary labour productivity growth	-0.314***	-0.324***
	(0.108)	(0.118)
US parent labour productivity growth	0.119**	0.161***
	(0.057)	(0.058)
US parent labour productivity growth * PMR	-0.166**	-0.207***
	(0.065)	(0.069)
Sales	0.026**	0.041**
	(0.012)	(0.020)
US parent number of employees	0.037**	0.047**
	(0.016)	(0.021)
Observations	2,334	2,334
Firm FE:	Yes	Yes
Year FE:	Yes	No
Industry-Year FE:	No	Yes
Arellano-Bond AR(2) stat	-1.640	-1.446
Arellano-Bond AR(2) p-value	0.101	0.148
Hansen J stat	120.4	99.74
Hansen J p-value	0.145	0.627
Hansen J df	105	105

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table 10. Country-level PMR and productivity shock, system GMM estimation

Variables			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			EU subsidiary labour productivity growth									
Lagged EU subsidiary labour productivity growth			-0.19**	-0.21**	-0.19**	-0.21**	-0.19**	-0.21**	-0.19**	-0.21**	-0.19**	-0.21**
			(0.094)	(0.091)	(0.094)	(0.091)	(0.094)	(0.092)	(0.094)	(0.092)	(0.094)	(0.092)
US parent labour productivity growth			0.035	0.050	0.038*	0.084	0.016	0.040	0.056**	0.059	-0.010	0.026
			(0.022)	(0.042)	(0.023)	(0.076)	(0.027)	(0.092)	(0.022)	(0.038)	(0.069)	(0.095)
Interaction of US parent labour productivity growth with PMR	PMR	General	-0.13**	-0.148*								
			(0.061)	(0.089)								
		Barriers to domestic and foreign entry			-0.14**	-0.252						
					(0.063)	(0.206)						
	PMR barriers to entry	Administrative and regulatory burden					-0.025	-0.068				
							(0.043)	(0.156)				
		Barriers in services and network sectors							-0.10***	-0.09**		

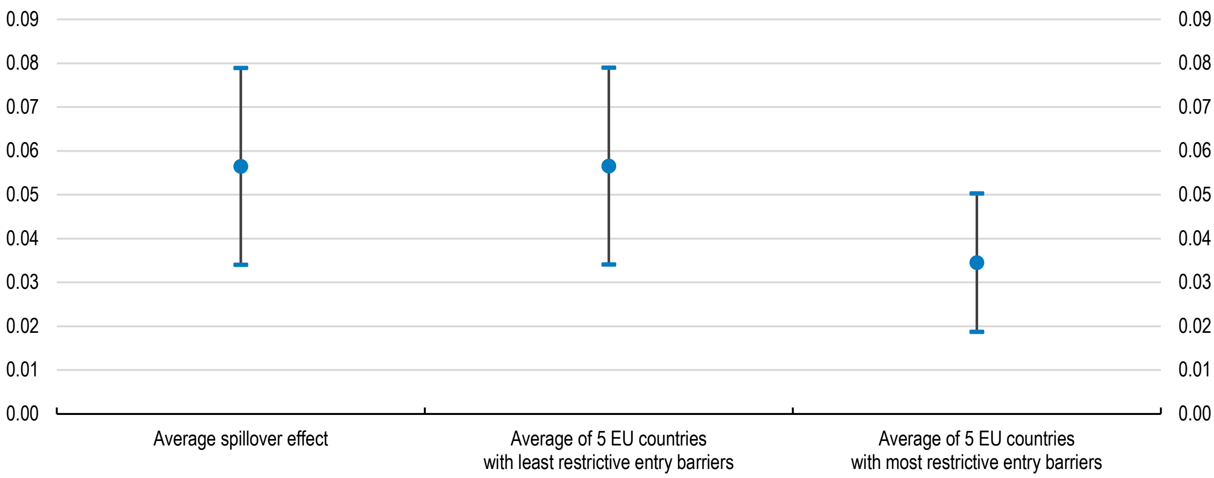
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
							(0.035)	(0.042)		
Barriers to trade and investment									-0.020	0.032
									(0.094)	(0.138)
Observations	7,071	7,071	7,071	7,071	7,071	7,071	7,071	7,071	7,071	7,071
Firm FE:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE:	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Industry-Year FE:	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Arellano-Bond AR(2) stat	-0.612	-1.713	-0.611	-1.810	-0.607	-1.939	-0.613	-1.672	-0.612	-1.508
Arellano-Bond AR(2) p-value	0.541	0.0867	0.541	0.0703	0.544	0.0525	0.540	0.0946	0.540	0.131
Hansen J stat	128.4	98.35	129.8	97.74	132.3	99.40	127.4	98.09	130.7	100.3
Hansen J p-value	0.0599	0.664	0.0508	0.680	0.0368	0.636	0.0677	0.671	0.0455	0.611
Hansen J df	105	105	105	105	105	105	105	105	105	105

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Productivity spillovers from US parents are weaker in more regulated economies. When analysing all sectors (i.e., manufacturing and services), countries with low PMR entry barriers in services and network sectors see higher spillover effects, while those with higher entry barriers experience reduced spillovers (Table 10, column 4). A 1% rise in US parent labour productivity growth is linked to 70% higher EU subsidiary labour productivity growth in the five least restrictive EU economies versus the five most restrictive, as measured by entry barriers in services and network sectors (Figure 16 and Table B.4 in the appendix). Results for service sectors alone are significant as well (Table B.5 in the appendix). The findings suggest that strict entry regulations can dampen positive spillover effects from more productive foreign firms.

Figure 16. Productivity spillovers from the US are weaker in more regulated economies – system GMM estimation

Effect of a 1% increase in US parent productivity growth on EU subsidiary productivity growth, labour productivity change, %, and 95% confidence interval



Note: The five EU countries in the sample with the lowest value of the PMR barriers to entry in services and network sectors indicator are Czechia, Denmark, Germany, the Netherlands and Sweden, while the five EU countries with the highest value are Belgium, Greece, Hungary, Italy and Portugal. Dependent variable is labour productivity growth of EU companies that are subsidiaries of US-based companies. Independent variable is labour productivity growth of US parent companies, interacted with the country-level PMR indicator for barriers to entry in services and network sectors. System GMM regression with firm-level and year fixed effects, covering 21 EU countries for 2000 to 2021.
Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Main Results – Reallocation Channel

Overall PMR stringency dampens the link between productivity and employment when analysing all sectors (i.e., manufacturing and services), driven mainly by administrative and regulatory burdens that new firms face when starting their business (Table 11). In column (1), the lagged MFP coefficient remains stable at around 0.18, indicating that a 1% rise in firm-level MFP increases firm-level employment growth by 0.18%. This is in line with empirical evidence that more productive firms have higher employment growth. Column (2) includes an interaction with overall PMR, showing a statistically significant coefficient of −0.03, suggesting that stricter regulation weakens this relationship. A one-unit increase in log PMR (i.e. a 100% increase) reduces the MFP–employment elasticity from 0.18 down to 0.15, i.e., a decline of roughly 15%.

When breaking down PMR, all subcomponents show significant effects, including entry barriers and administrative and regulatory burden. Administrative and regulatory burden has the highest coefficient of 0.044, meaning that a doubling of red tape for new firms reduces the MFP-employment elasticity by about 24%. Red tape raises startup costs, diverting resources from hiring to compliance. This administrative burden can reduce competition by increasing entry barriers, limiting innovative startups, and lowering incumbents' incentives to improve productivity. Results for service sectors alone are significant (Table B.6 in the appendix) using country-level PMR, but not industry-level PMRs, suggesting other policy factors such as employment protection may play a role as well (see below).

Table 11. Country-level PMR and employment growth, OLS regression

Variables			(1)	(2)	(3)	(4)	(5)	(6)
			Employment Growth					
MFP			0.176***	0.180***	0.174***	0.181***	0.155***	0.198***
			(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
Interaction of MFP With PMR	PMR	General		-0.030***				
				(0.002)				
		Barriers to domestic and foreign entry			-0.006***			
					(0.001)			
	PMR barriers to entry	Administrative and regulatory burden				-0.044***		
						(0.001)		
		Barriers in services and network sectors					0.029***	
							(0.001)	
		Barriers to trade and investment						0.042***
								(0.002)
Age			-0.068***	-0.070***	-0.070***	-0.069***	-0.070***	-0.070***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capital stock			0.013***	0.013***	0.013***	0.013***	0.013***	0.013***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Depreciation share of capital			-0.011***	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***

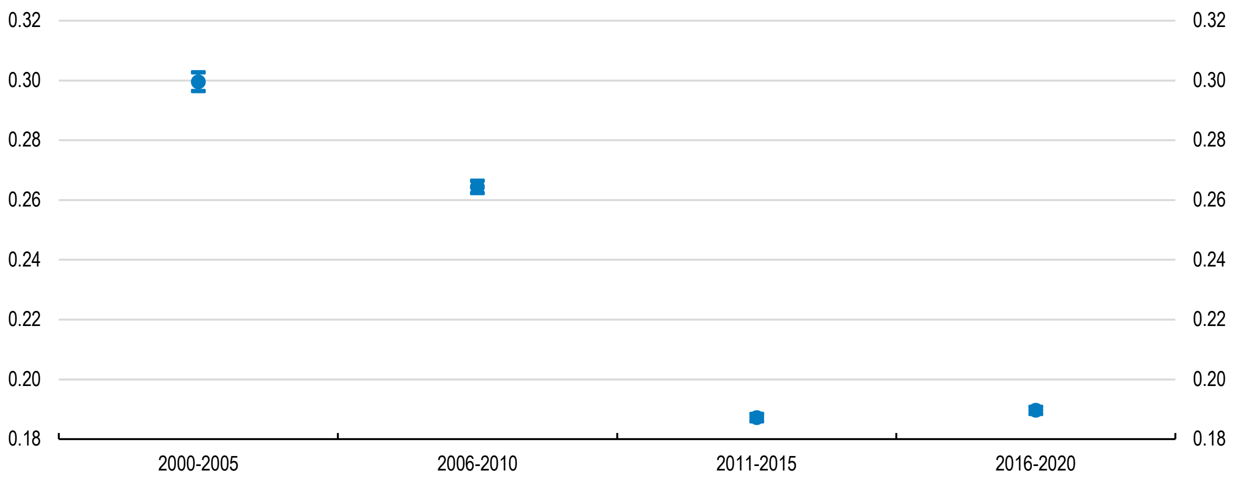
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales	-0.121***	-0.114***	-0.114***	-0.114***	-0.113***	-0.113***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	19,363,175	19,363,175	19,363,175	19,363,175	19,363,175	19,363,175
R-squared	0.098	0.096	0.096	0.097	0.096	0.096
Firm FE:	Yes	Yes	Yes	Yes	Yes	Yes
Country-Industry-Year FE:	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

The elasticity of employment growth to MFP has declined over recent decades, signalling reduced business dynamism (Figure 17). From 2000-2005, a 1% rise in firm-level MFP corresponded to roughly 0.30% firm-level employment growth. This elasticity fell to 0.19% in 2011-2015 and remained low through 2016-2020. The weakening link between productivity and employment may stem from labour substitution, technological change, employment protection rules, and PMR stringency.

Figure 17. Labour reallocation to more productive firms has declined

Effect of a 1% increase in lagged firm-level MFP on employment growth, employment change, %, and 95% confidence interval

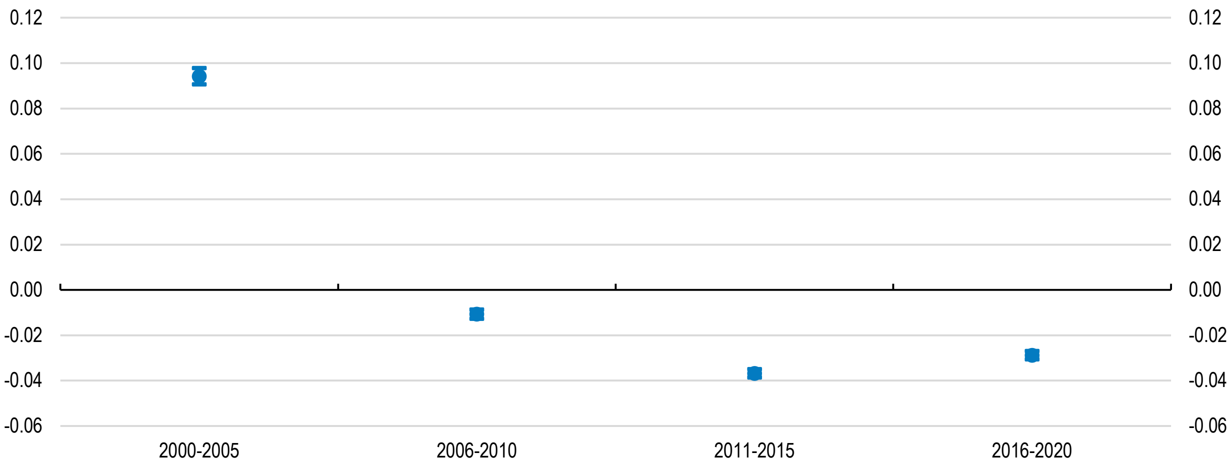


Note: Dependent variable is employment growth of EU companies. Independent variable is lagged multifactor productivity level of EU companies. OLS regression with firm-level and country-industry-year fixed effects, covering 21 EU countries for 2000 to 2021.
Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

PMR stringency has increasingly been linked to a weaker elasticity of employment growth to productivity. The interaction coefficient between PMR and firm-level MFP on firm-level employment growth fell from 0.09 in 2000-2005 to -0.03 in 2016-2020 (Figure 18), suggesting that stricter regulations increasingly dampen business dynamism. Confidence intervals are relatively small using the full Orbis sample, in contrast with the previous result based on the smaller sample of US parents and EU subsidiaries. However, since the PMR is fixed at 2018 levels and endogeneity concerns exist, these results may reflect spurious correlations rather than a direct causal effect of regulation on business dynamism.

Figure 18. PMR is increasingly linked to weaker elasticity of employment growth to productivity

Effect of a 1% increase in lagged firm-level MFP (interacted with PMR stringency) on employment growth, employment change, %, and 95% confidence interval



Note: Dependent variable is employment growth of EU companies. Independent variable is lagged multifactor productivity level of EU companies, interacted with the country-level PMR indicator. OLS regression with firm-level and country-industry-year fixed effects, covering 21 EU countries for 2000 to 2021.
Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Robustness Tests

GMM addresses endogeneity concerns in identifying productivity spillovers but risks instrument proliferation when rich fixed effects, notably country-industry-year fixed effects, are included, as the number of instruments exceeds degrees of freedom. OLS panel regressions, in contrast, includes stricter fixed effects but cannot fully correct for the endogeneity of spillovers and productivity. Both methods yield similar estimates, supporting the robustness of our findings.

Lobbying may influence PMR by protecting unproductive industries and limiting spillovers, which leads to endogeneity concerns. To mitigate these concerns, OLS results in Table 5, Column 4 include country-industry-year fixed effects that move at the same level of aggregation as the industry PMR to account for unobserved lobbying. Another concern is that US FDI could impact EU subsidiaries through domestic spillovers. Country-industry-year fixed effects also account for potential influences from US FDI within a given country and industry.

To further test the robustness of our results, we conduct two checks. First, we run a placebo test to ensure our significant coefficients in the US parent-EU subsidiary sample are not driven by noise. We replace each EU subsidiary with an independent EU firm, randomly matching from a pool of non-US-owned EU firms using nearest neighbour matching based on Mahalanobis distance[4]. Matching is done on industry (2 digit NACE Rev. 2), country, and firm characteristics such as capital depreciation share, employee cost share (in sales), labour productivity, sales and employment—averaged over each firm's observed period. If our identification strategy is valid, this placebo test should yield coefficients statistically indistinguishable from zero, indicating no effect when treatment is randomly assigned. We then replicate the spillover channel estimation using the system GMM model with the placebo test. As shown in the appendix, we find

[4] Our results hold also using propensity score matching, although using this second metric the sample reduces considerably, exposing our results to potential sample selection issues.

no statistically significant estimate of the productivity shock or PMR effect at either the country or industry level. These findings support the validity of our empirical approach and suggest that the observed effects in our main analysis are not driven by spurious correlations or sample selection bias.

As a second test, we examine whether PMR might confound the effect of other policies, such as stringency of employment protection or inefficient insolvency regimes, which may influence productivity by decreasing competition. Since PMR can also affect productivity through similar channels, we run the following regression:

$$\Delta y_{EUt} = \alpha + \alpha_{EU} + \beta_1 \Delta y_{USt-1} + \sum_k \beta_{2k} \Delta y_{USt-1} * P_k + \beta_3 X_{EUt} + \beta_4 X_{USt} + FE_t + u_{EUt} \qquad (5)$$

where the notation follows as usual, except for P_k, which refers to one of the three policy indices: PMR, Employment Protection Law (EPL) or Insolvency Regime (IR). EPL is represented by the “EPL-dismissal of regular workers” index taken from OECD Indicators of Employment Protection data. The index is assembled following a similar process to PMR, where a higher index value indicates stricter regulation (OECD, 2020[35]). Similarly, the IR index reflects the extent to which insolvency procedures delay proceedings and is also sourced from OECD data (André and Demmou, 2022[36]). Country-level IR data is available for 2016 and 2022, so we use the 2016 values. Country-level EPL data is available as time series until 2019, so we use data from each available year and exclude years from 2020 onwards. The main text reports the OLS results, with system GMM estimates available in the Appendix.

Results of our baseline OLS regression on the impact of various policy indicators on the productivity spillover from US parent companies to EU subsidiaries are presented in Figure 10 and Figure 11. Figure 10 focuses on sector-level PMR in services, while Figure 11 examines country-level PMR. We report results with and without the inclusion of EPL and IR indicators for each PMR analysis. Generally, the magnitudes of these results differ slightly from those in Figure 5 and Figure 9, likely due to the exclusion of 2020 and 2021 data, which covers the COVID-19 pandemic. After adding interactions between US parents’ productivity and EPL and IR, we find that the PMR effect remains stable for sector-level PMR (column 2 of Table 12) but decreases by approximately 3 percentage points for country-level PMR. For the aggregate PMR index, the coefficient changes from -0.28 to -0.25, and for the “Barriers to Entry” PMR index, it changes from -0.30 to -0.25, indicating a significant negative impact of PMR.

We find no significant effect of EPL or IR on productivity spillovers when included with PMR, or when included without PMR. As for EPL, this suggests that EU subsidiaries, which are typically larger and more productive, are less constrained by labour market rules, possibly due to their ability to attract skilled workers through higher wages. ICT firms are also overrepresented among subsidiaries, and digital companies may face fewer national labour constraints given access to a global talent pool. Instead, PMR and competitive pressures in goods and services markets appear to drive productivity gains, prompting EU subsidiaries to adopt best practice from their US parent firms.

In contrast, EPL appears to influence labour reallocation (Table B.11 in the appendix). Results for the full sample of manufacturing and services firms show that higher EPL values weaken labour reallocation towards more productive firms, when included without PMR. This suggest that flexible labour markets are more conducive to productivity and efficient allocation. However, the EPL coefficient changes sign when included with PMR, implying that more rigid labour markets may, under certain conditions, support reallocation. However, this likely reflects collinearity between EPL and PMR variables conditional on fixed effects, as residual variation in these indicators is correlated, causing the EPL coefficient to reverse sign when both are included.

As a final remark, while our results are robust, an additional test using time-series variation in PMR indicators (rather than just 2018 values) could further strengthen our results when the time-series data becomes available. Although PMR changes only slightly in most countries over our sample period (from 2000 to 2018), most impactful reforms occurred in the 1990s and early 2000s.

Table 12. Effect of Employment Protection Law and Insolvency Regime compared to sector-level PMR

Variables	(1)	(2)
	EU subsidiary labour productivity growth	
US parent labour productivity growth	0.240***	-0.129
	(0.084)	(0.404)
US parent labour productivity growth * PMR	-0.217***	-0.218***
	(0.073)	(0.073)
US parent labour productivity growth * EPL		0.131
		(0.138)
US parent labour productivity growth * IR		0.169
		(0.498)
Observations	1,898	1,898
R-squared	0.253	0.254
Firm FE:	Yes	Yes
Country-Industry-Year FE:	Yes	Yes

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table 13. Effect of Employment Protection Law and Insolvency Regime compared to country-level PMR

Variables			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			EU subsidiary labour productivity growth									
US parent labour productivity growth			0.128**	0.219	0.130***	0.240	0.125**	0.303	0.110**	0.300	0.136	0.447*
			(0.051)	(0.218)	(0.050)	(0.220)	(0.058)	(0.214)	(0.043)	(0.216)	(0.153)	(0.245)
Interaction of US parent labour productivity growth with PMR	PMR	General	-0.279**	-0.245**								
			(0.129)	(0.110)								
		Barriers to domestic and foreign entry			-0.298**	-0.253*						
					(0.133)	(0.132)						
	PMR barriers to entry	Administrative and regulatory burden					-0.159*	-0.140				
							(0.089)	(0.093)				
		Barriers in services and network sectors							-0.099	-0.050		
									(0.065)	(0.059)		
		Barriers to trade and investment									0.114	0.165
											(0.208)	(0.200)

US parent labour productivity growth * EPL		-0.007		-0.014		-0.032		-0.045		-0.063
		(0.065)		(0.065)		(0.065)		(0.061)		(0.057)
US parent labour productivity growth * IR		-0.286		-0.299		-0.384		-0.374		-0.437
		(0.263)		(0.281)		(0.269)		(0.278)		(0.268)
Observations	5,476	5,476	5,476	5,476	5,476	5,476	5,476	5,476	5,476	5,476
R-squared	0.203	0.203	0.203	0.203	0.203	0.204	0.203	0.203	0.202	0.203
Firm FE:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Industry-Year FE:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Conclusions

Using EU firm-level data from Orbis, this study finds widening productivity gaps between frontier and lagging firms between 2000 and 2021, aligning with earlier findings (Andrews, Criscuolo and Gal, 2016[14]). The rise in low-productivity firms was not matched by a proportional increase in high-productivity firms. Digitalised, knowledge-intensive sectors such as ICT and professional services are expanding value-added shares, yet their still limited employment and value-added shares could not offset the decline of manufacturing.

Standard productivity decomposition indicates that misallocation, partly in less knowledge-intensive services, contributes to this trend. Moreover, productivity dynamics in knowledge-intensive-services varies markedly across countries, suggesting that national policies and regulations continue to shape productivity outcomes despite IT advances enabling cross-border trade and economies of scale in these services.

Building on this evidence, the study further examines the relationship between product market regulation (PMR) and productivity growth using a novel identification strategy based on productivity spillovers from US parent companies to their EU subsidiaries. These EU firms tend to be larger, more productive and active in the ICT sector. Using sector- and country-level PMR indicators, we find that higher regulatory stringency is linked to weaker productivity spillovers from US parents to EU subsidiaries in service sectors, as well as in the overall economy (i.e. manufacturing and services). Productivity spillovers from the US are weaker in more regulated economies, indicating that strict regulations can dampen positive spillover effects.

The results hold across different estimation methods, including system GMM, which addresses endogeneity concerns such as unobserved factors that may affect both US and EU productivity, and persistent productivity shocks. Our results are also robust to controls for other regulatory factors, such as employment protection legislation and insolvency regimes. Nonetheless, some endogeneity concerns remain, as lobbying may influence PMR by protecting unproductive industries and limiting spillovers. To address this and account for unobserved lobbying, we use OLS estimation with country-industry-year fixed effects aligned with PMR's aggregation level. Country-industry-year fixed effects also control for potential spillovers from US foreign direct investment within a given country and industry.

We also find that stricter PMR is associated with a weaker elasticity of firm-level employment growth to productivity within sectors, indicating that tighter regulation can hinder efficient labour reallocation. This effect may add to known barriers to reallocation from inflexible labour markets. Moreover, PMR stringency has increasingly weakened the elasticity of employment growth to productivity over the past two decades, suggesting reduced business dynamism.

This evidence highlights the need for future research on regulation's impact on productivity and the Single Market, focusing on which regulations hinder growth and market integration, and the benefits of regulatory reforms.

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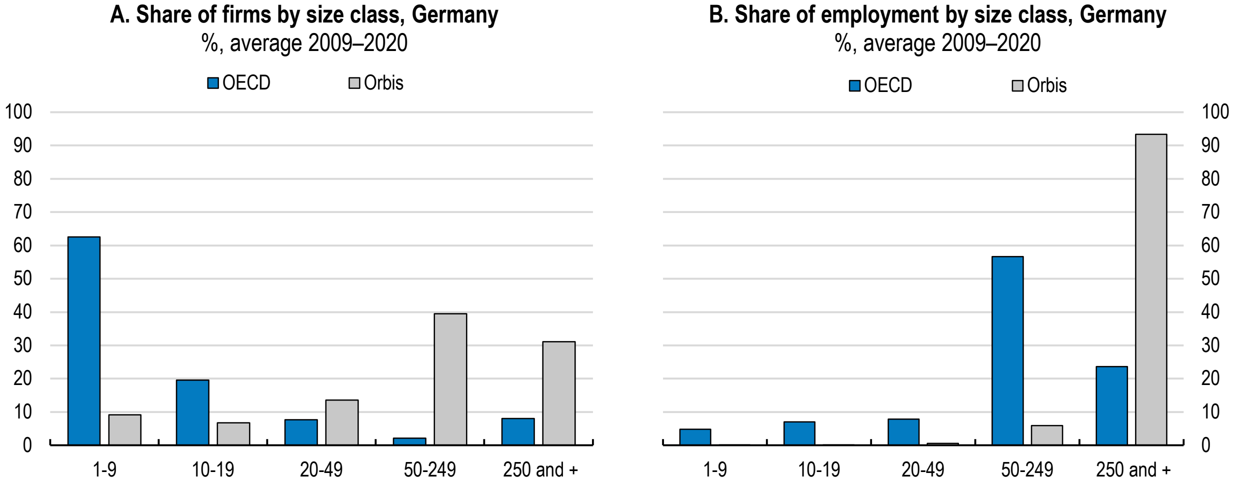
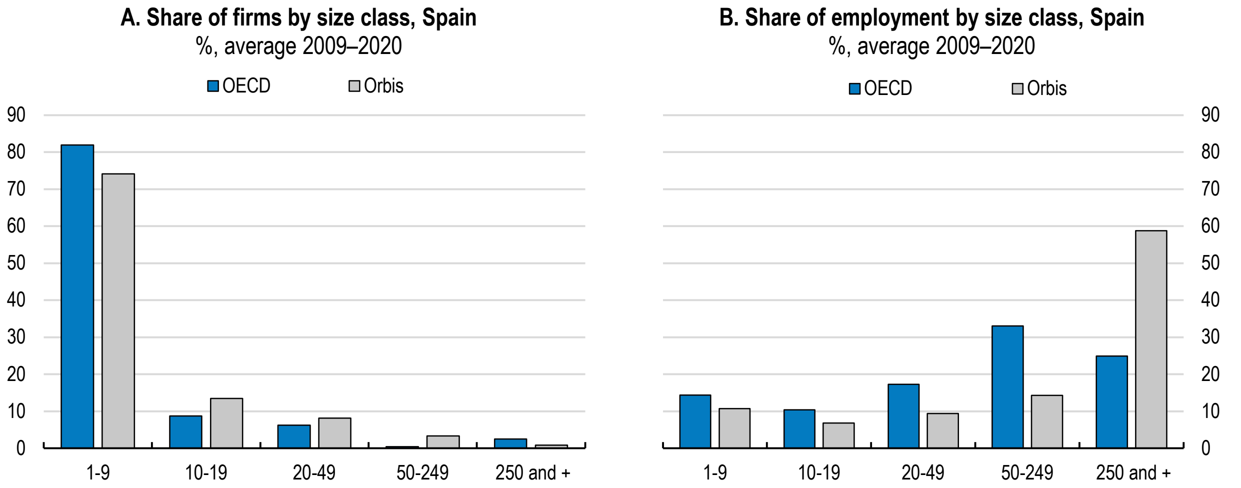
Annex A. Figures

Figure A.1. Percentage share of firms and employment by size class for Germany, Orbis sample versus OECD official data



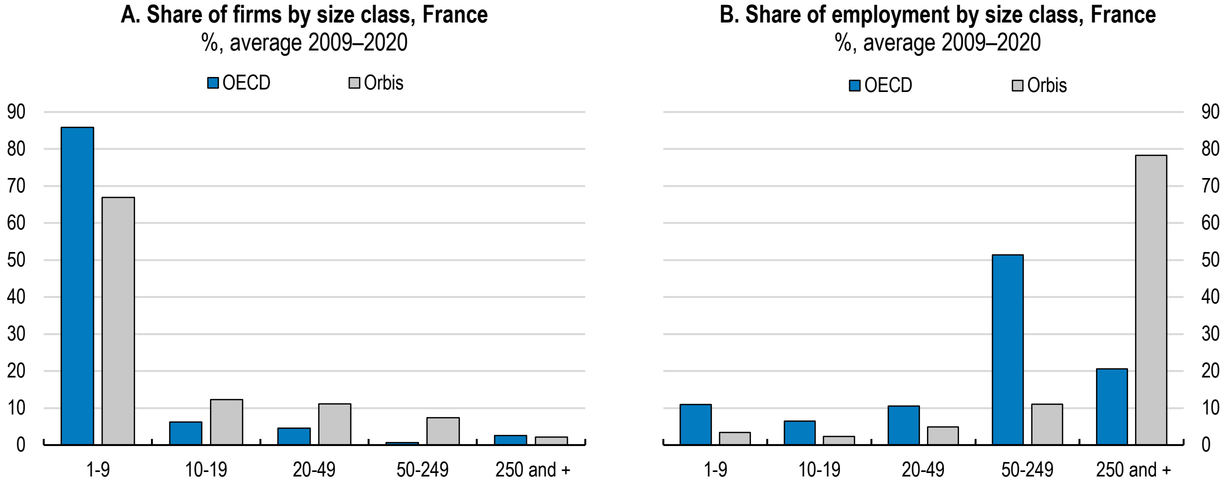
Note: Size class is based on the number of employees.
Source: OECD Structural business statistics by size class and economic activity (ISIC Rev. 4) database; OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Figure A.2. Percentage share of firms and employment by size class for Spain, Orbis sample versus OECD official data



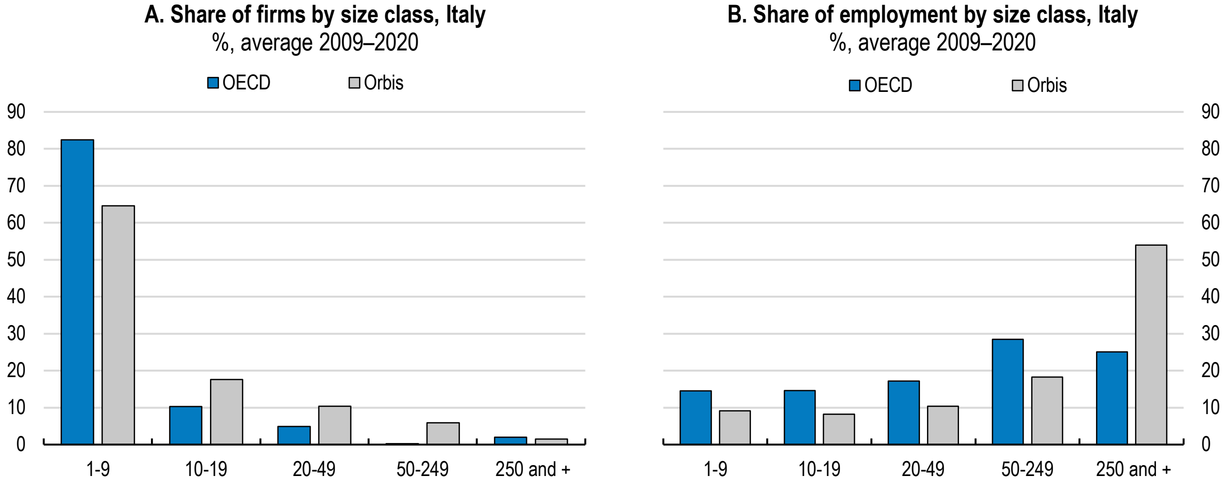
Note: Size class is based on the number of employees.
Source: OECD Structural business statistics by size class and economic activity (ISIC Rev. 4) database; OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Figure A.3. Percentage share of firms and employment by size class for France, Orbis sample versus OECD official data



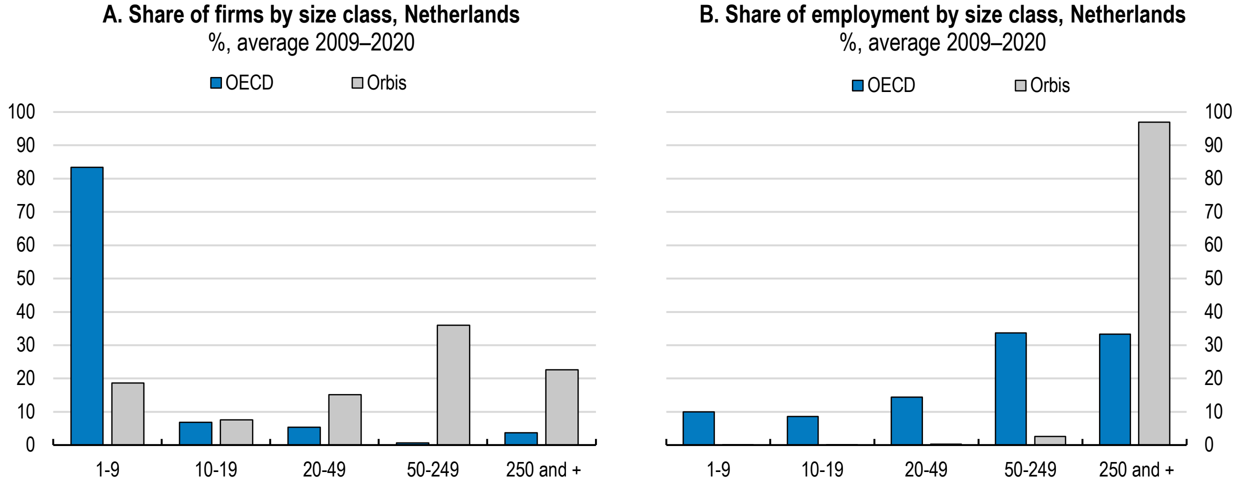
Note: Size class is based on the number of employees.
Source: OECD Structural business statistics by size class and economic activity (ISIC Rev. 4) database; OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Figure A.4. Percentage share of firms and employment by size class for Italy, Orbis sample versus OECD official data



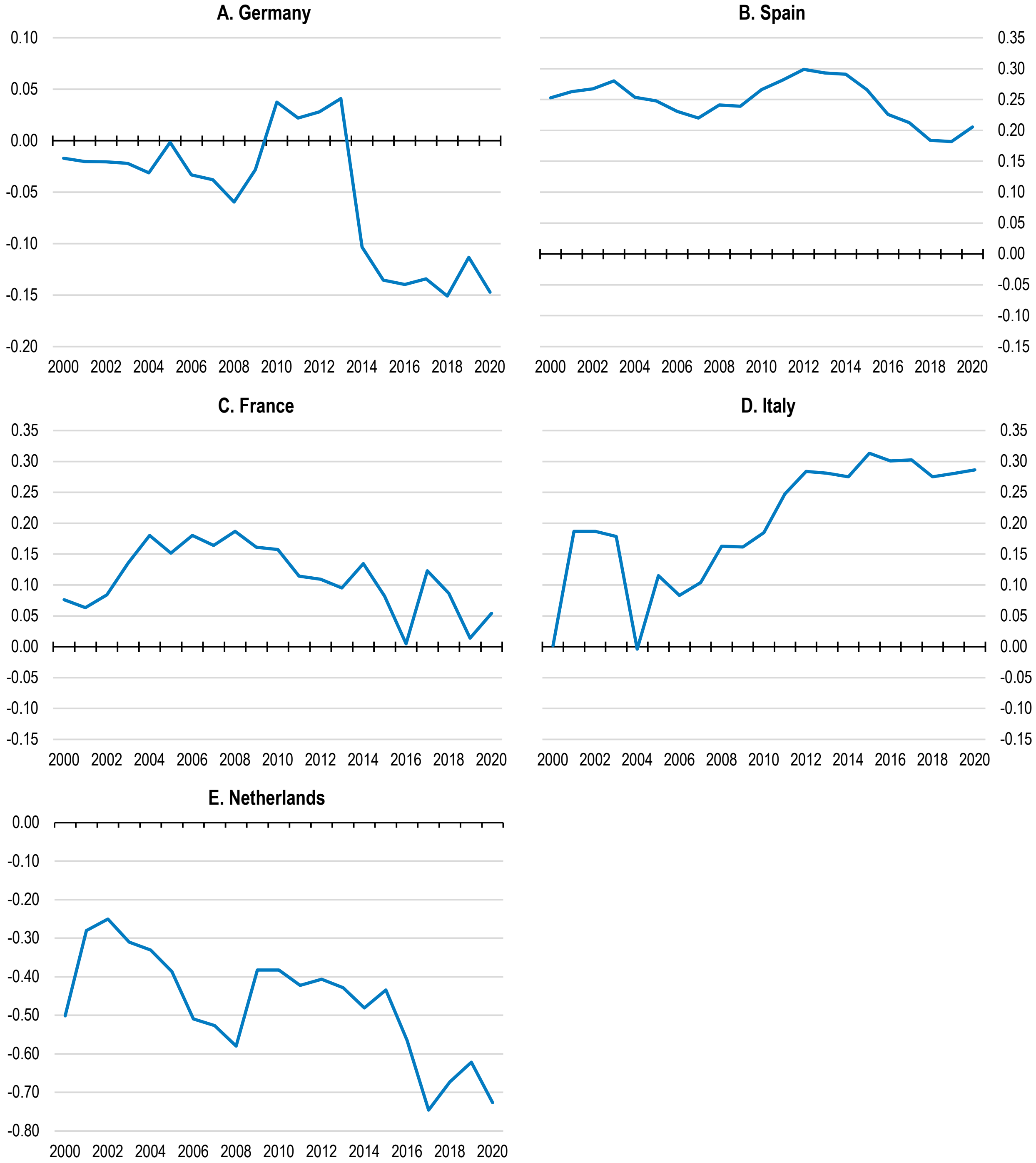
Note: Size class is based on the number of employees.
Source: OECD Structural business statistics by size class and economic activity (ISIC Rev. 4) database; OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Figure A.5. Percentage share of firms and employment by size class for the Netherlands, Orbis sample versus OECD official data



Note: Size class is based on the number of employees.
Source: OECD Structural business statistics by size class and economic activity (ISIC Rev. 4) database; OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

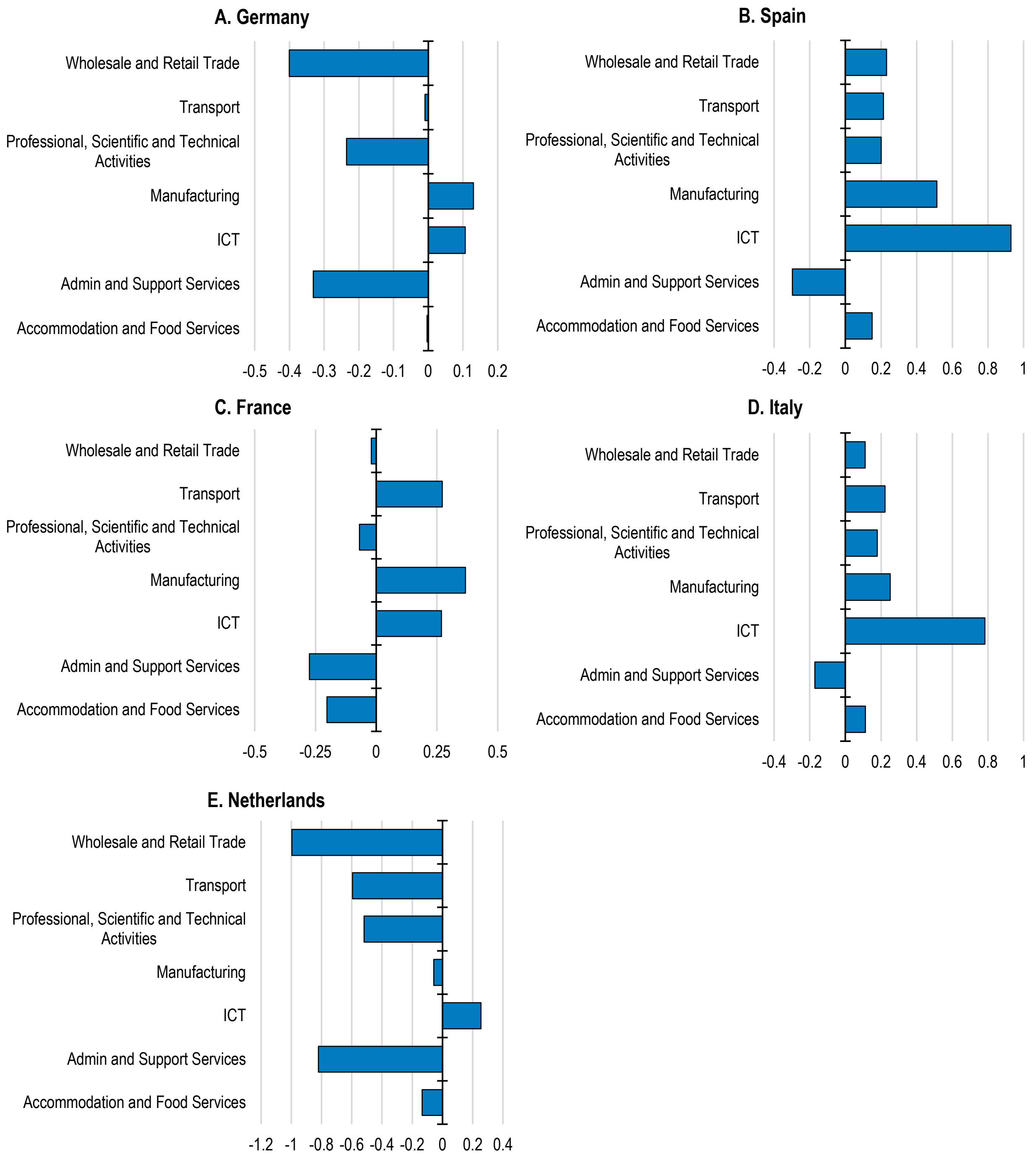
Figure A.6. Olley-Pakes (OP) decomposition by country



Note: The terms of the composition are calculated at the 2 digit industry level and aggregated across countries and industries using employment weights.
Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Figure A.7. Olley-Pakes (OP) covariance by sector

averages 2000-2021



Source: OECD calculations using the Orbis firm-level financial accounts database by Moody's/BvD (2024).

Annex B. Additional results

Table B.1. Industry-level PMR and productivity shock, 2005-2021, system GMM estimation

Variables	(1)	(2)
	EU subsidiary labour productivity growth	
Lagged EU subsidiary labour productivity growth	-0.280**	-0.298*
	(0.140)	(0.155)
US parent labour productivity growth	0.125*	0.127**
	(0.066)	(0.062)
US parent labour productivity growth * PMR	-0.180*	-0.152
	(0.109)	(0.102)
Observations	2,138	2,138
Firm FE:	Yes	Yes
Year FE:	Yes	No
Industry-Year FE:	No	Yes
Arellano-Bond AR(2) stat	-1.328	-1.379
Arellano-Bond AR(2) p-value	0.184	0.168
Hansen J stat	84.02	78.39
Hansen J p-value	0.223	0.372
Hansen J df	75	75

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table B.2. Country-level PMR and productivity shock, services only, system GMM estimation

Variables			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			EU subsidiary labour productivity growth									
Lagged EU subsidiary labour productivity growth			-0.24**	-0.26**	-0.24**	-0.26**	-0.23**	-0.25**	-0.24**	-0.25**	-0.24**	-0.26**
			(0.099)	(0.101)	(0.099)	(0.101)	(0.098)	(0.101)	(0.099)	(0.101)	(0.099)	(0.101)
US parent labour productivity growth			0.057***	0.091**	0.056**	0.089	0.050*	0.072	0.061***	0.078**	0.054	0.064
			(0.022)	(0.039)	(0.022)	(0.063)	(0.026)	(0.080)	(0.023)	(0.038)	(0.079)	(0.074)
Interaction of US parent labour productivity growth with PMR	PMR	General	-0.16**	-0.21***								
			(0.061)	(0.076)								
		Barriers to domestic and foreign entry			-0.17***	-0.237						
					(0.062)	(0.164)						
	PMR barriers to entry	Administrative and regulatory burden					-0.08*	-0.102				
							(0.043)	(0.127)				
		Barriers in services and network sectors							-0.083**	-0.09**		
									(0.040)	(0.045)		
		Barriers to trade and investment									0.051	0.058
											(0.109)	(0.113)

Observations	5,009	5,009	5,009	5,009	5,009	5,009	5,009	5,009	5,009	5,009
Firm FE:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE:	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Industry-Year FE:	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Arellano-Bond AR(2) stat	-0.983	-1.212	-0.984	-1.231	-0.971	-1.216	-0.995	-1.125	-0.974	-1.215
Arellano-Bond AR(2) p-value	0.326	0.225	0.325	0.218	0.332	0.224	0.320	0.261	0.330	0.224
Hansen J stat	121.7	95.47	122.2	96.02	123	96.61	120.5	97.03	123.5	97.60
Hansen J p-value	0.127	0.736	0.121	0.723	0.111	0.708	0.143	0.698	0.105	0.683
Hansen J df	105	105	105	105	105	105	105	105	105	105

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table B.3. Country-level PMR and productivity shock, 2005-2021, system GMM estimation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	EU subsidiary labour productivity growth									
Lagged EU subsidiary labour productivity growth	-0.096	-0.116	-0.095	-0.115	-0.095	-0.113	-0.094	-0.113	-0.096	-0.113
	(0.130)	(0.127)	(0.130)	(0.128)	(0.131)	(0.129)	(0.129)	(0.128)	(0.131)	(0.128)
US parent labour productivity growth	0.043*	0.046*	0.043*	0.037	0.019	0.022	0.059**	0.048*	-0.028	0.005
	(0.024)	(0.024)	(0.026)	(0.025)	(0.031)	(0.027)	(0.024)	(0.025)	(0.072)	(0.066)
Interaction of US parent labour productivity growth with PMR – PMR – General	-0.14**	-0.14**								
	(0.065)	(0.067)								
Interaction of US parent labour productivity growth with PMR – PMR – Barriers to domestic and foreign entry			-0.14**	-0.109						
			(0.071)	(0.072)						
Interaction of US parent labour productivity growth with PMR – PMR barriers to entry – Administrative and regulatory burden					-0.023	-0.026				
					(0.050)	(0.046)				
Interaction of US parent labour productivity growth with PMR – PMR barriers to entry – Barriers in services and network sectors							-0.10***	-0.071*		
							(0.036)	(0.038)		
Interaction of US parent labour productivity growth with PMR – PMR barriers to entry – Barriers to trade and investment									-0.054	-0.009
									(0.098)	(0.090)
Observations	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709
Firm FE:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE:	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Industry-Year FE:	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Arellano-Bond AR(2) stat	0.140	0.511	0.140	0.517	0.142	0.788	0.148	0.703	0.134	0.698
Arellano-Bond AR(2) p-value	0.889	0.609	0.888	0.605	0.887	0.431	0.883	0.482	0.893	0.485
Hansen J stat	95.57	76.85	95.45	77.01	97.06	77.53	94.38	76.62	96.72	77.37
Hansen J p-value	0.0548	0.419	0.0557	0.414	0.0443	0.398	0.0646	0.426	0.0465	0.403
Hansen J df	75	75	75	75	75	75	75	75	75	75

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table B.4. Country-level PMR and productivity shock by country group, system GMM estimation

Variables	(1)	(2)	(3)
	EU subsidiary labour productivity growth		
	Average spillover effect (Table 10, column 7)	Average of 5 EU countries with least restrictive entry barriers	Average of 5 EU countries with most restrictive entry barriers
US parent labour productivity growth	0.056**	0.057**	0.035**
	(0.022)	(0.022)	(0.016)

Note: The five EU countries in the sample with the lowest value of the PMR barriers to entry in services and network sectors indicator are Czechia, Denmark, Germany, the Netherlands and Sweden, while the five EU countries with the highest value are Belgium, Greece, Hungary, Italy and Portugal. Results replicate those shown in Table 10, column 7 by country group. Dependent variable is labour productivity growth of EU companies that are subsidiaries of US-based companies. Independent variable is labour productivity growth of US parent companies, interacted with the country-level PMR indicator for barriers to entry in services and network sectors. System GMM regression with firm-level and year fixed effects, covering 21 EU countries for 2000 to 2021. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table B.5. Country-level PMR and productivity shock by country group, services only, system GMM estimation

Variables	(1)	(2)	(3)
	EU subsidiary labour productivity growth		
	Average spillover effect (Table 10, column 7)	Average of 5 EU countries with least restrictive entry barriers	Average of 5 EU countries with most restrictive entry barriers
US parent labour productivity growth	0.061***	0.061***	0.043***
	(0.023)	(0.023)	(0.016)

Note: The five EU countries in the sample with the lowest value of the PMR barriers to entry in services and network sectors indicator are Czechia, Denmark, Germany, the Netherlands and Sweden, while the five EU countries with the highest value are Belgium, Greece, Hungary, Italy and Portugal. Results replicate those shown in Table 10, column 7 for services by country group. Dependent variable is labour productivity growth of EU companies that are subsidiaries of US-based companies. Independent variable is labour productivity growth of US parent companies, interacted with the country-level PMR indicator for barriers to entry in services and network sectors. System GMM regression with firm-level and year fixed effects, covering 21 EU countries for 2000 to 2021. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table B.6. Country-level PMR and employment growth, services only, OLS regression

Variables			(1)	(2)	(3)	(4)	(5)	(6)
			Employment Growth					
MFP			0.176***	0.176***	0.170***	0.176***	0.153***	0.193***
			(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Interaction of MFP With PMR	PMR	General		-0.027***				
				(0.002)				
		Barriers to domestic and foreign entry			-0.002			
					(0.002)			
	PMR barriers to entry	Administrative and regulatory burden				-0.038***		
						(0.001)		
		Barriers in services and network sectors					0.027***	
							(0.001)	

Barriers to trade and investment						0.039***
						(0.002)
Age	-0.071***	-0.071***	-0.071***	-0.071***	-0.071***	-0.071***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capital stock	0.012***	0.012***	0.012***	0.012***	0.012***	0.012***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Depreciation share of capital	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales	-0.116***	-0.116***	-0.116***	-0.115***	-0.115***	-0.116***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	14,993,666	14,993,666	14,993,666	14,993,666	14,993,666	14,993,666
R-squared	0.094	0.094	0.094	0.094	0.094	0.094
Firm FE:	Yes	Yes	Yes	Yes	Yes	Yes
Country-Industry-Year FE:	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table B.7. Placebo GMM estimation – sector-level PMR

Variables	(1)	(2)
	Placebo EU subsidiary labour productivity growth	
Lagged Placebo EU subsidiary labour productivity growth	-0.434***	-0.443
	(0.076)	(487.880)
US parent labour productivity growth	0.049	0.064
	(0.044)	(844.763)
US parent labour productivity growth * PMR	-0.047	-0.085
	(0.055)	(840.110)
Observations	1,856	1,856
Firm FE:	Yes	Yes
Year FE	Yes	No
Industry-Year FE:	No	Yes
Arellano-Bond AR(2) stat	-1.429	-0.000442
Arellano-Bond AR(2) p-value	0.153	1
Hansen J stat	112.8	494.4
Hansen J p-value	0.283	0
Hansen J df	105	105

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table B.8. Placebo GMM estimation – country-level PMR

Variables			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			Placebo EU subsidiary labour productivity growth									
Lagged Placebo EU subsidiary labour productivity growth			-0.24***	-0.23***	-0.24***	-0.23***	-0.24***	-0.23***	-0.23***	-0.23***	-0.24***	-0.23***
			(0.067)	(0.069)	(0.067)	(0.069)	(0.066)	(0.068)	(0.067)	(0.068)	(0.067)	(0.070)
US parent labour productivity growth			0.004	0.006	0.013	0.017	0.033	0.038	-0.006	-0.006	0.030	0.025
			(0.017)	(0.026)	(0.019)	(0.055)	(0.022)	(0.055)	(0.021)	(0.024)	(0.059)	(0.070)
Interaction of US parent labour	PMR	General	0.009	0.013								
			(0.061)	(0.070)								
		Barriers to domestic and foreign entry			-0.041	-0.041						

			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
productivity growth with PMR					(0.066)	(0.162)						
	PMR barriers to entry	Administrative and regulatory burden					-0.070*	-0.078				
							(0.041)	(0.099)				
		Barriers in services and network sectors							0.027	0.031		
									(0.039)	(0.039)		
		Barriers to trade and investment									0.035	0.026
											(0.088)	(0.108)
Observations			4,828	4,828	4,828	4,828	4,828	4,828	4,828	4,828	4,828	4,828
Firm FE:			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE:			Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Industry-Year FE:			No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Arellano-Bond AR(2) stat			-0.689	-0.450	-0.687	-0.440	-0.671	-0.415	-0.697	-0.436	-0.685	-0.440
Arellano-Bond AR(2) p-value			0.491	0.652	0.492	0.660	0.502	0.678	0.486	0.663	0.494	0.660
Hansen J stat			112.9	97.35	113.8	98.47	112	98	111.8	96.52	112.6	97.04
Hansen J p-value			0.281	0.690	0.261	0.661	0.303	0.673	0.308	0.711	0.288	0.698
Hansen J df			105	105	105	105	105	105	105	105	105	105

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table B.9. Effect of Employment Protection Law and Insolvency Regime compared to sector-level PMR, GMM estimation

Variables	(1)	(2)	(3)	(4)
	EU subsidiary labour productivity growth			
Lagged EU subsidiary labour productivity growth	-0.227***	-0.192**	-0.227***	-0.196**
	(0.063)	(0.077)	(0.064)	(0.077)
US parent labour productivity growth	0.170**	0.260***	-0.157	-0.095
	(0.070)	(0.092)	(0.279)	(0.295)
US parent labour productivity growth * PMR	-0.219***	-0.321***	-0.228***	-0.324***
	(0.080)	(0.104)	(0.083)	(0.110)
US parent labour productivity growth * EPL			0.091	0.097
			(0.081)	(0.080)
US parent labour productivity growth * IR			0.363	0.362
			(0.440)	(0.490)
EPL			0.011	0.028
			(0.029)	(0.033)
IR			-0.131	-0.117
			(0.215)	(0.212)
Observations	1,815	1,815	1,815	1,815
Firm FE:	Yes	Yes	Yes	Yes
Year FE:	Yes	No	Yes	No
Industry-Year FE:	No	Yes	No	Yes
Arellano-Bond AR(2) stat	-1.848	-0.624	-1.849	-0.795
Arellano-Bond AR(2) p-value	0.0646	0.532	0.0645	0.427
Hansen J stat	108.8	80.21	113.2	81.52
Hansen J p-value	0.126	0.825	0.0754	0.797

Hansen J df	93	93	93	93

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table B.10. Effect of Employment Protection Law and Insolvency Regime compared to country-level PMR, GMM estimation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	EU subsidiary labour productivity growth									
Lagged EU subsidiary labour productivity growth	-0.24***	-0.24***	-0.24***	-0.24***	-0.24***	-0.24***	-0.24***	-0.24***	-0.24***	-0.24***
	(0.085)	(0.085)	(0.084)	(0.085)	(0.085)	(0.086)	(0.086)	(0.086)	(0.085)	(0.086)
US parent labour productivity growth	0.067	0.034	0.103	0.020	0.068	0.099	0.065	0.141	0.059	0.134
	(0.049)	(0.125)	(0.090)	(0.120)	(0.119)	(0.101)	(0.041)	(0.127)	(0.103)	(0.135)
Interaction of US parent labour productivity growth with PMR: PMR: General	-0.184*	-0.173								
	(0.104)	(0.138)								
Interaction of US parent labour productivity growth with PMR: PMR: Barriers to domestic and foreign entry			-0.300	-0.324						
			(0.236)	(0.289)						
Interaction of US parent labour productivity growth with PMR: PMR barriers to entry: Administrative and regulatory burden					-0.111	-0.087				
					(0.194)	(0.188)				
Interaction of US parent labour productivity growth with PMR: PMR barriers to entry: Barriers in services and network sectors							-0.092**	-0.068		
							(0.046)	(0.058)		
Interaction of US parent labour productivity growth with PMR: PMR barriers to entry: Barriers to trade and investment									0.066	0.044
									(0.140)	(0.107)
US parent labour productivity growth * EPL		0.005		0.019		-0.015		-0.031		-0.026
		(0.041)		(0.049)		(0.040)		(0.045)		(0.031)
US parent labour productivity growth * IR		0.064		0.151		-0.023		-0.038		-0.101
		(0.225)		(0.270)		(0.206)		(0.172)		(0.161)
EPL		-0.005		-0.003		-0.011		-0.017		0.001
		(0.021)		(0.020)		(0.022)		(0.037)		(0.021)
IR		-0.120		-0.101		-0.127		-0.143		-0.075
		(0.117)		(0.114)		(0.110)		(0.163)		(0.110)
Observations	5,264	5,264	5,264	5,264	5,264	5,264	5,264	5,264	5,264	5,264
Firm FE:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-FE	No	No	No	No	No	No	No	No	No	No
Industry-Year FE:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Arellano-Bond AR(2) stat	-1.829	-1.176	-1.220	-1.230	-1.193	-1.179	-1.866	-2.212	-2.105	-1.120
Arellano-Bond AR(2) p-value	0.0674	0.240	0.222	0.219	0.233	0.238	0.0620	0.0269	0.0353	0.263
Hansen J stat	79.72	82.90	83.73	82.77	84.26	82.91	79.93	80.09	82.25	84.99
Hansen J p-value	0.835	0.764	0.744	0.767	0.730	0.764	0.831	0.828	0.780	0.711
Hansen J df	93	93	93	93	93	93	93	93	93	93

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.

Table B.11. Effect of Employment Protection Law, OLS regression

Variables	(1)
	Employment growth
MFP	0.179***
	(0.001)
MFP * EPL	-0.003***
	(0.001)
Age	-0.020***
	(0.000)
Capital stock	-0.005***
	(0.000)
Sales	-0.092***
	(0.000)
Observations	12,986,619
R-squared	0.066
Firm FE:	Yes
Country-Industry-Year FE:	Yes

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Variables with non-significant estimates omitted from the table.