Are pro-productivity policies effective?

Evidence from cross-country historical data

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Abstract

This paper examines the role of public policies in shaping cross-country productivity performance over the period 2003–2018 based on a comprehensive framework that maps more than one hundred policy indicators into the five broad policy channels identified by van Ark et al. (2024). Using data for up to 21 advanced economies and 14 industries, the paper combines principal component analysis with a sector-level empirical model that exploits cross-industry differences in exposure to national policies. The results show that, while structural and historical factors explain most of the productivity differences, policy settings are strongly and systematically associated with productivity outcomes. Institutional quality, human capabilities, competitive and flexible markets, public R&D expenditure, environmental policies, and trade openness display robust positive correlations with labour and total factor productivity. The analysis highlights substantial heterogeneity in policy mixes across countries and rejects a one-size-fits-all approach to productivity policy reform. Scenario simulations suggest that convergence toward international best practices could yield sizeable productivity gains, especially for lagging and "muddling through" economies. While the estimates are descriptive rather than causal, the framework provides a coherent basis for identifying country-specific productivity policy priorities.

1. Introduction

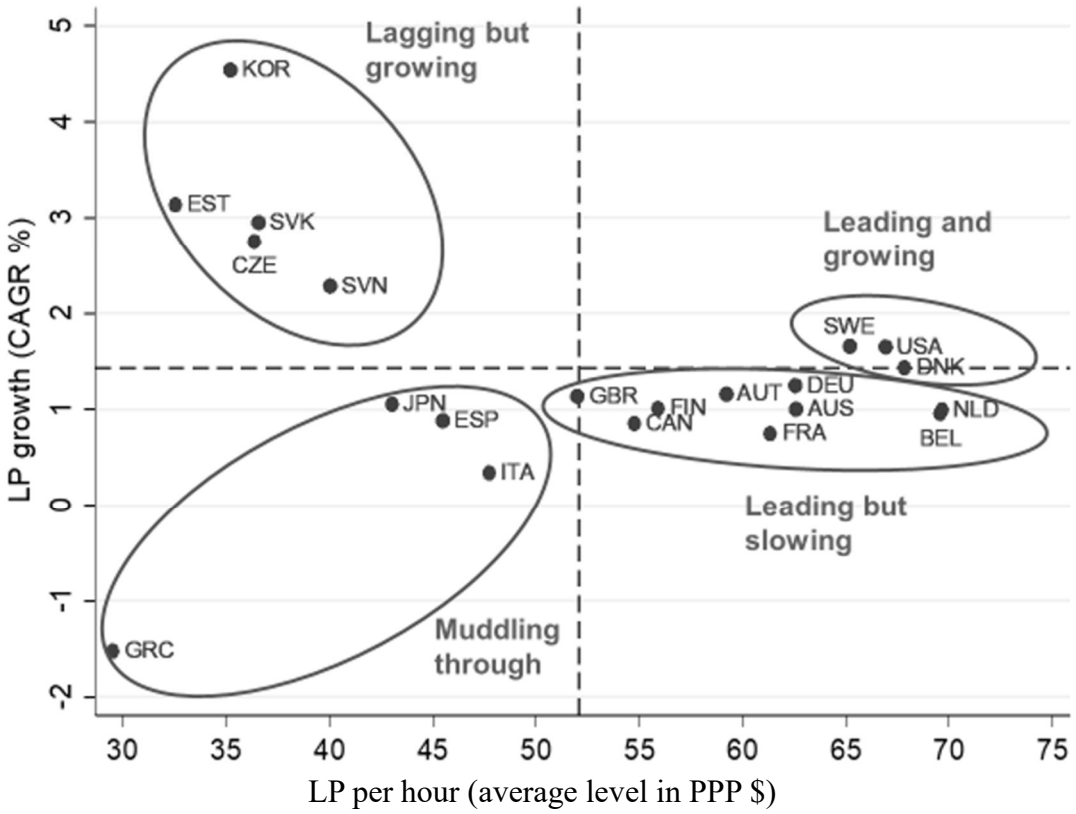
Productivity levels and growth rates have differed widely across countries over the past decades. The global productivity slowdown experienced this century has affected countries with varying degrees of intensity and persistence. As recently noted by Goldin et al. (2024) and Bergeaud (2024), such diverse patterns cannot be attributed to a single cause: instead, a combination of historical, structural and policy factors is responsible for productivity outcomes.

This paper investigates the role played by public policies in shaping cross-country productivity patterns. It focuses on policies that are either explicitly targeted at improving productivity -- like those promoting innovation and technology adoption -- or on policies that have implications for productivity via its proximate drivers -- such as human capital or market pressures and mechanisms.

Policy influences on productivity are organized following the taxonomy proposed by van Ark et al. (2024). This paper makes their framework empirically operational by mapping a very large set of cross-country indicators into five different policy channels: institutional foundations; accumulation of production factors; markets and resource allocation; technological and structural change; and internationalization. The policy indicators were collected from a variety of international sources to cover a wide group of advanced economies over a sufficiently long time span. This allows cross-country comparisons of approaches to pro-productivity policy. By merging the indicators with sectoral productivity data, policy influences on productivity can be investigated for each of the five channels.

The countries in the sample provide a diverse set of productivity patterns (Figure 1) that can be organized into four groups: countries that are “muddling through”, sharing both relatively low productivity levels and growth rates; those that are “lagging but growing”, starting from low levels but catching up rapidly; those that are “leading but slowing”, which are highly productive but suffered most from the global productivity slowdown; and those that are “leading and growing”, which are both highly productive and still growing above the sample average despite the productivity slowdown.

Figure 1: Productivity differences and country groupings
(business sector, 2003-2018 average)



Notes and sources: LP= labour productivity. CAGR %= $((LP_{2018}/LP_{2003})^{1/15} - 1) *100$. Labour productivity is sourced from EUKLEMS & INTANProd and is calculated as value added per hour worked in the business sector (MARKTxAG), where value added includes intangibles not classified as investment in the national accounts (Corrado et al. 2022). For Japan, the aggregate includes agriculture within the business sector (MARKT). For Australia (AUS), Canada (CAN), and Korea (KOR), LP comes from the OECD Productivity database, measured as GDP per hour worked (2020 USD PPP). This latter measure does not incorporate intangible assets currently not included in national account and corresponds to the total economy (NACE A–U).

Leveraging these data, our analysis provides an overview of cross-country policy differences in 21 countries over the 2003-2018 period. It then relates policy indicators to productivity via regression analysis for a panel of 14 industries in 18 countries over the same time span. The policy indicators are summarized by principal component analysis (PCA) to group policies into key areas within each of the five main policy channels and verify which areas are empirically relevant for productivity outcomes.

The paper provides a first attempt to empirically assess the relevance of an extensive set of policies for productivity within a unified framework and in a cross-country setting. In particular, it highlights which policies have been associated with productivity in the sample and their likely relative contribution to productivity growth. The analysis cannot claim to be causal, due to the difficulties in fully accounting for both confounding factors and political economy feedback from productivity outcomes to policy interventions. Nonetheless, based on the empirical estimates, policies can be ranked by the strength of their association with productivity, allowing to policy makers to set priorities for different country groups.

The data analysis confirms that cross-country policy approaches directly or indirectly affecting productivity differ substantially across the five main policy channels. When ranking policy approaches from least to most favourable to productivity, some notable patterns emerge. The 'muddling through' countries (Italy, Greece, Spain) generally rank lower on policy, while 'leading' nations (USA, Sweden, Denmark) rank higher. Geographic clusters also emerge in key policy areas. Southern and Eastern Europe show relative weaknesses in foundational policies and in policies aimed at market dynamism and factor accumulation, whereas Anglophone and some Nordic countries are at the opposite side of the policy spectrum in these areas. Asian nations are positioned in the middle.

Policy patterns are more nuanced regarding technology, structural change, and internationalization, which reflects diverse, country-specific policy mixes. For technology and structural change, nations like France, Canada, and the Nordics provide robust support for both innovation and the green transition. In contrast, the United States prioritizes innovation. Innovation strategies also vary significantly by mechanism: while many continental European countries and Canada rely heavily on tax incentives to support private R&D and innovation, the Nordics, the U.S., and South Korea emphasize direct public expenditures to do so. Similar divergence exists in internationalization: countries like Germany and the UK promote both trade and Foreign Direct Investment (FDI), whereas others—including the U.S., Japan, and parts of the EU—pair trade facilitation with FDI restrictions.

Regression estimates and the related scenario analysis suggest that such differences in policy approaches can play a key role in shaping productivity outcomes. As expected, non-policy factors, reflecting the importance of geographical, historical and structural differences, tend to explain most of the variability in productivity outcomes across countries. However, policies are strongly and positively associated with productivity outcomes, especially those affecting (i) institutional quality and macro stability, (ii) human capabilities, (iii) the efficient functioning of product, labour and financial markets, (iv) R&D expenditure and the green transition, and (v) international openness. Among these, policies improving skills, enhancing labour market flexibility, raising competitive pressures in product markets and facilitating trade and FDI show the strongest positive association with productivity. Moreover, as starting points differ across countries, scenario analysis reveals that there is no one-size-fits-all approach to productivity policy reform. Priorities for boosting productivity remain highly country-specific. The analysis provides a country-specific guide for establishing these priorities, which can supplement the policy prescriptions emerging from more specific country studies.

2. Policies and productivity: A framework for empirical analysis

2.1. Identifying and summarizing pro-productivity policies

Policies that influence productivity are numerous, heterogeneous and implemented via a variety of institutional channels. Some are embedded in regulatory frameworks, others in tax incentives, and still others in education, innovation, or infrastructure programs. This chapter describes productivity policy settings by using more than 106 policy indicators drawn from various official sources -- including the OECD, the IMF, the World Bank, and the World Economic Forum (Table 1). Following van Ark et al (2024), policies are assumed to influence productivity via five main channels: (i) foundational policies; (ii) factor accumulation; (iii) market functioning; (iv) technology and industry structure; and (v) internationalization.

Table 1: Details of policy indicators and Principal Components Analysis (PCA)

Name of retained policy axis	**Details of Indicators used (106 indicators) with original metric and *[source]***	**Percentage of variability explained by retained principal components (PC)**
Human capabilities *(6 indicators)*	• Government expenditure on education (% of GDP) *[World Bank WDI]* • Educational attainment in tertiary education (% of 25–64-year-old population) *[OECD Education at a Glance]* • Educational attainment in tertiary education (% of women aged 25–64-year-old) *[OECD Education at a Glance]* • Performance in reading (units: score)[3] *[OCDE PISA Database]* • Performance in mathematics (units: score) *[OCDE PISA Database]* • Performance in science (units: score) *[OCDE PISA Database]*	PC1 = 60%
Rail and air transport *(5 indicators)*	• Air transport: registered carrier departures worldwide *[World Bank WDI]* • Air transport: freight (million ton-km) *[World Bank WDI]* • Air transport: passengers carried *[World Bank WDI]* • Railways: goods transported (million ton-km) *[World Bank WDI]* • Railways: passengers carried (million passenger-km) *[World Bank WDI]*	PC1 = 77%
Density of infrastructure *(3 indicators)*	• Density of rail lines (km per one hundred sq. km) *[OECD International Transport Forum]* • Density of roads (km per one hundred sq. km) *[OECD International Transport Forum]* • Number of airports per 1,000 sq. km *[OECD International Transport Forum]*	PC1 = 68%
Government capabilities *(5 indicators)*	• Control of corruption (units: score)[4] *[World Bank WGI]* • Government effectiveness (units: score) *[World Bank WGI]* • Regulatory quality (units: score) *[World Bank WGI]* • Better outcomes regarding extra payments, bribes, and favouritism (units: score) *[EFW]*[5] • Better outcomes for voice and accountability (units: score) *[World Bank WGI]*	PC1 = 85%
Institutional framework efficiency *(10 indicators)*	• Stability of the state (units: score) *[World Bank WGI]* • Respect for the rule of law (units: score) *[World Bank WGI]* • Access to financial institutions (index (0-1)) *[IMF Financial Development Indicators]* • Large and complex financial institutions (index (0-1)) *[IMF Financial Development Indicators]* • Efficiency of financial institutions (index (0-1)) *[IMF Financial Development Indicators]* • Regulatory restrictions on property sales *[EFW]* • Indirect taxes, % of total revenue (recurrent taxes on immovable property + taxes on goods and services) *[OECD Global Revenue Statistics Database]* • Close to the frontier and efficient (0 to 100 with 100 = frontier) *[World Bank Doing Business]* • Taxes (payments per year) *[World Bank Doing Business]* • Taxes (hours per year) *[World Bank Doing Business]*	PC1 = 33%
Macro-economic uncertainty *(3 indicators)*	• Debt to equity ratio of financial corporations (debt-to-equity ratio) *[OECD STD Financial Statistics]* • Loans assets of the banking sector, as a percentage of its currency and deposits liabilities *[OECD STD Financial Statistics]* • Ten-year average of Harmonised Headline Inflation, year-on-year percentage growth *[OECD Economic Outlook Database]*	PC1 = 45%

[3] Mean score of capacity to understand, use and reflect on written texts to achieve goals, develop knowledge and potential, and participate in society (the higher the score, the higher the level of competence).

[4] WGI indicator in percentile rank terms from 0 to 100, with higher values corresponding to better outcomes.

[5] Indicator ranging from 0 to 10 (with 10 representing an environment where extra payments, bribes, and favouritism are almost non-existent).

Trade facilitation *(7 indicators)*	• Efficiency of custom clearance process (index) *[World Bank WDI]* • Ease of arranging competitively priced shipment (index) *[World Bank WDI]* • Quality of trade & transport-related infrastructure (index) *[World Bank WDI]* • Efficiency overall (index) *[World Bank WDI]* • Frequency with which shipments reach consignee (index) *[World Bank WDI]* • Competence and quality of logistics services (index) *[World Bank WDI]* • Ability to track and trace consignments (index) *[World Bank WDI]*	PC1 = 87%
FDI restriction *(4 indicators)*	• Restriction on the employment of foreigners (index)[6] *[OECD, FDIRRI Regulatory Database]* • Foreign equity limitation (index) *[OECD, FDIRRI Regulatory Database]* • Operational restrictions (index) *[OECD, FDIRRI Regulatory Database]* • Screening or approval mechanism (index) *[OECD, FDIRRI Regulatory Database]*	PC1 = 37%
Financial market accessibility and smoothness *(8 indicators)*	• Financial markets access index (0-1 with 1 = better) *[IMF Financial Development Indicators]* • Financial markets depth index (0-1 with 1 = better) *[IMF Financial Development Indicators]* • Financial markets efficiency index (0-1 with 1 = better) *[IMF Financial Development Indicators]* • Legal framework to obtain credit information (index 0-12) *[World Bank Doing Business]* • Legal framework to obtain credit (index 0-12) *[World Bank Doing Business]* • Protecting minority investors (index) *[World Bank Doing Business]* • Protecting minority investors - Ease of shareholder suit (index) *[World Bank Doing Business]* • Distance to the best practice frontier (getting credit) (index 0-100) *[World Bank Doing Business]*	PC1 = 40%
Labour market rigidity (PC1) **Job matching (PC2)** *(13 indicators)*	• Regulation of individual and collective dismissals for regular contracts (EPL index 0 to 6) *[OECD]* • Regulation of individual and collective dismissals for temporary contracts (EPL index 0 to 6) *[OECD]* • Training (% of GDP) *[OECD Database on Labour Market Programmes]* • Workplace training (% of GDP) *[OECD Database on Labour Market Programmes]* • Integrated training (% of GDP) *[OECD Database on Labour Market Programmes]* • Special support of apprenticeship (% of GDP) *[OECD Database on Labour Market Programmes]* • Start-up incentives (% of GDP) *[OECD Database on Labour Market Programmes]* • Full unemployment benefit (% of GDP) *[OECD Database on Labour Market Programmes]* • Average tax wedge (% labour costs) *[Labour taxation – OECD comparative indicators]* • Labour market regulation (index) [*Fraser Institute Economic Freedom of the World (EFW)]* • Hiring and firing regulations (index) *[EFW]* • Hour regulation (index) *[EFW]* • Mandated cost of worker dismissal (index) *[EFW]*	PC1 = 37% PC2= 15%
Product market regulation *(5 indicators used to construct regulatory burden)*	• Regulation of the energy sector (PMR index 0 to 6) *[OECD]* • Regulation of the transport sector (PMR index 0 to 6) *[OECD]* • Regulation of the communication sector (PMR index 0 to 6) *[OECD]* • Regulation of the retail distribution sector (PMR index 0 to 6) *[OECD]* • Regulation of the professional services sector (PMR index 0 to 6) *[OECD]*	- NO PCA
Contract enforcement inefficiency *(4 indicators)*	• Distance to the best practice frontier (index 0 to 100) *[World Bank Doing Business]* • Time to enforcing contract (days) *[World Bank Doing Business]* • Time required to enforcing contract *[World bank WDI]* • Procedure to enforcing contract (number of procedures) *[World Bank Doing Business]*	PC1 = 76%
Difficulty of entry *(8 indicators)*	• Cost to start-up (% of GDP per capita) *[World bank WDI]* • Start-up procedure to register a business *[World bank WDI]* • Time required to start a business *[World bank WDI]* • Cost to start a business (% income/capita) *[World Bank Doing Business]* • Paid-in minimum capital to start (% income/capita) *[World Bank Doing Business]* • Number of procedures to start *[World Bank Doing Business]* • Time required to start a business (days) *[World Bank Doing Business]* • Proximity to the best practice frontier (index 0-100) *[World Bank Doing Business]*	PC1 = 63%
Difficulty of exit *(5 indicators)*	• Time to resolve insolvency (index) *[World bank WDI]* • Time to resolve insolvency (year) *[World Bank Doing Business]* • Cost to resolving insolvency (% of estate) *[World Bank Doing Business]* • Recovery rate (cents on the dollar) *[World Bank Doing Business]* • Distance to best practice frontier (0-100 with 100 = frontier) *[World Bank Doing Business]*	PC1 = 78%
Stringency of emission limits *(13 indicators)*	• Stringency of CO2 trading scheme (index 0 to 6)[7] *[OECD, Environmental Policy Stringency index]* • Stringency of CO2 tax (index 0-6) *[OECD, EPS index]* • Stringency of Diesel tax (index 0-6) *[OECD, EPS index]* • Stringency of Nox tax (index 0-6) *[OECD, EPS index]* • Stringency of renewable energy trading scheme (index 0-6) *[OECD, EPS index]* • Stringency of Sox tax (index 0-6) *[OECD, EPS index]* • Stringency of emission limit value PM (index 0-6) *[OECD, EPS index]* • Stringency of emission limit value Nox (index 0-6) *[OECD, EPS index]* • Stringency of emission limit value Sox (index 0-6) *[OECD, EPS index]* • Stringency of emission limit value Sulphur (index 0-6) *[OECD, EPS index]* • Low carbon R&D expenditure (index 0-6) *[OECD, EPS index]* • Price support to solar energy (index 0-6) *[OECD, EPS index]* • Price support to wind energy (index 0-6) *[OECD, EPS index]*	PC1 = 23%
R&D tax incentives (PC1) **R&D expenditure**	• Implied tax subsidy rates on R&D tax incentives: profitable large firms *[OECD R&D Tax Incentives]* • Implied tax subsidy rates on R&D tax incentives: loss-making large firms *[OECD R&D Tax Incentives]* • Implied tax subsidy rates on R&D tax incentives: profitable SMEs *[OECD R&D Tax Incentives]* • Implied tax subsidy rates on R&D tax incentives: loss-making SMEs *[OECD R&D Tax Incentives]*	PC1 = 53% PC2 = 24%

[6] Index of 0-1; 0 for complete openness to trade and investment.

[7] Index from 0 (not stringent) to 6 (highest degree of stringency).

(PC2) *(7 indicators)*	• Business enterprise expenditure on R&D financed by government, (% of GDP) *[OECD]* • Research and development expenditure (% of GDP) *[World bank WDI]* • Higher education expenditure on R&D (% of GDP) *[OECD MSTI]*	

The paper extends their approach by mapping the five broad policy categories into 13 more specific policy areas and 16 sub-areas (Table 1 and Figure 2). Key areas for foundational policies are government capabilities, institutional frameworks, and macroeconomic stability. Key areas for factor accumulation are human capabilities and infrastructure investment; while in key policy areas linked to the market mechanisms and resource allocation channel cover financial, labour, and product markets. In turn, labour market policies include two sub-areas: support to workers' reallocation and the mix of job protection and tax-benefit systems. Similarly, product market policies are subdivided into two sub-areas: contract enforceability and competition policies in sectors that provide important intermediate inputs to the rest of the economy. Policies supporting technological and structural transformation span the green transition, creative destruction and technology and innovation – with innovation policies subdivided into R&D spending and R&D tax incentives. Finally, internationalization policies encompass trade facilitation and foreign direct investment.

Each of the policy sub-areas summarizes a range of policy indicators. For instance, the *markets and resource allocation* category includes 30 indicators, 8 of them covering financial markets, 13 covering the labour market and 9 covering product markets. In turn the product market indicators are split into contract enforceability (4 indicators) and anticompetitive regulations (5 indicators).

One of the main challenges in managing such a broad set of policies lies in their complementary nature and overlaps. Treating each indicator in isolation would risk double counting or misrepresenting their combined effects. In addition, many policies are synergetic: their full impact on productivity only materializes when implemented together. For instance, within the human capital dimension, three of the five indicators rely on PISA achievement scores in reading, mathematics and science, which are highly correlated and therefore reflect a common underlying construct. A similar overlap arises in the "stringency of emission limits" cluster, where taxes, trading schemes and emission standards for CO_2, NOx, SOx, PM and sulphur all capture closely-related climate policy stringency.

This challenge is addressed by using Principal Component Analysis (PCA) to summarize the indicators included in each broad policy area with measures that reflect the variation across the indicators and capture their common underlying pattern.[8] In some areas they are summarized into a single PCA axis (e.g. human capabilities), in others they are summarized into two PCA axes that are orthogonal and statistically independent (e.g. labour markets and innovation). Each PCA axis corresponds to a distinct sub-area of the proposed policy taxonomy and has an unambiguous interpretation. For instance, the value of the *human capabilities* axis increases with higher levels of public spending in education, higher tertiary education attainment and stronger student performance in reading, mathematics, and/or science.

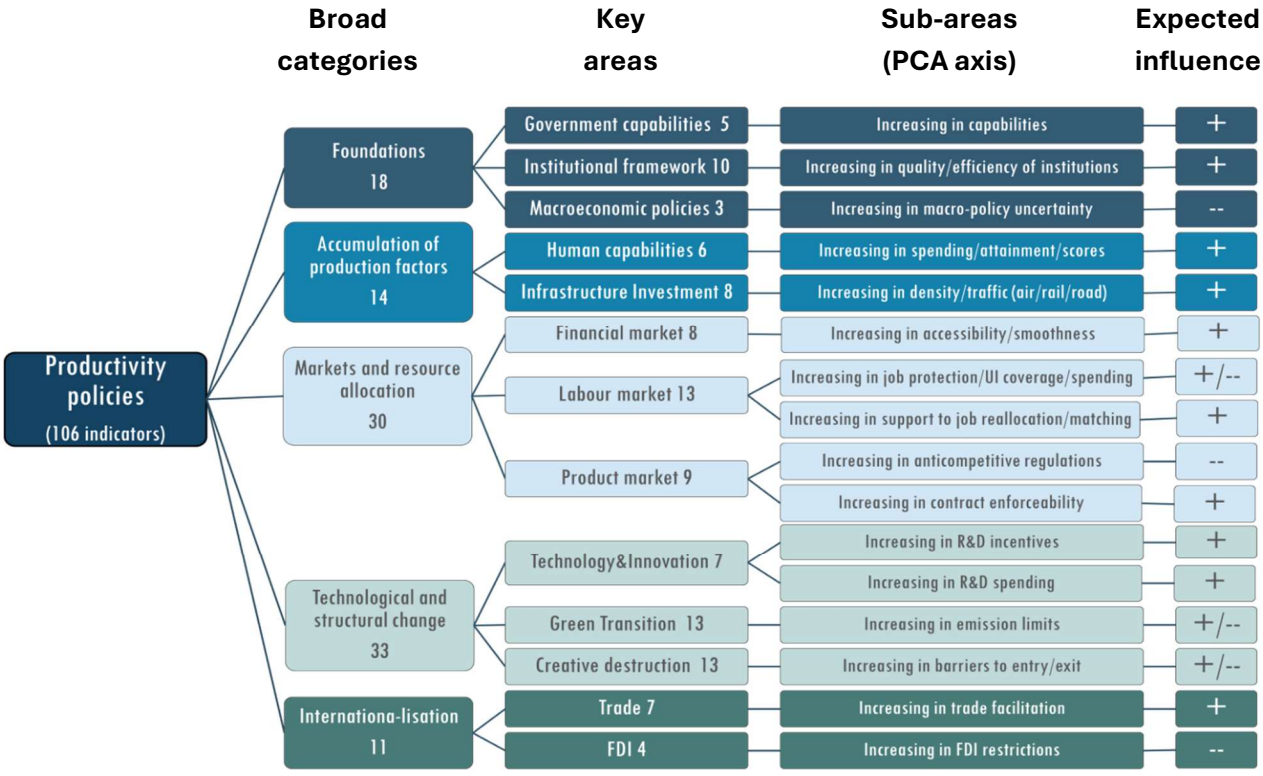
Condensing the policy space into interpretable and orthogonal dimensions creates a framework that can be directly linked to productivity outcomes across countries and industries. Most of the 16 policy sub-areas identified by PCA have an unambiguous a priori influence on productivity. In some cases, their influence is more contentious because the sub-area includes

[8] PCA allows to extract latent dimensions that capture the common variance across related policy indicators, thereby reducing redundancy and improving analytical clarity.

policies whose a priori effect on productivity is more ambiguous. For example, some labour market indicators promote job security while others enhance adaptability. Policies promoting creative destruction shape both firm selection and dynamism. And policies setting emission limits combine incentives with coercive measures.

However, all these potential policy influences can be tested against the data. Indeed, the resulting PCA measures not only facilitate cross-country comparisons by accounting for complementarities and trade-offs among different policy domains; they also allow meaningful econometric analysis of the likely productivity consequences of implementing different policies.

Figure 2: Mapping productivity policies



Source : Authors' elaboration.

2.2. Linking policies to productivity

Empirical model

The 16 policy measures are then related to productivity using an empirical model specification in which the country and industry-specific levels of labour or total factor productivity (TFP) depend on four main factors – a catch-up term reflecting each country's starting position, a capital intensity measure (which is omitted in the TFP specification), pro-productivity policies and a set of unobserved fixed effects. The latter helps in accounting for possible measurement errors as well as for potential endogeneity bias due to the omission of some of the confounding factors that could drive both productivity and policies.

While policy measures are generally implemented at the national level, their impact on labour productivity and TFP may vary by industry. To capture this variation, the policies are interacted with industry-specific exposure metrics. These metrics are designed to be constant across countries and over time, varying only by sectors. This interaction also helps to identify the linkage between policies and productivity by focusing on cross-industry differentials within the same country–period (net of country–industry averages).

Despite the inclusion of fixed effects and the identification strategy, the specification may still be affected by other potential sources of endogeneity. For instance, it does not account for country-industry factors that may affect both policies and productivity over time, such as country-specific developments in industry technologies that call for specific policy interventions. Reverse causality also cannot be excluded, such as country-specific policy interventions in certain industries that are the result of lobbying by interest groups reacting to productivity outcomes.[9] The estimates should therefore be considered as descriptive in nature and not causal.

The following models are estimated by OLS:

$$ln\left(LP_{c,i,t}\right) = \alpha_0 + \alpha_1\, ln\left(LP_{i,t-1}^{leader}\right) + \alpha_2\, ln\left(Int\, K_{c,i,t-1}\right) + \sum_k \alpha^k Policy\ Axis_{c,t-1}^k \times Exp_i^k + \phi_{c,t} + \phi_{c,i} + \epsilon_{c,i,t} \quad (1)$$

$$ln\left(TFP_{c,i,t}\right) = \alpha_0 + \alpha_1\, ln\left(TFP_{i,t-1}^{leader}\right) + \sum_k \alpha^k Policy\ Axis_{c,t-1}^k \times Exp_i^k + \phi_{c,t} + \phi_{c,i} + \epsilon_{c,i,t} \quad (2)$$

Where, $\ln\left(LP_{c,i,t}\right)$ and $\ln\left(TFP_{c,i,t}\right)$ denote the log of hourly productivity for country c, industry i at time t ; $\ln\left(LP_{i,t-1}^{leader}\right)\ and\ ln\left(TFP_{i,t-1}^{leader}\right)$ represent the lagged log of leader productivity, which captures the distance to the (country-invariant) industry productivity frontier, a proxy for technological catch-up; $\ln\left(Int\, K_{c,t-1}\right)$ is the lagged log of capital intensity; $\sum_k \alpha^k Policy\ Axis_{c,t-1}^k$ captures the full set of policy axes resulting from PCA at the country level (lagged to partially account for both possible endogeneity bias and the delay between policy implementation and their influence on outcomes); Exp_i denotes the industry-specific exposure to each nation-wide policy (see below). Finally, the country-time crossed fixed effects (denoted $\phi_{c,t}$) control for industry-invariant shocks that may influence both productivity and policy choices; they also help address the possible reverse causality of nation-wide public policy decisions taken in response to low productivity levels.[10] Additionally, the country-industry crossed fixed effects (denoted $\phi_{c,i}$) serve as individual fixed effects. They capture unobserved heterogeneity across industries within countries, which helps to isolate the impact of the policy axis more accurately.

Industry exposure variables

Table 2 summarizes the industry-specific exposure variables used for each nation-wide policy axis, corresponding to the following assumptions:

[9] For instance, industries with weak productivity performances in certain countries may lobby for government protection or support. Alternatively, dynamic industries in certain countries could lobby for policy reforms that enhance their productivity performances.

[10] Indeed, lagging policies may not be sufficient to address the problem given that policies are often quite persistent over time.

- Policies aimed at improving human capabilities are particularly important for productivity in sectors with structurally higher organizational-capital or digital intensity (OECD, 2013).
- Policies that strengthen the institutional framework or government capabilities (which include judicial efficiency) may be related to productivity especially in sectors that rely primarily on enforceable contracts.
- Policies enhancing macro stability are key for productivity in sectors in which productivity is more volatile over the economic cycle (Bloom, 2009; Aghion et al., 2010).
- Financial market policies relate to productivity especially in sectors where dependence on external finance is strong (Rajan and Zingales, 1998).
- Labour market policies are particularly relevant for productivity in sectors with structurally high job turnover rates (Haltiwanger et al., 2014).
- Policies affecting the creative-destruction process influence productivity especially in sectors with structurally high firm turnover rates (OECD, 2015a).
- The relation between productivity and technology or innovation policies is likely to be particularly strong in sectors with high R&D or digital intensity.
- Policies limiting emissions for the green transition may have a stronger link with productivity in sectors that have a high percentage of green tasks (Smiderle et al., 2026).
- Policies aimed at trade and FDI are particularly related to productivity in sectors that are open to trade or capital intensive, respectively.

Product market policies are a special case as measures of the trickle-down effects of anticompetitive regulations in energy, communication, transport, retail trade and the professional services ("upstream industries") are available for all countries, industries and periods covered in the analysis (see Conway and Nicoletti, 2007; Bourlès et al., 2013; Cette et al., 2025). The assumption here is that the relevance of anticompetitive regulations in upstream industries for productivity in other industries depends on the intensity of their input-output linkages with the regulated industries. More precisely, in each industry *i* the product market policy variable is computed as the weighted sum of regulations in upstream industries *j*, where the weights are the intensity of intermediate use in *i* of inputs produced by the regulated sectors:[11]

$$NMR^{up}_{c,i,t} = \sum_{j} int_{i,j} \times NMR_{c,j,t} \qquad int_{i,j} = 0 \; if \; i = j$$

Sensitivity to the choice of some of these exposure variables is tested either by changing its definition (e.g. replacing organizational capital intensity with digital intensity) or by changing the reference year for the measurement of the time and country invariant industry characteristics. The results remain broadly unaffected by these changes.

[11] To minimize endogeneity issues, intermediate input intensities are drawn from the 2006 USA input-output table.

Table 2: Sectoral exposure to nation-wide policies

Key areas	Sectoral exposure	Aggregate	Source
Foundational policies for productivity			
Government capabilities	**Contract intensity indicator***	USA 1997	Nunn (2007)
Institutional framework	**Contract intensity indicator**	USA 1997	Nunn (2007)
Macro-economic policies	**Cyclical variability** (computed as standard error of ln(LP)'s cycle extracted via a Hodrick-Prescott (1997) filter)	Average for 18 countries over 2003-2018	EUKLEMS&INTANProd national account
Policies aimed at factor accumulation			
Human capabilities	**Organizational capital intensity****	Average for 18 countries over 2003-2018	EUKLEMS Intangible file
	Digital intensity indicator	USA average 2003-2024 or single year 2003, 2006, 2024	Smiderle et al., (2026)
Infrastructure investment	**Investment in transport equipment**	Average for 18 countries over 2003-2018	EUKLEMS&INTANProd capital account file
	Intensity of use of intermediate input from transport sectors	USA: 2006 or 2018	I-O OECD table
Policies focused on market mechanisms and resource allocation			
Financial market	**Financial dependence indicator**	USA over the 1990-2006 period	Demmou et al., (2019) use Rajan and Zingales (1998) indicator
Labour market	**Job turnover** (calculated as the sum of job creation and job destruction rates, net of their difference)	USA: average (2002–2017) or a single year: **2002**, 2006, or 2017	Business of Labour Statistics (BLS)
Product market regulation	**Intermediate input intensity from regulated sectors** (network industries, retail trade, professional services).	USA for 1997 or **2006**	I-O OECD table
Policies supporting technological and structural transformation			
Technology and innovation	**R&D capital intensity**	Average for 18 countries over 2003-2018	EUKLEMS&INTANProd Intangible file
Green transition	**Greenness intensity indicator** (based on the share of green tasks in the sector)	USA average (2003-2024) or a single year: 2003, 2006 or **2024**	Smiderle et al., (2026)
Creative destruction	**Firms' turnover** (calculated as the percentage of firm entries plus the percentage of firm exits)	USA: for **2002**, 2006 or2017	Business of Labour Statistics (BLS)
Internationalization policies			
Trade	**Openness indicator** (computed as exports plus absolute imports, divided by output)	USA 1997	I-O OECD table
FDI	Openness indicator	USA 1997	I-O OECD Table
	Total capital intensity	Average for 18 countries over 2003-2018	EUKLEMS&INTANProd Intangible file

Notes: The grey-shaded exposure variables (or years) are selected to describe regression results and are used in policy scenarios. Country averages are for Austria, Belgium, Czechia, Germany, Denmark, Spain, Estonia, Finland, France, United Kingdom, Greece, Italy, Japan, Netherlands, Slovakia, Slovenia, Sweden, United States.

* The contract intensity indicator is an index designed to measure a sector's dependence on the enforcement of contracts. Based on the USA I-O table, the author calculates for each sector the share of inputs or contract-specific investments (e.g. having little value outside the contractual relationship) in total production or investment.

** Organizational capital is used as a proxy for managerial skills. Sectors with higher organizational capital intensity rely more on effective management and coordination of skilled labour. In these sectors, human capital is likely to be more productive, as better managerial practices improve the allocation and use of high-skilled workers.

2.3. Cross-country policy patterns

The sample used to describe pro-productivity policies includes 21 advanced countries in four continents over the 2003-2018 period.[12] More than one hundred (106) quantitative policy indicators were collected from international institutions such as the OECD, the IMF, the World Bank, and the World Economic Forum. The indicators were selected based on historical and country coverage to span the productivity policy channels identified by van Ark et al (2024).

Figure 3 summarizes cross-country differences in approaches grouping the (standardized) policy axes resulting from PCA in four different panels reflecting the channels of influence on productivity, with policies influencing foundations and production factors described in the same panel to reflect effects on endowments. A positive value indicates that a country performs above the average of the sample, while a negative value indicates that it performs below the average. The interpretation of these values is straightforward: a higher value reflects better policy performance. To this end, the metric of some of the policy axes has been inverted (e.g. macro-economic uncertainty has been turned into macro-economic certainty) and for three of them (labour market flexibility, stringency of emissions limits and ease of entry or exit) it has been assumed for illustrative purposes that their effects on productivity are positive. To improve readability, each panel is ordered according to the sum of the PCA values associated with the most desirable policy outcomes. Countries whose policies are overall more pro-productivity appear at the top of the graph, while those where policies are less pro-productivity appear at the bottom.

Overall, there is a significant heterogeneity in policy approaches across countries. On **foundations and production factors (Panel A)**, countries such as Slovakia, Greece and Italy appear among the weakest performers -- reflecting a combination of institutional inefficiencies, uncertain macro policies and low human capital formation. By contrast, Canada, Finland, Denmark and Sweden are positioned at the top of the panel -- indicating strong institutional frameworks, stable macro policies and effective educational systems. Japan occupies an intermediate position: despite outstanding human capabilities, its weaker institutional efficiency and higher macro-uncertainty push it downward in the ranking.

Approaches to **markets and resource reallocation (Panel B)** also differ a lot. Southern EU countries tend to combine labour market rigidities and limited support for job transitions with less competitive (and reliable) product markets and more restricted access to financial markets, while Anglo-Saxon economies, Japan and several Nordic countries are at the opposite end of the spectrum. But policy mixes vary also in this area. For instance, in the Nordic countries labour market settings are characterized by relatively strong income support and activation policies, while in Anglo-Saxon countries such policies are relatively weak and more emphasis is placed on flexibility, competition and access to finance.

In the area of **technology and structural change policies (Panel C)**, differences in environmental and innovation approaches are wide. Slovakia, Greece and the United States appear to have the least favourable overall configurations, though for different reasons. The United States suffers from weak environmental stringency despite stronger support for innovation, while the other countries suffer from weaknesses in both domains. At the opposite end, countries like France, Canada and the Netherlands stand out as having both stringent

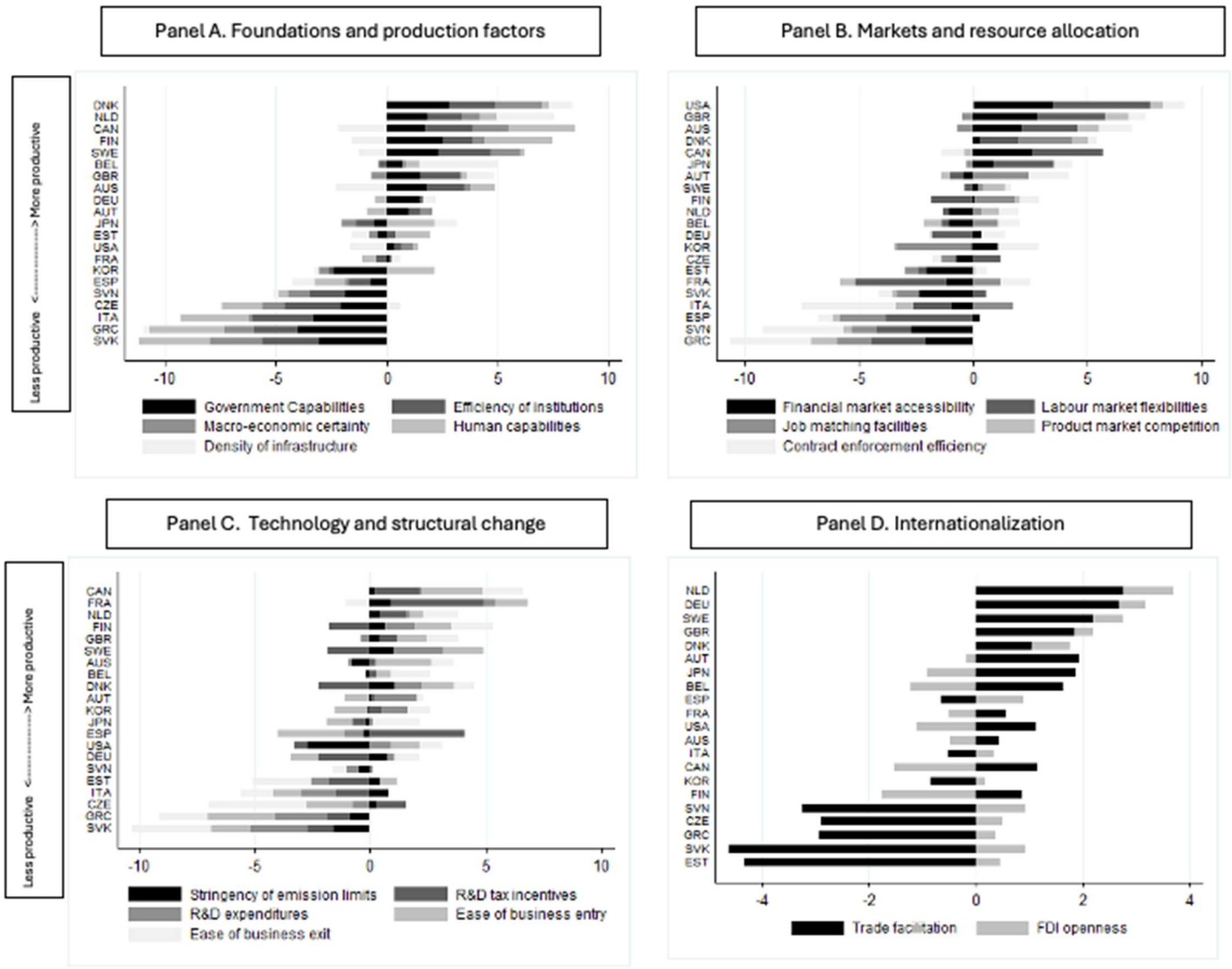
[12] The countries are Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Czechia (CZE), Germany (DEU), Denmark (DNK), Spain (ESP), Estonia (EST), Finland (FIN), France (FRA), United Kingdom (GBR), Greece (GRC), Italy (ITA), Japan (JPN), South Korea (KOR), Netherlands (NLD), Slovakia (SVK), Slovenia (SVN), Sweden (SWE), United States (USA).

emission limits and strong innovation support. Also, the innovation policy mix varies widely across countries, with some prioritising either tax incentives (e.g. Spain and Canada) or direct public expenditures (e.g. the United States, the Nordics) while yet others use both policy instruments (France, Korea and Austria).

Finally, despite rising global integration, **internationalization** (**Panel D)** has also been achieved to different degrees and in different ways. Countries like Eastern EU countries and Greece are relatively restrictive, reflecting either limited trade facilitation or barriers to foreign direct investment. Conversely, the Netherlands, Germany, Sweden and the United Kingdom present the most favourable configurations, combining high trade openness with few FDI restrictions. Some countries, such as Canada, Finland, Belgium and Japan (and to a lesser extent the United States), present a mixed profile — strong trade facilitation coupled with relatively high FDI restrictions.

Across all four domains, some clusters can be identified: Slovakia, Greece, and Italy often maintain the least favourable productivity policies, whereas the Nordic countries, the Netherlands and Canada are often among the top performers. Other major economies, such as the United States, Japan, Germany, and France, exhibit mixed profiles with a combination of policy strengths and weaknesses.

Figure 3: Productivity policy approaches across countries



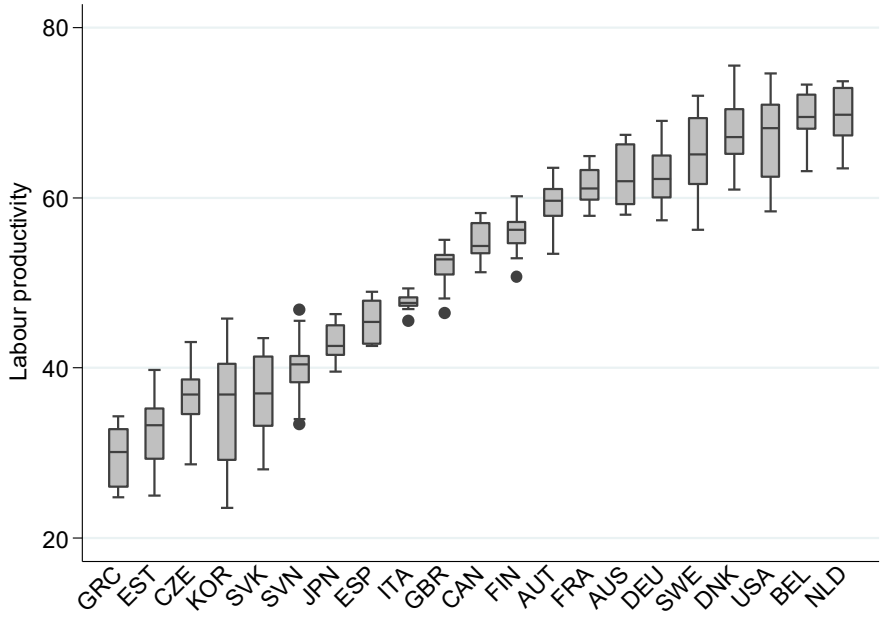
Notes: Average of standardized PCA policy axes over the 2003-2018 period by country and by axis. Positive (negative) values indicate performance above (below) the sample average. For instance, Panel A shows that Denmark (DNK) exhibits comparatively more pro-productivite than other countries in the sample across the five key areas of foundational policies and factor accumulation.

2.4. The influence of policies on productivity

The substantial cross-country heterogeneity in policy approaches may have contributed to the dispersion observed in productivity outcomes (Figure 4). This relationship is assessed using productivity and capital formation data from the EUKLEMS & INTANProd Database (Bontadini et al., 2023). The database was used to compute hourly labour and total factor productivity as well as capital intensity, which includes both intangible assets included in the national accounts (such as R&D and software) and those not included in the national accounts, such as organisational capital, business training, branding, and marketing.[13] Merging these data with the policy indicators results in a balanced sample covering 14 industries (11 manufacturing, 3 services) across 18 countries for labour productivity and 13 industries in 16 countries for TFP over the 2003-2018 period.[14,15]

Figure 4: Business sector labour productivity (LP) dispersion

Panel A. Dispersion over time (2003-2018)

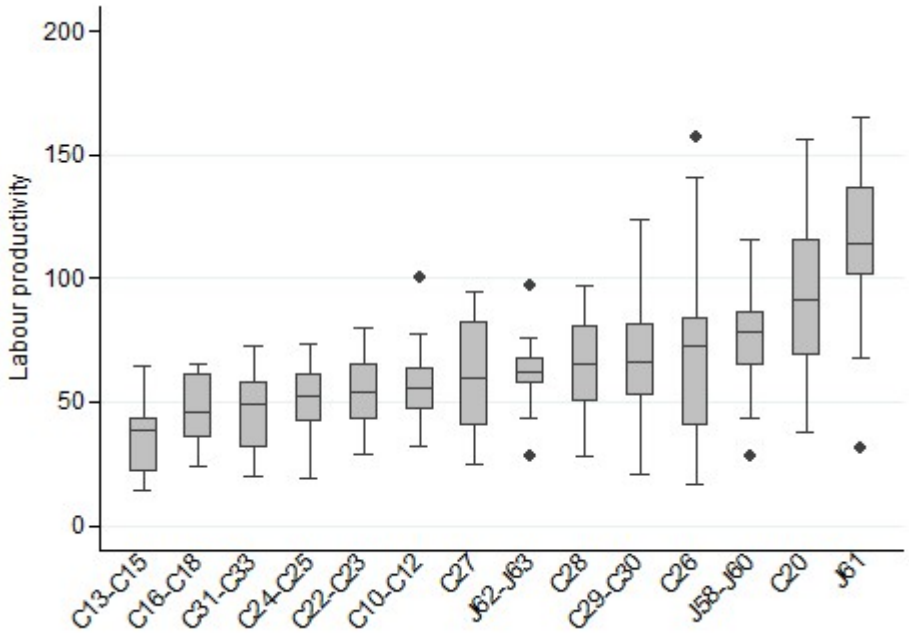


[13] TFP and labour productivity are computed using a definition of value added that treats non-NA intangible assets as investments rather than intermediate consumption. The empirical model is estimated using a TFP index (2015 = 100) and the level of labour productivity (value added per hour worked, in 2015 PPPs).

[14] The NACE codes and labels of industries are: C10–C12 Manufacture of food products, beverages and tobacco; C13–C15 Textiles, apparel, leather; C16–C18 Wood, paper, printing; C20 Chemicals; C22–C23 Rubber, plastic, non-metallic minerals; C24–C25 Basic and fabricated metals; C26 Computer, electronic, optical products; C27 Electrical equipment; C28 Machinery and equipment n.e.c.; C29–C30 Motor vehicles and transport equipment; C31–C33 Furniture, jewelry, toys, repair and installation; J58–J60 Publishing, audiovisual, broadcasting; J61 Telecommunications; J62–J63 IT and information services.

[15] In all the productivity regressions Australia, Canada and South Korea are omitted due to incomplete labour and total factor productivity data. In the TFP regressions Greece, Estonia as well as the machinery and equipment sector (C28) are also omitted due to incomplete data.

Panel B. Dispersion across industries (average 2003-2018)

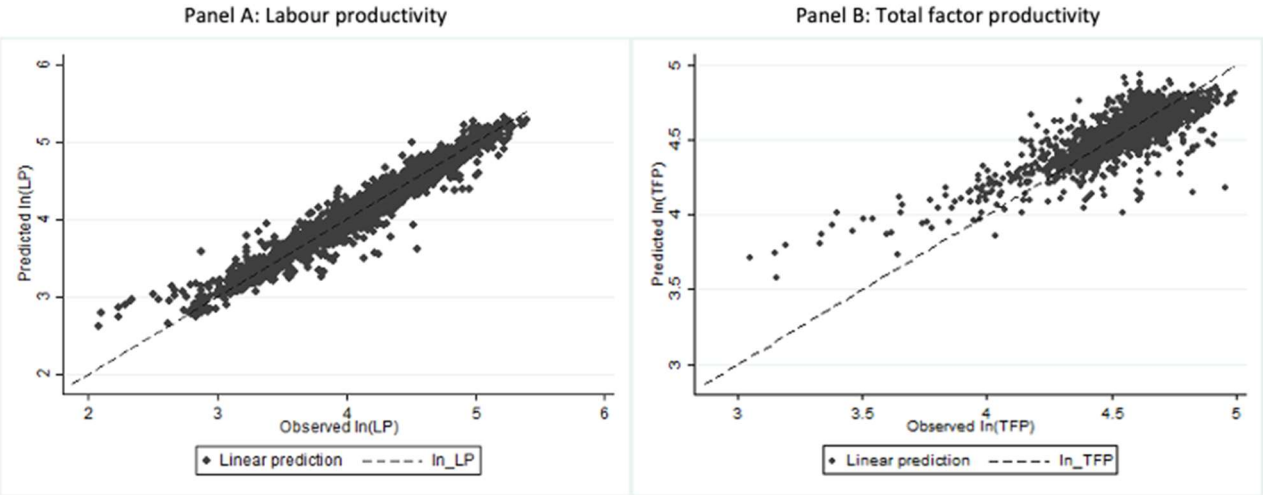


Notes: Labour Productivity is in $PPP per hour worked. It corresponds to EUKLEMS industry MARKTxAG. For Japan the aggregation also includes agriculture (EUKLEMS industry = MARKT). For Australia (AUS), Canada (CAN), and Korea (KOR), LP comes from the OECD Productivity database, measured as GDP per hour worked (2020 USD PPP). This measure does not incorporate intangible assets currently not included in national account and corresponds to the total economy (NACE A–U).

Several sources were used to construct sectoral exposure variables (see Table 2). These include the input-output table of the United States (for several years); the Nunn (2007) contract intensity indicator; the Rajan-Zingales (1998) external financial dependence index; the Smiderle et al. (2026) indicators of intensity in green and digital tasks; the US BLS and BDS data on job turnover (defined as the sum of job creation and job destruction rates) and firm turnover (defined as the sum of firm entry and exit rates). Finally, R&D intensities and the industry-specific cyclical volatility of productivity (computed as the standard deviation of the cyclical component of log labour productivity, extracted with the Hodrick–Prescott (1997) filter) were drawn from the EUKLEMS & INTANProd data.

As illustrated in Figure 5, the catch-up model outlined in equations (1) and (2) replicates industry-level productivity patterns across countries reasonably well over the 15-year horizon of the sample. Predicted productivity from the estimates of equation (1) are mostly aligned with observed levels, suggesting that the model captures the core covariates of cross-country productivity differences, though unsurprisingly less so for the more volatile TFP measure. However, differences in policy settings explain only a small part of the variations in productivity. Most of the differences reflects structural factors that are only indirectly affected by policies and captured by the catch-up term, capital intensity and especially the fixed effects (See Annex for details).

Figure 5: Observed vs predicted productivity values



Note: The scatterplot compares observed (x-axis) and predicted (y-axis) log labour productivity or total factor productivity. Predicted values are obtained by estimating equations (1) and (2) above.

Nonetheless policies summarized in the PCA axes have the expected association with productivity in most areas spanned by the van Ark et al. 2024 taxonomy (Table 3). Institutional quality, human capabilities, job matching efficiency, financial market smoothness and trade facilitation are all positively related to labour and/or total factor productivity performances. Conversely, macroeconomic policy instability, labour market rigidity, anticompetitive regulations and barriers to FDI are inversely related to them. Most of these policy-productivity linkages are in line with previous research investigating each of these policy channels individually.[16]

Interestingly, for R&D policies only public R&D expenditures are positively and significantly related to productivity measures. This is consistent with firm-level research finding that such expenditures have a much stronger impact on productivity than R&D tax incentives, perhaps reflecting the less targeted manner in which they affect innovation (OECD, 2015; Bloom et al., 2013; Andrews et al., 2016; Cappelen et al., 2012; Cirera et al, 2017). An additional insightful result concerns emission-limiting and environmental compliance policies, which are found to have a strong and positive association with productivity, consistent with previous results by Smiderle et al. (2026). Well-designed environmental policies might therefore support both the green transition and productivity performance.

The results are less conclusive and even counterintuitive in several important areas. For instance, neither government capabilities nor infrastructure policies show significant (or sensible) associations with productivity. Policies that hinder creative destruction show a positive association with productivity, though results are not robust to changes in model specification. While a positive link between entry costs and average productivity levels could reflect selection bias, whereby only the most productive firms survive in the market, it is difficult to rationalize a similar link between barriers to exit and productivity. These regression outcomes, which go against our assumptions outlined above, suggest that further work is

[16] See, for instance, Rajan and Zingales (1998) for financial market development, Bourlès et al. (2013) for anticompetitive regulations, Cette et al. (2016; 2018) for labour market rigidities, OECD (2016) for job matching policies, Hanushek and Woessmann (2012) for education policies and Melitz (2003) for trade openness policies.

needed tospecify the policy axes, the appropriate industry exposure variables and verify the links to productivity growth instead of levels.

Most of these results are robust to changes in model specification (see Tables A18-A29 in the Annex for details). First, an alternative definition of the technological frontier is tested, using the average of the leading productivity countries (Sweden, the United States, and Denmark) instead of the United States alone. The catch-up effect becomes slightly stronger, as does the effect of capital intensity. Regarding the policy variables, the signs of the coefficients for each policy category remain unchanged, irrespectively of the productivity measure. Another specification is also tested replacing the technological frontier with an industry-year fixed effect. Once again, all coefficient signs remain unchanged although the significance of some of the policy variables declines as the new fixed effect captures more variation than the other measures of the technological frontier. Second, a sensitivity analysis on the fixed-effects structure is also performed. These estimations show that it is crucial to include both country-year and country-industry fixed effects: without them, several of the policy-productivity linkages change sign and become inconsistent, pointing at the importance of controlling for omitted variables and endogeneity or measurement bias. Third, robustness to sample variation was also tested by dropping single countries, industries or periods. Results are very robust, which rules out the possibility that they are driven by outliers.

Finally, it is important to reiterate that the estimated linkages between policies and productivity should be interpreted in relative terms, as they compare industries that are more or less exposed to the different policies. This is because the policy axes, which are defined nation-wide (except for anticompetitive regulations, whose impact is also measured at the industry-level), are interacted with industry exposure variables. A further robustness test is therefore to test alternative definitions of these exposure variables. The results prove highly stable across almost all policy categories, confirming the validity of the differential approach.

Table 3: Estimated policy-productivity linkages

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Log of labour productivity	Log of labour productivity	Log of labour productivity	Log of TFP	Log of TFP	Log of TFP
Log of US productivity-1	0.241***			0.250***		
	(0.033)			(0.035)		
Log of leaders' productivity-1		0.362***			0.497***	
		(0.05)			(0.051)	
Log of total capital intensity-1	0.264***	0.285***	0.293***			
	(0.035)	(0.036)	(0.036)			
Human capabilities-1	0.077***	0.071***	0.057***	0.084***	0.065***	0.067***
	(0.015)	(0.014)	(0.017)	(0.015)	(0.013)	(0.015)
Infrastructure density-1	0.116	0.051	0.326	-0.249	-0.232	0.003
	(0.221)	(0.217)	(0.241)	(0.235)	(0.226)	(0.252)
Government capabilities-1	-0.014	-0.001	-0.038**	0.011	0.011	-0.024
	(0.016)	(0.016)	(0.018)	(0.015)	(0.015)	(0.017)
Quality of institutions-1	0.005*	-0.003	0.016***	0.006*	0.001	0.019***
	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Macro policy uncertainty-1	-0.021**	-0.019**	-0.015	-0.042***	-0.035***	-0.031**
	(0.009)	(0.009)	(0.010)	(0.011)	(0.012)	(0.013)
Financial market smoothness-1	0.049***	0.050***	0.051***	0.026**	0.024**	0.021*
	(0.0111)	(0.012)	(0.011)	(0.011)	(0.010)	(0.011)
Labour market rigidity-1	-0.055***	-0.048***	-0.043***	-0.045***	-0.035***	-0.027***
	(0.009)	(0.008)	(0.010)	(0.008)	(0.008)	(0.010)
Job matching policies-1	0.022	0.009	0.003	0.021	0.006	0.025
	(0.015)	(0.014)	(0.019)	(0.014)	(0.014)	(0.018)
Regulatory burdens-1	-0.081***	-0.075***	-0.090***	-0.068***	-0.081***	-0.112***
	(0.023)	(0.019)	(0.030)	(0.021)	(0.018)	(0.028)

Weak contract enforcement-1	-0.016	-0.019	0.001	-0.005	-0.019	-0.020
	(0.012)	(0.012)	(0.013)	(0.014)	(0.014)	(0.017)
Difficulty to start business -1	-0.001	0.009*	0.035***	-0.001	0.018**	0.044***
	(0.005)	(0.005)	(0.007)	(0.008)	(0.008)	(0.010)
Difficulty to exit business-1	-0.001	0.007	0.017***	0.010	0.019***	0.024***
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Green transition policies-1	0.019***	0.020***	0.007	0.026***	0.025***	0.016***
	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.005)
R&D tax incentives-1	0.007	0.009	0.003	0.001	-0.003	-0.006
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
R&D expenditures-1	0.035***	0.041***	0.027**	0.016*	0.004	-0.003
	(0.009)	(0.009)	(0.013)	(0.010)	(0.010)	(0.012)
Trade facilitation-1	0.028***	0.029***	0.019**	0.030***	0.029***	0.0161
	(0.009)	(0.009)	(0.009)	(0.011)	(0.011)	(0.012)
FDI restrictions-1	-0.028***	-0.025***	-0.017***	-0.027***	-0.020***	-0.015***
	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Constant	1.897***	1.340***	2.783***	3.580***	2.485***	4.808***
	(0.208)	(0.255)	(0.188)	(0.155)	(0.231)	(0.092)
Observations	3,095	3,095	3,095	2,716	2,716	2,716
R-squared	0.942	0.942	0.950	0.656	0.668	0.710
Country FE	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes
Industry FE	yes	yes	yes	yes	yes	yes
Country*time FE	yes	yes	yes	yes	yes	yes
Country*industry FE	yes	yes	yes	yes	yes	yes
Industry*time FE	no	no	yes	no	no	yes
Comment				Without C28, GRC and EST	Without C28, GRC and EST	Without C28, GRC and EST

Note: Results from estimating equations (1) and (2) above. OLS with robust standard errors. '***' indicates a positive coefficient statistically significant at the 1% level, '**' at the 5% level, and '*' at the 10% level. All variables are standardized. Full results are available in Table A18 in the Annex.

3. Implications for the design of pro-productivity policies

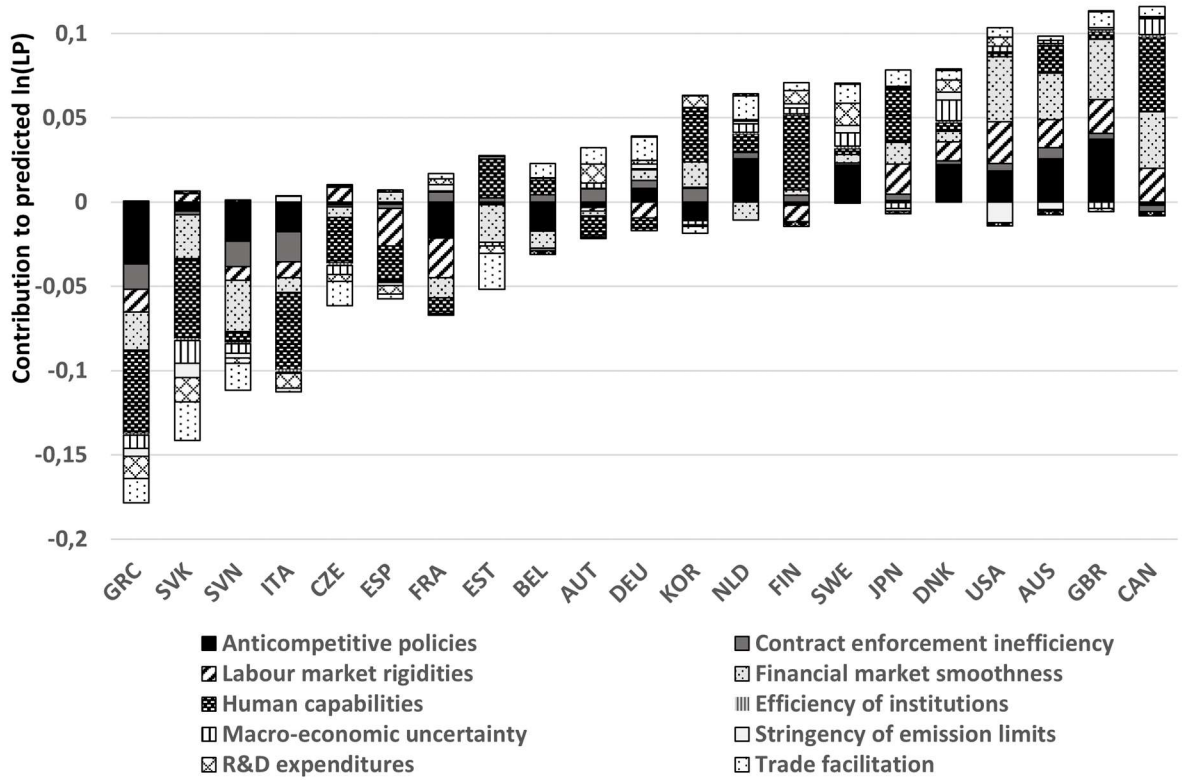
Drawing on this work, this section evaluates how different policy areas contributed to productivity across countries between 2003 and 2018 and uses these rankings to examine future policy scenarios and priorities. However, although these findings provide a useful framework for country-specific analysis, they are intended to be illustrative as the underlying estimates do not imply direct causality.

The comparative analysis presented in Figure 6 suggests significant cross-country heterogeneity in how policy environments have influenced productivity outcomes. By identifying indicators with statistically-significant coefficients (from column 1 of Table 3) and standardizing sectoral exposure variables, the figure shows where national policy settings either mitigate or exacerbate productivity gaps relative to the sample average. Positive contributions arise in countries where policy settings (relative to the average policy stance across countries) align with their estimated association with productivity outcomes, while negative values signal a misalignment between such relative policy settings and their productivity potential. As a result, the contribution of policies is not uniform across countries.

It varies significantly based on whether specific national policies have been pro- or anti-productive.[17]

Consider Italy, as an example: policy measures regarding the stringency of emission limits represent the only area contributing to a reduction of Italy's productivity gap relative to the sample average. This positive contribution is the result of a positive estimated coefficient coupled with a national score that exceeds the cross-country average. For opposite reasons, the area of human capabilities yields a negative contribution for Italy. While promoting such capabilities generally correlates with higher labour productivity, Italy has remained well below average in this area over the sample period. Therefore, the estimated contribution of this policy area has been negative relative to the average contribution for countries (the product of a positive coefficient, on average, and a negative score for Italy compared to other countries).

Figure 6: Relative policy contributions to productivity gaps between countries



Source: Authors' calculations based on column 1 of Table 3.

Notes: Contributions are computed as: $X_c = \frac{1}{S \times T} \sum (\hat{\beta} \times Policy_{ct} \times Exp_s^+)$ where β are regression coefficients, the sectoral exposure variable *Exp* (for sector *s=1…S*) is rescaled to lie between 0 and 1 ($Exp_s^+ = Exp_s + |MIN\ Exp_s|$) and the PCA *Policy* scores are relative to the sample average. It is assumed that in weakly exposed sectors policies are not associated with productivity.

To ensure visual and analytical clarity, the figure exclusively reports indicators with estimated effects that are statistically significant.

Building on these findings, a hypothetical productivity scenario is simulated in which national policy frameworks converge towards global best practices (Table 4).[18] To establish a clear

[17] The exercise requires the additional assumption that in sectors that are most weakly exposed to policies the association between policies and productivity is nil.

[18] Details on the simulation methodology and results can be found in the Annex.

benchmark for the maximum potential gains, this exercise assumes an instantaneous alignment with top-tier policy standards across all domains. In practice, because baseline policy settings vary significantly across countries, the transition towards these benchmarks requires very different levels of reform effort. Consequently, the resulting productivity dividends are not uniform but rather reflect the unique starting point and specific "reform gaps" of each country.

Table 4: Best practice countries

Policy Axis	Best practice country (2018)
Human capabilities	Canada
Institutional framework quality	Sweden
Macro policies	Denmark
Financial market smoothness	United States
Labour market flexibility	United States
Job matching policies	Austria
Regulation in energy	United Kingdom
Regulation in transport	United Kingdom
Regulation in communication	Austria
Regulation in retail	Estonia
Regulation in professional services	Finland
Contract enforceability	Korea
Emission limits	France
R&D tax incentives	France
R&D expenditure	Korea
Trade facilitation	Germany
FDI openness	Slovenia

Note: 2018 is the most recent year for which policy axes could be calculated because all policy indicators were available at the time of writing.

The scenario analysis is intended primarily for illustrative purposes. By design, it abstracts from the inherent complexities of structural transitions, and overlooks critical economic constraints, potential policy trade-offs, and additional factors that characterize real-world reforms. Furthermore, the analysis does not account for indirect general equilibrium effects or the possibility that policies may transmit unevenly across diverse institutional settings.[19] Notwithstanding these analytical simplifications, the model establishes a rigorous benchmark for quantifying the "productivity dividends" potentially available to countries that successfully mitigate their specific structural deficiencies by implementing global best practices in pro-productivity policies.

The main results of the scenario analysis are illustrated in figures 7 and 8 below. Figure 7 shows the cross-country variation in policy payoffs, stressing how the potential productivity rewards of reforms diverge across different policy domains and individual economies. The resulting heatmap serves as a diagnostical tool to identify the priority areas for policy improvement. The map can be read from two perspectives:

- By country (columns): Looking down each column reveals a country's specific reform priorities. It highlights policy "bottlenecks" where a country is falling behind and needs

[19] As is standard in regressions that yield differential effects across industries, overall level effects are derived assuming that (i) the effect is nil in the least exposed sector and (ii) there are no significant general equilibrium or cross-sector reallocation effects due to the change in policy.

to take action— and which areas are the most responsible for slowing down its productivity growth.

- By policy area (rows): Looking across each row shows which countries would benefit the most from a specific policy reform. For example, it identifies whether and where an investment in education or a change in regulation would provide the biggest productivity return.

Taken together, these perspectives provide an empirical foundation for a tailored menu of policy options. Rather than suggesting a "one-size-fits-all" approach, the heatmap allows policymakers to design a reform strategy that is specifically calibrated to their nation's unique economic situation and institutional needs.

Figure 7: Heatmap of the potential benefits of policy reforms by country

country	Human capabilities		Institutional framework quality		Macro policies certainty	Financial market smoothness	Labour market flexibility	Job matching policies	Product Market Competition - PMC (sum)	PMC in energy	PMC in transport	PMC in communication	PMC in retail	PMC in Prof. Serv.	Contract enforcement efficiency	Emission limits	R&D tax incentives	R&D expenditure	Ease to start a business	Ease to exit a business	Trade facilitation	FDI openness
AUS	1,98%	0,07%	0,85%	0,83%	2,27%	1,59%	7,70%	1,36%	3,26%	1,16%	1,21%	0,71%	0,23%	0,78%	0,31%	0,77%	0,00%	0,01%	2,56%	0,75%
AUT	3,51%	0,18%	0,68%	3,34%	5,13%	0,00%	10,37%	1,43%	1,30%	0,00%	4,99%	2,64%	0,19%	0,62%	0,26%	0,25%	0,03%	0,01%	1,03%	0,60%
BEL	1,84%	0,19%	0,48%	2,35%	4,10%	0,63%	12,14%	2,21%	1,17%	1,46%	5,33%	1,96%	0,69%	0,60%	0,21%	0,36%	0,01%	0,01%	0,64%	0,94%
CAN	0,00%	0,02%	0,29%	0,19%	1,50%	1,19%	14,14%	2,66%	1,92%	2,66%	3,46%	3,44%	2,45%	0,87%	0,23%	0,65%	0,00%	0,01%	2,70%	1,32%
CZE	5,57%	0,56%	1,26%	4,50%	3,54%	1,73%	15,80%	1,81%	2,62%	4,49%	4,06%	2,82%	2,41%	1,30%	0,43%	1,41%	0,03%	0,04%	5,41%	0,46%
DEU	4,39%	0,37%	1,16%	3,53%	4,36%	1,14%	10,07%	0,98%	0,63%	3,18%	1,80%	3,48%	1,08%	0,62%	0,75%	0,75%	0,03%	0,01%	0,00%	0,34%
DNK	2,17%	0,02%	0,00%	2,36%	3,00%	0,50%	4,83%	0,71%	0,19%	2,72%	0,71%	0,50%	0,77%	0,22%	0,41%	0,15%	0,01%	0,01%	0,97%	0,18%
ESP	2,46%	0,20%	0,47%	1,59%	6,24%	1,85%	8,93%	0,50%	1,16%	2,14%	3,90%	1,23%	1,03%	0,57%	0,07%	0,61%	0,02%	0,02%	1,45%	0,03%
EST	0,81%	0,19%	0,87%	5,13%	7,56%	1,99%	10,17%	1,98%	1,36%	4,33%	0,00%	2,50%	1,19%	0,63%	0,62%	1,25%	0,01%	0,08%	6,62%	0,35%
FIN	0,84%	0,02%	0,73%	2,96%	7,18%	0,59%	11,56%	3,45%	1,15%	4,53%	2,42%	0,00%	1,06%	0,32%	0,47%	0,48%	0,01%	0,00%	1,31%	0,55%
FRA	2,54%	0,16%	0,51%	3,01%	8,94%	0,82%	11,72%	1,47%	1,16%	2,60%	4,34%	2,15%	0,38%	0,00%	0,00%	0,35%	0,01%	0,03%	1,38%	0,87%
GBR	1,67%	0,05%	0,68%	0,93%	1,52%	1,53%	2,17%	0,00%	0,00%	1,50%	0,26%	0,41%	0,50%	0,33%	0,17%	0,35%	0,01%	0,01%	0,77%	0,16%
GRC	2,94%	0,16%	0,41%	1,48%	3,98%	1,10%	9,82%	2,05%	1,21%	1,54%	3,72%	1,30%	2,61%	0,25%	0,09%	0,33%	0,01%	0,04%	2,12%	0,11%
ITA	4,72%	0,49%	0,92%	3,53%	5,12%	0,41%	12,55%	1,33%	0,60%	1,51%	6,30%	2,82%	3,47%	0,01%	0,30%	0,98%	0,03%	0,04%	3,02%	0,41%
JPN	0,80%	0,35%	1,24%	2,71%	1,97%	1,09%	13,28%	3,38%	2,44%	4,45%	0,85%	2,17%	0,78%	0,65%	0,52%	1,00%	0,02%	0,00%	1,14%	0,69%
KOR	0,89%	0,17%	0,83%	1,88%	5,14%	2,59%	17,95%	6,14%	2,38%	3,95%	2,81%	2,67%	0,00%	0,72%	0,33%	0,00%	0,01%	0,01%	3,37%	0,59%
NLD	1,96%	0,02%	0,35%	3,23%	3,56%	1,10%	3,91%	0,29%	0,38%	0,36%	2,07%	0,81%	0,69%	0,24%	0,14%	0,34%	0,01%	0,01%	0,63%	0,08%
SVK	6,56%	0,58%	1,39%	5,47%	5,00%	1,73%	14,76%	3,26%	1,45%	2,61%	4,19%	3,26%	2,35%	1,18%	0,23%	1,95%	0,03%	0,07%	10,40%	0,13%
SVN	2,96%	0,40%	0,93%	5,96%	5,58%	1,69%	12,89%	2,06%	3,41%	3,33%	1,57%	2,51%	3,58%	0,76%	0,27%	1,11%	0,01%	0,01%	6,76%	0,00%
SWE	1,85%	0,00%	0,46%	3,17%	5,49%	1,26%	7,76%	1,97%	0,24%	3,76%	1,47%	0,32%	0,88%	0,39%	0,43%	0,03%	0,01%	0,03%	0,88%	0,28%
USA	1,96%	0,13%	0,47%	0,00%	0,00%	1,05%	10,42%	1,03%	1,39%	2,90%	3,38%	1,73%	0,67%	0,61%	0,37%	0,49%	0,01%	0,01%	1,44%	0,97%
Average	2,50%	0,22%	0,70%	2,92%	4,41%	1,13%	10,38%	1,71%	1,25%	2,64%	2,88%	1,90%	1,41%	0,54%	0,32%	0,68%	0,02%	0,02%	2,56%	0,45%

Source: Authors' calculations based on Column 1 of Table 3.

Note: The simulation is as follows: $Simul_c^{Policy} = \left(Policy_{\substack{best \\ practice}} - Policy_c\right)^{2018} \times \hat{\beta} \times \sum_s (Exp_s^+ \times W_{cs}^{2018})$

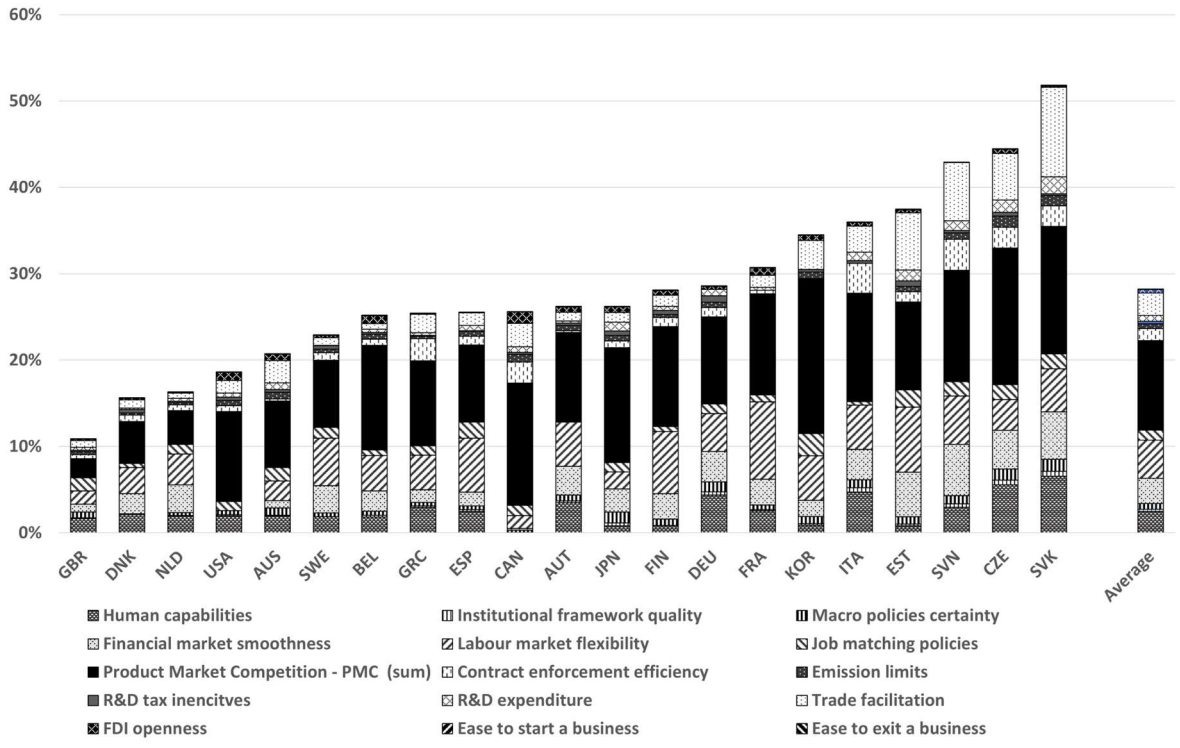
First, the policy gap to best practice is calculated for each country and policy in 2018. Then the gap is multiplied by the estimated policy coefficient $\hat{\beta}$, and to account for the different effects across industries, the same exposure variables as in the regression are used, though rescaled as in Figure 6. The assumption is again that weakly exposed sectors do not benefit from policy reforms. Finally, aggregation at the national level is obtained by weighting with the shares of sector *s* (s=1…S) in the country's total employment in market industries in 2018 ($W_{c,s}^{2018}$).

Taking the policy perspective, the simulation outcomes indicate that average potential productivity gains are substantial. They are particularly large for policies focused on product market competition in "upstream" sectors providing key inputs to the rest of the economy, which offer the highest estimated returns. These are followed by labour market flexibility and

matching, financial market access and smoothness and finally, skill formation and trade facilitation. Given these significant returns, country's strategic focus should prioritize the enhancement of pro-productivity frameworks in these specific domains.

Figure 8 provides an approximate quantification of the total productivity growth that could be unlocked through comprehensive reforms in each country.

Figure 8: Cumulative potential productivity gains of aligning policies to international best practice in all productivity policy areas (in %)



Note: The Figure shows the percentage gains in labour productivity levels that could be obtained (according to our estimates) by aligning policies on the best international practices observed in the sample. They correspond to the sum of the effects reported in Figure 7.
Source: Authors calculations (see note to Figure 7 for details).

The simulation suggests that the cumulative productivity dividends of systemic convergence toward international best practice policies are substantial. These gains are particularly pronounced for "productivity laggards"—such as South Korea, Estonia, Slovakia, the Czech Republic, and Slovenia—as well as for economies characterized by "muddling through" trajectories, notably Italy and Japan. Furthermore, the analysis indicates that "leading but slowing" nations, including France and Germany, would also derive significant structural benefits from such alignment.

As already noted, the magnitude of the "productivity dividend" ultimately depends on the existing reform gap. For lagging economies, the convergence process offers an opportunity to overcome historical structural rigidities, while for more advanced but stagnating economies, it

provides a necessary impetus to revitalize growth. Taken together, these findings confirm the strategic importance of targeted policy reforms as a primary engine for long-term economic growth.

4. Conclusions

This paper has explored the potential influence of a wide range of public policies on productivity. “Pro-productivity” policies have been organized along the channels identified by van Ark et al. (2024), statistically summarized via principal components analysis and related to industry-level productivity outcomes observed in a large set of countries over the past 15 years.

The results reveal significant international policy fragmentation, highlighting substantial gaps between individual national strategies and global best practices. Evidence suggests these disparities directly correlate with observed variations in cross-country productivity. Superior performance appears specifically linked to competitive pressures in key product markets, high-quality educational outcomes, and adaptable labour markets. Furthermore, productivity is fostered by deep, resilient financial systems, an openness to global trade, and robust innovation spending. Notably, the promotion of green structural change also enhances performance, yielding a "double dividend" where environmental policies simultaneously drive economic efficiency.

Scenario analysis points to a large potential for improving productivity by implementing reforms in these policy areas, with estimated long-term gains of wide-ranging reforms ranging from 10 to 50% increases in initial productivity levels, depending on the country. Note that these figures should be interpreted with significant caution for several reasons. Most importantly, as detailed in the paper, the estimates do not imply causality. Establishing causal relationships in cross-country empirical analysis is notoriously difficult, and achieving such rigor would require extensive further research. Also, the proposed scenarios are based on the simplifying assumptions that the productivity effects of reforms are not affected by compensating general equilibrium and reallocation effects, which could reduce their impact. Additionally, the kind of reforms that are envisaged are hardly realistic as they involve simultaneous policy changes in all areas and ignore implementation lags, government failures and delays or distortions arising from political resistance by social groups that stand to lose from reforms.

Finally, the empirical findings support the framework proposed in van Ark et al. (2024) for analysing the channels through which public policies can influence aggregate productivity outcomes. It demonstrates that estimates based on this framework can provide a basis for establishing a menu of pro-productivity policy priorities that are tailored to the initial policy and productivity conditions of different countries. Given the need to reverse the productivity

slowdown and resume cross-country productivity convergence globally, this is perhaps the main insight contained in this paper.

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Are pro-productivity policies effective? Evidence from cross-country historical data

ANNEX

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1. Basic data, coverage and source

The sample used to describe productivity policies includes 21 advanced countries over the 2003-2018 period. The countries are Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Czechia (CZE), Germany (DEU), Denmark (DNK), Spain (ESP), Estonia (EST), Finland (FIN), France (FRA), United Kingdom (GBR), Greece (GRC), Italy (ITA), Japan (JPN), South Korea (KOR), Netherlands (NLD), Slovakia (SVK), Slovenia (SVN), Sweden (SWE), United States (USA).

We use 106 quantitative policy indicators that were collected from international institutions such as the OECD, the IMF, the World Bank, and the World Economic Forum. Table A2 presents all quantitative policy indicators and their corresponding sources.

The data on productivity and capital formation comes from the EUKLEMS & INTANProd Database (Bontadini et al., 2024). The database was used to compute hourly labour and total factor productivity as well as capital intensity, including intangible assets included and not included in the national accounts.[1] Merging these data with the policy indicators results in a sample covering 14 industries (11 manufacturing, 3 services presented in table A1) in 18 countries (the 21 previously cited, excluding KOR, AUS, and CAN) over the 2003-2018 period for labour productivity and 13 industries in 16 countries over the same period for TFP.

Several sources were also used to construct sectoral exposure variables (see Table 1 in the main document).

Table A1: Code and label of industries

Code NACE	Label
C10–C12	Manufacture of food products; beverages and tobacco products
C13–C15	Manufacture of textiles, wearing apparel, leather and related products
C16–C18	Manufacture of wood, paper, printing and reproduction
C20	Manufacture of chemicals and chemical products
C22–C23	Manufacture of rubber and plastic products and other non-metallic mineral products
C24–C25	Manufacture of basic metals and fabricated metal products, except machinery and equipment
C26	Manufacture of computer, electronic and optical products
C27	Manufacture of electrical equipment
C28	Manufacture of machinery and equipment n.e.c.
C29–C30	Manufacture of motor vehicles, trailers, semi-trailers and other transport equipment
C31–C33	Manufacture of furniture; jewellery, musical instruments, toys; repair and installation of machinery and equipment
J58–J60	Publishing, audiovisual and broadcasting
J61	Telecommunications
J62–J63	IT and other information services

[1] TFP and labor productivity are computed using a definition of value added that treats non-NA intangible assets as investments rather than intermediate consumption. The empirical model is estimated using a TFP index (2015 = 100) and the level of labour productivity (value added per hour worked, in 2015 PPPs).

2. Details of Principal Component Analysis (PCA) results

The PCAs are conducted over the period 2003 to 2018, using data from 21 countries (AUS, AUT, BEL, CAN, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, GRC, ITA, JPN, KOR, NLD, SVK, SVN, SWE, USA). For better readability, only the first two axes are presented (Comp1 and Comp2).

Table A2. Human Capabilities

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.581	2.240	0.597	0.597
Comp2	1.341	0.570	0.224	0.820
Comp3	0.771	0.628	0.129	0.949

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV1_5_EDU_PUBSPEND_PCGDP_WDI	Higher expenditure on education	0.140	0.563
zV1_5_EDUCATTAIN_TER	Higher educ attainment in tertiary educ	0.433	0.373
zV1_5_EDUCCATTAIN_TER_WOMEN	Higher educ attainment in tertiary educ	0.419	0.447
zV1_5_PISA_READ	Stronger performance in reading	0.487	-0.174
zV1_5_PISA_MATH	Stronger performance in math	0.422	-0.423
zV1_5_PISA_SCIENCE	Stronger performance in sciences	0.449	-0.367

Table A3. Infrastructure investment

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.061	1.535	0.687	0.687
Comp2	0.526	0.114	0.175	0.863
Comp3	0.412	.	0.137	1.000

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV1_7_DENSTY_RAIL	Higher density of rail lines (infrastructure)	0.567	-0.707
zV1_7_DENSTY_ROAD	Higher road density (infrastructure)	0.597	-0.001
zV1_7_AIRPORT	Higher number of airports per 1000 sq. Km	0.567	0.708

Table A4. Rail and air transport

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.886	2.857	0.777	0.777
Comp2	1.029	0.966	0.206	0.983
Comp3	0.062	0.044	0.013	0.995

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV1_7_AIRTANS_CARRDEP_WDI	A higher number of registered carrier departures (air)	0.504	-0.068
zV1_7_AIRTRANS_PASSENGERS_WDI	Higher air freight volumes	0.505	0.002
zV1_7_ AIRTRANS_FREIGHT_WDI	More passengers carried by air	0.493	0.113
zV1_7_INFRA_RAILGOODS_WDI	Greater volumes of goods transported by rail	0.495	-0.157
zV1_7_INFRA_RAILPASSENGER_WDI	More passengers carried by rail	0.056	0.979

Table A5. Government capabilities

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.259	3.896	0.852	0.852

Comp2	0.364	0.192	0.073	0.924
Comp3	0.172	0.011	0.034	0.959

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV2_3_CORRPT	More control of corruption	0.474	-0.052
zV2_3_GOVEFT	Higher government effectiveness	0.458	-0.065
zV2_3_REGQUAL	Greater regulatory quality	0.447	-0.269
zV2_3_REG_BUSINESS4_EFW	Better outcomes concerning extra payments/bribes/favoritism	0.410	0.869
zV2_3_VOICEACC	Better outcomes of voice and accountability	0.445	-0.407

Table A6. Institutional framework quality

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.289	1.459	0.329	0.329
Comp2	1.830	0.145	0.183	0.512
Comp3	1.685	0.828	0.169	0.680

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV2_6_POLSTAB	Greater state stabiltity	0.161	0.485
zV2_6_RULELAW	Stronger respect for the rule of law	0.451	0.304
zV2_6_FIN_INST_ACCESS	Easier access to financial institutions	-0.110	-0.138
zV2_6_FIN_INST_DEPTH	Larger and more complex financial institutions	0.418	0.200
zV2_6_FIN_INST_EFFIC	More effective financial institutions	0.200	0.315
zV2_6_LEGSYS_RRSR_EFW	Fewer regulatory restrictions on property sales	0.152	-0.066
zV2_6_TAX_INDIRECT	Higher indirect taxes	0.009	-0.486
zV2_6_PAYTAX_DTF	Greater proximity to the efficiency frontier	0.474	-0.283
zV2_6_PAYTAX_NUM	Higher tax payments (per year)	-0.349	0.372
zV2_6_PAYTAX_TIME	Longer time spent on tax compliance (hours per year)	-0.417	0.236

Table A7. Macro-economic policies

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.359	0.406	0.453	0.453
Comp2	0.953	0.265	0.318	0.771
Comp3	0.688	.	0.229	1.000

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV2_9_FINCORP_DEPT	Higher debt of financial corporations	0.682	-0.020
zV2_9_LOAN_DEPO	Higher loan assets of the banking sector	-0.543	0.656
zV2_9_CPI10Y	Higher inflation	0.490	0.754

Table A8. Trade facilitation

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	6.093	5.693	0.870	0.870
Comp2	0.400	0.207	0.057	0.927
Comp3	0.192	0.051	0.028	0.955

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV3_12_ LOGIST_CUSTOMS_WDI	Greater efficiency of customs clearance process	0.382	-0.064
zV3_12_ LOGIST_EASE_WDI	Greater ease of arranging competitively priced shipments	0.335	0.873
zV3_12_ LOGIST_INFRASTRUCTURE_WDI	Higher quality of trade & transport-related infrastructure	0.385	-0.091
zV3_12_ LOGIST_OVERALL_WDI	Higher overall efficiency	0.405	0.015

zV3_12_ LOGIST_PUNCTUAL_WDI	Greater frequency with which shipments reach consignee	0.365	-0.349
zV3_12_ LOGIST_QUALITY_WDI	Higher competence and quality of logistics services	0.395	0.024
zV3_12_ LOGIST_TRACK_WDI	Greater ability to track and trace consignments	0.375	-0.322

Table A9. FDI restrictions

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.517	0.269	0.379	0.379
Comp2	1.248	0.440	0.312	0.691
Comp3	0.808	0.380	0.202	0.893

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV3_12_FDIRR_EMP	Higher restrictions on the employment of foreigners	0.723	0.022
zV3_12_FDIRR_EQUITY	Stricter foreign equity limitation	0.163	0.674
zV3_12_FDIRR_OPER	More operational restrictions	0.641	-0.389
zV3_12_FDI_SCREEN	Stronger screening or approval mechanism	0.196	0.628

Table A10. Financial market smoothness

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.080	1.350	0.385	0.385
Comp2	1.730	0.640	0.216	0.601
Comp3	1.090	0.274	0.136	0.737

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV4_2_FIN_MKT_ACCESS	Easier access to financial markets	0.299	0.386
zV4_2_FIN_MKT_DEPTH	A more developed and deeper financial market	0.401	0.421
zV4_2_FIN_MKT_EFFIC	Greater market efficiency	0.339	0.410
zV4_2_ GETCRED_CII	A legal framework more conducive to obtaining credit information	0.329	0.111
zV4_2_ GETCRED_DTF	Closer proximity to the best-practice frontier	0.443	-0.281
zV4_2_ GETCRED_LRI	A legal framework more conducive to obtaining credit (legal rights)	0.364	-0.439
zV4_2_ PROTMINOR_DTF	Stronger minority investor protection	0.355	-0.156
zV4_2_ PROTMINOR_ESSINDEX	Greater ease of shareholder lawsuits	0.269	-0.444

Table A11. Labour market

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	5.230	3.161	0.374	0.374
Comp2	2.069	0.537	0.148	0.521
Comp3	1.533	0.422	0.110	0.631

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV4_8_EPL_OV	Greater regulation of regular contracts	0.276	-0.077
zV4_8_EPL_T	Greater regulation of temporary contracts	0.345	-0.095
zV4_8_ALM~20	More training provided	0.163	0.500
zV4_8_ALM~22	More workplace-based training	0.181	0.150
zV4_8_ALM~23	More integrated training programs	0.106	-0.219
zV4_8_ALM~24	Greater special support of apprenticeships	0.173	0.369
zV4_8_ALM~70	More Start-up incentives	0.274	-0.181
zV4_8_ALM~81	Higher full unemployment benefits	0.265	0.274
zV4_8_ATW	Higher average tax wedge	0.285	0.327
zV4_8_REG_LM_EFW	Less market regulation	-0.376	0.125
zV4_8_ REG_LM 1_EFW	Fewer hiring regulation and lower minimum wage	-0.346	0.169
zV4_8_ REG_LM 2_EFW	Fewer hiring and firing regulations	-0.297	0.090
zV4_8_ REG_LM 4_EFW	Less regulation of working hours	-0.321	-0.011
zV4_8_ REG_LM 5_EFW	Less mandated cost for worker dismissals	-0.162	0.510

Table A12. Contract enforcement inefficiency

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.051	2.255	0.763	0.763
Comp2	0.797	0.649	0.199	0.962
Comp3	0.148	0.144	0.037	0.999

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV4_10_CONTRACT_DTF	Closer proximity to the best-practice frontier	-0.542	0.000
zV4_10_CONTRACT_TIME	Longer time required to enforce contracts	0.551	-0.269
zV4_10_CONTRACT_PROC	More procedures required to enforce contracts	0.320	0.925
zV4_10_ DB_TIME_CONTRACT_WDI	Longer overall duration for contract enforcement	0.548	-0.269

Table A13. Difficulty to start a business

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	5.087	3.794	0.636	0.636
Comp2	1.293	0.515	0.162	0.797
Comp3	0.778	0.194	0.097	0.895

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV5_1_DB_COSTSTARTBUS_PC_WDI	Higher costs to start a business	0.293	0.408
zV5_1_DB_REGISTERBUSINESS_WDI	More procedures required to register a business	0.402	0.080
zV5_1_DBTIME_STARTBUSINES_WDI	Longer time required to start a business	0.340	-0.535
zV5_1_START_COST	Higher cost to start a business	0.345	0.337
zV5_1_START_MINCAP	Higher paid-in minimum capital required to start a business	0.222	0.380
zV5_1_START_PROC	Greater number of procedures to start a business	0.403	0.076
zV5_1_START_TIME	Longer overall duration to start a business	0.344	-0.524
zV5_1_START_DTF	Greater efficiency (closer to the best-practice frontier)	-0.434	0.048

Table A14. Difficulty to exit a business

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.910	3.247	0.782	0.782
Comp2	0.663	0.284	0.133	0.915
Comp3	0.379	0.332	0.076	0.990
Comp4	0.046	0.044	0.009	1.000

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV5_1_DB_TIME_INSOLVENCY_WDI	Longer time required to resolve insolvency	0.475	-0.232
zV5_1_INSOLV_COST	Higher costs of resolving insolvency	0.325	0.935
zV5_1_INSOLVE_TIME	Longer overall duration of insolvency resolution	0.474	-0.233
zV5_1_INSOLV_DTF	Greater efficiency (closer to the best-practice frontier)	-0.466	0.119
zV5_1_INSOSOL_RR	Higher recovery rates	-0.476	0.059

Table A15. Green transition

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.926	0.823	0.225	0.225
Comp2	2.103	0.429	0.162	0.387
Comp3	1.674	0.339	0.129	0.515

Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV5_4_EPS_MKT_CO2TS	More stringent Co2 trading scheme	0.158	0.071

zV5_4_EPS_MKT_CO2TX	More stringent Co2 tax	0.164	0.488
zV5_4_EPS_MKT_DIESTX	More stringent Diesel tax	0.098	0.117
zV5_4_EPS_MKT_NOXTX	More stringent Nox tax	0.192	0.355
zV5_4_EPS_MKT_RENEWTS	More stringent renewable energy trading scheme	0.026	0.439
zV5_4_EPS_MKT_SOXTX	More stringent Sox tax	0.081	-0.054
zV5_4_EPS_NONMKT_PMLIM	More stringent emission limit values for particular matter (PM)	0.419	0.004
zV5_4_EPS_NONMKT_NOXLIM	More stringent emission limit values for Nox	0.465	0.069
zV5_4_EPS_NONMKT_SOXLIM	More stringent emission limit values for Sox	0.465	-0.005
zV5_4_EPS_NONMKT_SULPHLIM	More stringent emission limit values for Sulphur	0.398	-0.057
zV5_4_EPS_TECHSUPP_RD	Higher public expenditure on low-carbon R&D	0.144	0.129
zV5_4_EPS_TECHSUPP_SOLAR	Higher price support for solar energy	0.209	-0.454
zV5_4_EPS_TECHSUPP_WIND	Higher price support for wind energy	0.252	-0.436

Table A16. R&D tax incentive and expenditure

Principal components/correlation Number of obs = 336

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.729	2.045	0.533	0.533
Comp2	1.684	0.742	0.241	0.773
Comp3	0.942	0.576	0.135	0.908

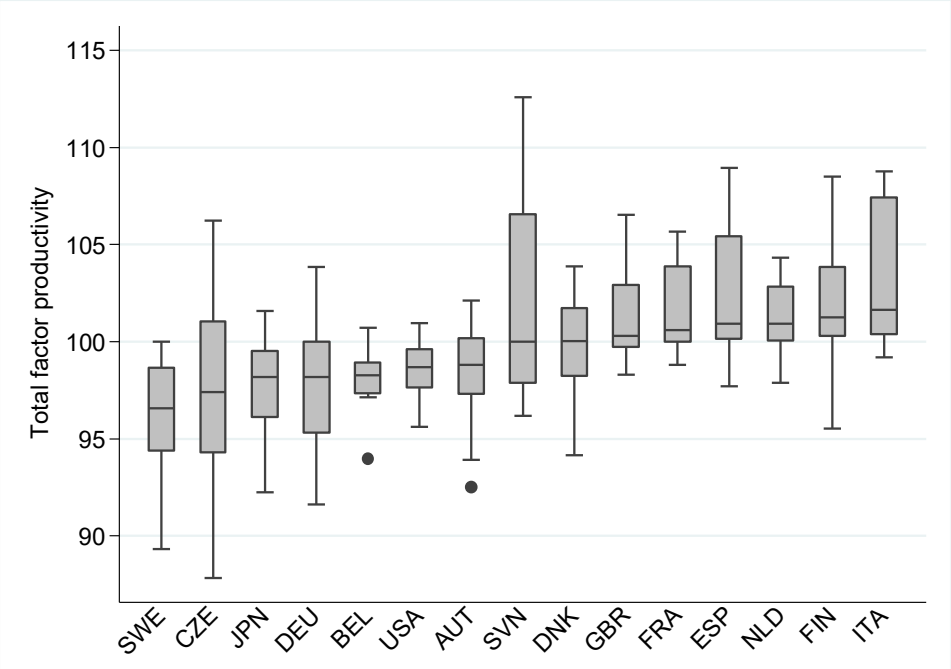
Principal components (eigenvectors)

Variable	Higher values of the variable indicate:	Comp1	Comp2
zV5_11_BERD_GOV_GDP	Higher R&D expenditure	0.092	0.469
zV5_11_BINDEX_LARGEF	Higher implied tax subsidy rate on R&D (profitable large firms)	0.495	-0.006
zV5_11_BINDEX_LARGEF_LOSS	Higher implied tax subsidy rate on R&D (loss-making large firms)	0.499	0.025
zV5_11_BINDEX_SMES	Higher implied tax subsidy rate on R&D (profitable SMEs)	0.496	0.042
zV5_11_ BINDEX_SMES_LOSS	Higher implied tax subsidy rate on R&D (los-making SMEs)	0.486	0.070
zV5_11_HERD_GDP	Higher higher-education expenditure on R&D	-0.086	0.548
zV5_11_RND_PC_WDI	Higher R&D expenditure	-0.088	0.687

3. Descriptives statistics of variables used

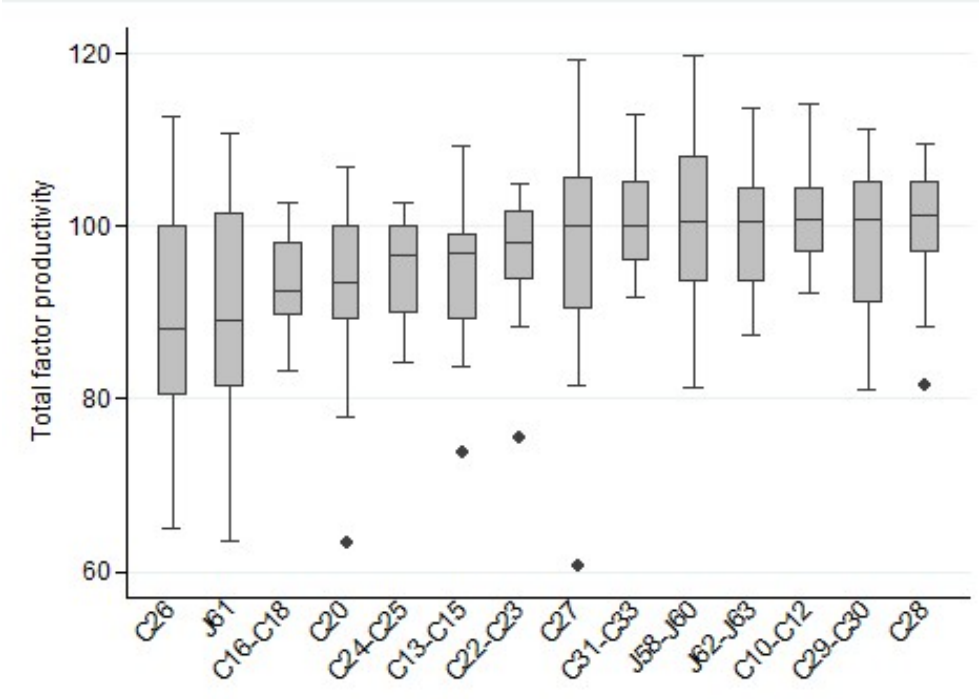
Figure A1: Business sector total factor productivity (TFP) dispersion

Panel A. Dispersion over time (2003-2018)



Notes: Total factor productivity is computed using a definition of value added that treats non-NA intangible assets as investments rather than intermediate consumption. TFP is an index (2015 = 100). It corresponds to EUKLEMS industry MARKTxAG. For Japan the aggregation also includes agriculture (EUKLEMS industry = MARKT).

Panel B. Dispersion across industries (average 2003-2018)



4. Basic regression results: sensitivity to fixed effects

Table A18: Regression results with all variables

(Results in column 1 used for scenario analysis)

Lag of variables	(1) LP (log)	(2) LP (log)	(3) LP (log)	(4) LP (log)	(5) LP (log)	(6) LP (log)	(7) LP (log)	(8) TFP (log)	(9) TFP (log)	(10) TFP (log)
Log-lag of US labour productivity	**0.241*** **			0.351***	0.123***	0.314***	0.196***			
	(0.0327)			(0.0530)	(0.0328)	(0.0148)	(0.0322)			
Log-lag of leaders' labour productivity		**0.362*** **								
		(0.0504)								
Log-lag of total capital intensity	**0.264*** **	**0.285*** **	**0.293*** **	0.232***	0.272***	0.287***	0.255***			
	(0.0353)	**(0.0362)**	**(0.0355)**	(0.0156)	(0.0357)	(0.0103)	(0.0386)			
Log-lag US TFP								**0.250*** **		
								(0.0347)		
Log-lag of leaders' TFP									**0.497*** **	
									(0.0506)	
Human capabilities axis (lag)	**0.0769*** **	**0.0714*** **	**0.0568*** **	0.0267***	0.0600***	0.00577	0.0856***	**0.0839*** **	**0.0647*** **	**0.0666*** **
	(0.0148)	**(0.0136)**	**(0.0171)**	(0.00773)	(0.0159)	(0.00895)	(0.0151)	**(0.0148)**	**(0.0134)**	**(0.0145)**
Infrastructure density axis (lag)	**0.116**	**0.0513**	**0.326**	-0.0413	0.0482	-0.0432***	-0.0476	**-0.249**	**-0.232**	**0.00277**
	(0.221)	**(0.217)**	**(0.241)**	(0.0268)	(0.0322)	(0.00477)	(0.230)	**(0.235)**	**(0.226)**	**(0.252)**
Government capabilities axis (lag)	**-0.0142**	**-0.000844**	**-0.0376** **	-0.0328***	-0.00302	-0.0327***	0.0124	**0.0105**	**0.0105**	**-0.0243**
	(0.0164)	**(0.0162)**	**(0.0181)**	(0.00688)	(0.0156)	(0.00758)	(0.0150)	**(0.0148)**	**(0.0149)**	**(0.0172)**
Institutional framework quality axis (lag)	**0.00496***	**-0.00295**	**0.0162*** **	0.0124*	-0.00419	0.00470	0.00301	**0.00615***	**0.00120**	**0.0187*** **
	(0.00423)	**(0.00493)**	**(0.00540)**	(0.00645)	(0.00530)	(0.00733)	(0.00414)	**(0.00472)**	**(0.00578)**	**(0.00610)**
Macro policy uncertainty axis (lag)	**-0.0214** **	**-0.0186** **	**-0.0149**	0.0132*	-0.0171*	0.0239***	-0.0445***	**-0.0419*** **	**-0.0350*** **	**-0.0312** **
	(0.00931)	**(0.00946)**	**(0.00971)**	(0.00783)	(0.00893)	(0.00870)	(0.0122)	**(0.0114)**	**(0.0116)**	**(0.0130)**
Financial market smoothness axis (lag)	**0.0491*** **	**0.0498*** **	**0.0507*** **	-0.0106	0.0398***	-0.0218***	0.0388***	**0.0256** **	**0.0238** **	**0.0208***
	(0.0111)	**(0.0116)**	**(0.0114)**	(0.00649)	(0.0126)	(0.00713)	(0.0112)	**(0.0105)**	**(0.0104)**	**(0.0108)**
Labour market rigidity axis (lag)	**-0.0548*** **	**-0.0482*** **	**-0.0432*** **	-0.00529	-0.0385***	-0.0357***	-0.0638***	**-0.0449*** **	**-0.0352*** **	**-0.0270*** **
	(0.00852)	**(0.00844)**	**(0.00994)**	(0.00959)	(0.00952)	(0.00874)	(0.00835)	**(0.00776)**	**(0.00783)**	**(0.00993)**
Job matching policies axis (lag)	**0.0224**	**0.00904**	**0.00279**	-0.0202**	0.00492	-0.0135**	0.0239	**0.0211**	**0.00553**	**0.0247**
	(0.0147)	**(0.0144)**	**(0.0186)**	(0.00838)	(0.0139)	(0.00684)	(0.0155)	**(0.0141)**	**(0.0136)**	**(0.0180)**
Regulatory burden (NMRup) (lag)	**-0.0814*** **	**-0.0750*** **	**-0.0890*** **	0.0108	0.0736***	-0.0122*	-0.0680***	**-0.0678*** **	**-0.0813*** **	**-0.112*** **
	(0.0232)	**(0.0190)**	**(0.0297)**	(0.0185)	(0.0134)	(0.00738)	(0.0238)	**(0.0211)**	**(0.0175)**	**(0.0284)**
Contract enforcement inefficiency axis (lag)	**-0.0164**	**-0.0188**	**0.00114**	0.00713	-0.0239*	-0.0249***	0.000185	**-0.00525**	**-0.0193**	**-0.0198**
	(0.0120)	**(0.0116)**	**(0.0128)**	(0.00663)	(0.0133)	(0.00792)	(0.0154)	**(0.0139)**	**(0.0141)**	**(0.0167)**
Difficulty to start business axis (lag)	**-0.000541**	**0.00916***	**0.0348*** **	0.0157*	0.00345	0.0223***	0.000834	**-0.00118**	**0.0184** **	**0.0440*** **
	(0.00526)	**(0.00546)**	**(0.00721)**	(0.00812)	(0.00548)	(0.00733)	(0.00670)	**(0.00780)**	**(0.00799)**	**(0.0103)**
Difficulty to exit business axis (lag)	**-0.000760**	**0.00653**	**0.0171*** **	0.0425***	0.000102	0.0223**	0.00280	**0.0102**	**0.0194*** **	**0.0236*** **
	(0.00724)	**(0.00694)**	**(0.00622)**	(0.00870)	(0.00789)	(0.0107)	(0.00742)	**(0.00625)**	**(0.00599)**	**(0.00600)**
Green transition policies axis (lag)	**0.0194*** **	**0.0202*** **	**0.00694**	0.0161***	0.0140***	0.0335***	0.0225***	**0.0263*** **	**0.0254*** **	**0.0159*** **
	(0.00310)	**(0.00318)**	**(0.00513)**	(0.00507)	(0.00363)	(0.00620)	(0.00293)	**(0.00311)**	**(0.00321)**	**(0.00525)**
R&D tax incentive axis (lag)	**0.00714**	**0.00858**	**0.00320**	-0.00424	0.00975	-0.00572	0.00574	**0.00115**	**-0.00326**	**-0.00614**
	(0.00579)	**(0.00621)**	**(0.00642)**	(0.00354)	(0.00603)	(0.00419)	(0.00585)	**(0.00661)**	**(0.00688)**	**(0.00722)**
R&D expenditure axis (lag)	**0.0346*** **	**0.0406*** **	**0.0273** **	0.00499	0.0506***	0.0213***	0.0288***	**0.0164***	**0.00394**	**-0.00302**
	(0.00936)	**(0.00919)**	**(0.0130)**	(0.00682)	(0.00926)	(0.00786)	(0.00933)	**(0.00957)**	**(0.00973)**	**(0.0122)**
Trade facilitation axis (lag)	**0.0275*** **	**0.0288*** **	**0.0193** **	0.0410***	0.0604***	0.102***	0.0392***	**0.0302*** **	**0.0285*** **	**0.0161**
	(0.00921)	**(0.00932)**	**(0.00942)**	(0.00765)	(0.00911)	(0.00865)	(0.0108)	**(0.0109)**	**(0.0109)**	**(0.0116)**
FDI restrictions axis (lag)	**-0.0281*** **	**-0.0245*** **	**-0.0166*** **	-0.0167***	-0.0243***	-0.0231***	-0.0293***	**-0.0267*** **	**-0.0202*** **	**-0.0150*** **
	(0.00452)	**(0.00382)**	**(0.00351)**	(0.00522)	(0.00342)	(0.00432)	(0.00480)	**(0.00539)**	**(0.00406)**	**(0.00404)**
Constant	**1.897*** **	**1.340*** **	**2.783*** **	1.504***	2.058***	1.386***	2.137***	**3.580*** **	**2.485*** **	**4.808*** **
	(0.208)	**(0.255)**	**(0.188)**	(0.228)	(0.214)	(0.0567)	(0.211)	**(0.155)**	**(0.231)**	**(0.0924)**
Observations	**3,095**	**3,095**	**3,095**	3,095	3,095	3,095	2,643	**2,716**	**2,716**	**2,716**
R-squared	**0.942**	**0.942**	**0.950**	0.770	0.926	0.591	0.943	**0.656**	**0.668**	**0.710**
Fixed effect										
Country	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
Time	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
Country*time	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES
Country*industry	YES	YES	YES	NO	YES	NO	YES	YES	YES	YES
Industry*time	NO	NO	YES	NO	NO	NO	NO	NO	NO	YES
							Without C28, GRC and EST	Without C28, GRC and EST	Without C28, GRC and EST	Without C28, GRC and EST

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: all variables are standardised.

Source: estimates by the authors

5. Additional regression results and sensitivity analysis

Table A19: Regression results including only statistically-significant variables

VARIABLES	(1) LP (log)	(2) LP (log)	(3) LP (log)	(4) LP (log)	(5) LP (log)	(6) LP (log)	(7) LP (log)	(8) TFP (log)	(9) TFP (log)	(10) TFP (log)
Log-lag of US labour productivity	**0.237*** **			0.296***	0.118***	0.292***	0.196***			
	(0.0317)			(0.0521)	(0.0317)	(0.0149)	(0.0311)			
Log-lag of leaders' labour productivity		**0.327*** **								
		(0.0457)								
Log-lag of total capital intensity	**0.268*** **	**0.295*** **	**0.317*** **	0.241***	0.278***	0.303***	0.255***			
	(0.0354)	**(0.0366)**	**(0.0366)**	(0.0160)	(0.0356)	(0.00982)	(0.0387)			
Log-lag US TFP								**0.247*** **		
								(0.0345)		
Log-lag of leaders' TFP									**0.421*** **	
									(0.0463)	
Human capabilities axis (lag)	**0.0769*** **	**0.0676*** **	**0.0456*** **	0.0116*	0.0582***	-0.00553	0.0847***	**0.0815*** **	**0.0570*** **	**0.0533*** **
	(0.0144)	**(0.0134)**	**(0.0175)**	(0.00665)	(0.0156)	(0.00765)	(0.0148)	**(0.0142)**	**(0.0131)**	**(0.0144)**
Infrastructure density axis (lag)	**0.00590**	**-0.000353**	**0.0175*** **	-0.00567	-0.00338	-0.0132***	0.00302	**0.00686**	**0.00485**	**0.0222*** **
	(0.00396)	**(0.00447)**	**(0.00496)**	(0.00449)	(0.00494)	(0.00501)	(0.00401)	**(0.00466)**	**(0.00520)**	**(0.00516)**
Macro policy uncertainty axis (lag)	**-0.0215** **	**-0.0162***	**-0.00948**	0.0273***	-0.0164*	0.0348***	-0.0434***	**-0.0389*** **	**-0.0275** **	**-0.0210**
	(0.00902)	**(0.00913)**	**(0.00945)**	(0.00754)	(0.00860)	(0.00798)	(0.0118)	**(0.0115)**	**(0.0122)**	**(0.0134)**
Financial market smoothness axis (lag)	**0.0488*** **	**0.0498*** **	**0.0471*** **	-0.0104	0.0398***	-0.0195***	0.0388***	**0.0256** **	**0.0239** **	**0.0184***
	(0.0111)	**(0.0118)**	**(0.0113)**	(0.00663)	(0.0124)	(0.00747)	(0.0113)	**(0.0106)**	**(0.0108)**	**(0.0109)**
Labour market rigidity axis (lag)	**-0.0547*** **	**-0.0463*** **	**-0.0452*** **	-0.000905	-0.0382***	-0.0249***	-0.0632***	**-0.0439*** **	**-0.0331*** **	**-0.0349*** **
	(0.00857)	**(0.00864)**	**(0.00968)**	(0.0105)	(0.00968)	(0.00847)	(0.00823)	**(0.00756)**	**(0.00769)**	**(0.00919)**
Job matching policies axis (lag)	**0.0232**	**0.00904**	**0.00608**	-0.0238***	0.00473	-0.0162**	0.0235	**0.0192**	**0.00489**	**0.0291**
	(0.0147)	**(0.0147)**	**(0.0193)**	(0.00750)	(0.0137)	(0.00636)	(0.0152)	**(0.0137)**	**(0.0136)**	**(0.0181)**
Regulatory burden (NMRup) (lag)	**-0.0814*** **	**-0.0738*** **	**-0.0939*** **	0.0195	0.0746***	-0.00996	-0.0681***	**-0.0681*** **	**-0.0762*** **	**-0.102*** **
	(0.0230)	**(0.0186)**	**(0.0296)**	(0.0187)	(0.0136)	(0.00750)	(0.0238)	**(0.0211)**	**(0.0173)**	**(0.0290)**
Contract enforcement inefficiency axis (lag)	**-0.0181**	**-0.0217***	**-0.0133**	0.0101	-0.0252*	-0.0296***	0.000231	**-0.00436**	**-0.0123**	**-0.00219**
	(0.0122)	**(0.0121)**	**(0.0139)**	(0.00653)	(0.0139)	(0.00778)	(0.0150)	**(0.0137)**	**(0.0140)**	**(0.0161)**
Green transition policies axis (lag)	**0.0195*** **	**0.0209*** **	**0.00674**	0.0210***	0.0148***	0.0388***	0.0226***	**0.0268*** **	**0.0275*** **	**0.0139*** **
	(0.00310)	**(0.00318)**	**(0.00506)**	(0.00513)	(0.00364)	(0.00641)	(0.00291)	**(0.00308)**	**(0.00319)**	**(0.00517)**
R&D tax incentive axis (lag)	**0.00717**	**0.00869**	**0.000276**	-0.00475	0.00959	-0.00510	0.00565	**0.00102**	**-0.00182**	**-0.00845**
	(0.00578)	**(0.00623)**	**(0.00643)**	(0.00369)	(0.00603)	(0.00425)	(0.00586)	**(0.00659)**	**(0.00687)**	**(0.00728)**
R&D expenditure axis (lag)	**0.0352*** **	**0.0433*** **	**0.0277** **	0.0140**	0.0518***	0.0272***	0.0291***	**0.0186** **	**0.0134**	**0.00312**
	(0.00924)	**(0.00899)**	**(0.0130)**	(0.00635)	(0.00908)	(0.00721)	(0.00915)	**(0.00944)**	**(0.00949)**	**(0.0123)**
Trade facilitation axis (lag)	**0.0262*** **	**0.0309*** **	**0.0234** **	0.0542***	0.0594***	0.113***	0.0406***	**0.0352*** **	**0.0409*** **	**0.0313** **
	(0.00917)	**(0.00935)**	**(0.00954)**	(0.00839)	(0.00910)	(0.00851)	(0.0111)	**(0.0115)**	**(0.0121)**	**(0.0124)**
FDI restrictions axis (lag)	**-0.0281*** **	**-0.0242*** **	**-0.0187*** **	-0.0185***	-0.0237***	-0.0216***	-0.0292***	**-0.0264*** **	**-0.0197*** **	**-0.0171*** **
	(0.00452)	**(0.00380)**	**(0.00348)**	(0.00524)	(0.00341)	(0.00436)	(0.00475)	**(0.00526)**	**(0.00399)**	**(0.00380)**
Constant	**1.913*** **	**1.437*** **	**2.725*** **	1.650***	2.064***	1.410***	2.129***	**3.545*** **	**2.775*** **	**4.789*** **
	(0.210)	**(0.250)**	**(0.194)**	(0.228)	(0.217)	(0.0569)	(0.212)	**(0.146)**	**(0.211)**	**(0.0783)**
Observations	**3,095**	**3,095**	**3,095**	3,095	3,095	3,095	2,643	**2,716**	**2,716**	**2,716**
R-squared	**0.942**	**0.942**	**0.949**	0.761	0.926	0.578	0.943	**0.655**	**0.663**	**0.700**
Fixed effect										
Country	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
Time	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
Country*time	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES
Country*industry	YES	YES	YES	NO	YES	NO	YES	YES	YES	YES
Industry*time	NO	NO	YES	NO	NO	NO	NO	NO	NO	YES
							Without C28, GRC and EST	Without C28, GRC and EST	Without C28, GRC and EST	Without C28, GRC and EST

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised.
Source: estimated by the authors

Table A20: Sensitivity to changes in exposure variable for human capabilities

VARIABLES	(1) LP (log)	(2) LP (log)	(3) LP (log)	(4) LP (log)	(5) LP (log)
Log-lag of US labour productivity	0.252*** (0.0220)	0.268*** (0.0225)	0.260*** (0.0223)	0.263*** (0.0227)	0.276*** (0.0226)
Log-lag of total capital intensity	0.313*** (0.0277)	0.317*** (0.0279)	0.319*** (0.0278)	0.317*** (0.0279)	0.315*** (0.0279)
Human capabilities axis (lag) - 1	0.0695*** (0.0106)				
Human capabilities axis (lag) - 2		0.0377*** (0.0113)			
Human capabilities axis (lag) - 3			0.0518*** (0.0111)		
Human capabilities axis (lag) - 4				0.0437*** (0.0114)	
Human capabilities axis (lag) - 5					0.0270** (0.0115)
Constant	1.466*** (0.157)	1.383*** (0.157)	1.400*** (0.157)	1.400*** (0.157)	1.369*** (0.157)
Observations	3,095	3,095	3,095	3,095	3,095
R-squared	0.935	0.934	0.934	0.934	0.934
Country*year FE	YES	YES	YES	YES	YES
Country*industry FE	YES	YES	YES	YES	YES

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised; Source: estimated by the authors

Human capabilities axis (lag) is interacted with organizational capital intensity (Average for 18 countries over 2003-2018)
Human capabilities axis (lag)–2 is interacted with the digital intensity indicator from Smiderle et al. (2025), averaged for USA over 2003-2024.
Human capabilities axis (lag)–3, *–4*, and *–5* use the same digital intensity indicator measured at benchmark years 2003, 2006, and 2024, respectively.

Table A21: Sensitivity to changes in exposure variable for labour market policies

VARIABLES	(1) LP (log)	(2) LP (log)	(3) LP (log)	(4) LP (log)	(5) LP (log)	(6) LP (log)	(7) LP (log)	(8) LP (log)
Log-lag of US labour productivity	0.277***	0.277***	0.277***	0.283***	0.289***	0.288***	0.293***	0.291***
	(0.0213)	(0.0212)	(0.0216)	(0.0212)	(0.0213)	(0.0213)	(0.0215)	(0.0213)
Log-lag of total capital intensity	0.292***	0.291***	0.297***	0.297***	0.315***	0.317***	0.311***	0.313***
	(0.0280)	(0.0279)	(0.0280)	(0.0279)	(0.0280)	(0.0280)	(0.0280)	(0.0279)
Labour market rigidity axis (lag) - 1	-0.0465***							
	(0.00869)							
Labour market rigidity axis (lag) - 2		-0.0486***						
		(0.00842)						
Labour market rigidity axis (lag) - 3			-0.0372***					
			(0.00956)					
Labour market rigidity axis (lag) - 4				-0.0386***				
				(0.00838)				
Job matching policies axis (lag) - 1					0.0234**			
					(0.0113)			
Job matching policies axis (lag) - 2						0.0287***		
						(0.0109)		
Job matching policies axis (lag) - 3							0.00646	
							(0.0125)	
Job matching policies axis (lag) - 4								0.0186*
								(0.0109)
Constant	1.483***	1.490***	1.457***	1.430***	1.355***	1.334***	1.343***	1.366***
	(0.158)	(0.158)	(0.160)	(0.158)	(0.157)	(0.156)	(0.159)	(0.158)
Observations	3,095	3,095	3,095	3,095	3,095	3,095	3,095	3,095
R-squared	0.934	0.934	0.934	0.934	0.934	0.934	0.934	0.934
Country*year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country*industry FE	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses ; *** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised. ; Source: estimated by the authors

Labour market rigidity axis (lag)–1 is interacted with the US job turnover rate averaged over the 2002–2017 period.
Labour market rigidity axis (lag)–2, *–3*, and *–4* are interacted with the US job turnover rate measured in 2002, 2006, and 2017, respectively.

The same interaction scheme applies to the *Job matching policies axis (lag)*.

Table A22: Sensitivity to changes in exposure variable for product market policies

VARIABLES	(1) LP (log)	(2) LP (log)	(3) LP (log)	(4) LP (log)
Log-lag of US labour productivity	0.309***	0.325***	0.300***	0.298***
	(0.0228)	(0.0243)	(0.0213)	(0.0211)
Log-lag of total capital intensity	0.314***	0.313***	0.303***	0.302***
	(0.0280)	(0.0279)	(0.0280)	(0.0279)
Regulatory burden (NMRup) (lag) - 1	-0.0326*			
	(0.0193)			
Regulatory burden (NMRup) (lag) - 2		-0.0489**		
		(0.0193)		
Contract enforcement inefficiency axis (lag) - 1			-0.0244***	
			(0.00947)	
Contract enforcement inefficiency axis (lag) - 2				-0.0350***
				(0.00931)
Constant	1.317***	1.291***	1.323***	1.325***
	(0.157)	(0.157)	(0.156)	(0.156)
Observations	3,095	3,095	3,095	3,095
R-squared	0.934	0.934	0.934	0.934
Country*year FE	YES	YES	YES	YES
Country*industry FE	YES	YES	YES	YES

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised; Source: estimated by the authors

Regulatory burden (NMRup) (lag)–1 is constructed using US intermediate input intensities measured in 1997. *Regulatory burden (NMRup) (lag)–2* is constructed using the same US intermediate input intensities measured in 2006.
The same construction applies to the *Contract enforcement inefficiency axis (lag)*.

Table A23: Sensitivity to changes in exposure variable for creative destruction policies

VARIABLES	(1) LP (log)	(2) LP (log)	(3) LP (log)	(4) LP (log)	(5) LP (log)	(6) LP (log)
Log-lag of US labour productivity	0.286***	0.315***	0.306***	0.296***	0.306***	0.303***
	(0.0220)	(0.0222)	(0.0217)	(0.0214)	(0.0214)	(0.0213)
Log-lag of total capital intensity	0.316***	0.295***	0.298***	0.310***	0.304***	0.305***
	(0.0283)	(0.0283)	(0.0284)	(0.0279)	(0.0279)	(0.0279)
Difficulty to start business axis (lag) - 1	-0.00513					
	(0.00369)					
Difficulty to start business axis (lag) - 2		0.0127***				
		(0.00421)				
Difficulty to start business axis (lag) - 3			0.00851**			
			(0.00386)			
Difficulty to exit business axis (lag) - 1				0.00208		
				(0.00511)		
Difficulty to exit business axis (lag) - 2					0.0185***	
					(0.00549)	
Difficulty to exit business axis (lag) - 3						0.0171***
						(0.00520)
Constant	1.331***	1.317***	1.337***	1.325***	1.310***	1.321***
	(0.157)	(0.156)	(0.157)	(0.157)	(0.156)	(0.156)
Observations	3,095	3,095	3,095	3,095	3,095	3,095
R-squared	0.934	0.934	0.934	0.934	0.934	0.934
Country*year FE	YES	YES	YES	YES	YES	YES
Country*industry FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised; Source: estimated by the authors

Difficulty to start business axis (lag)–1, *–2*, and *–3* are interacted with the US firm turnover rate measured in 2002, 2006, and 2017, respectively.
The same interaction scheme applies to the *Difficulty to exit business axis (lag)*.

Table A24: Sensitivity to exposure variables for green transition policies

VARIABLES	(1) LP (log)	(2) LP (log)	(3) LP (log)	(4) LP (log)
Log-lag of US labour productivity	0.322*** (0.0214)	0.309*** (0.0215)	0.336*** (0.0214)	0.319*** (0.0214)
Log-lag of total capital intensity	0.302*** (0.0277)	0.314*** (0.0279)	0.310*** (0.0275)	0.293*** (0.0278)
Green transition policies axis (lag) - 1	0.0225*** (0.00352)			
Green transition policies axis (lag) - 2		0.0116*** (0.00336)		
Green transition policies axis (lag) - 3			0.0293*** (0.00331)	
Green transition policies axis (lag) - 4				0.0227*** (0.00354)
Constant	1.271*** (0.156)	1.258*** (0.158)	1.177*** (0.155)	1.321*** (0.155)
Observations	3,095	3,095	3,095	3,095
R-squared	0.935	0.934	0.935	0.935
Country*year FE	YES	YES	YES	YES
Country*industry FE	YES	YES	YES	YES

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised; Source: estimated by the authors

Green transition policies axis (lag)–1 is interacted with the US average greenness intensity indicator from Smiderle et al. (2026) over the 2003–2024 period.
Green transition policies axis (lag)–2, *–3*, and *–4* are interacted with the same greenness intensity indicator measured in the US in 2003, 2006, and 2024, respectively.

Table A25: Sensitivity to changes in exposure variable for infrastructure policies

VARIABLES	(1) LP (log)	(2) LP (log)	(3) LP (log)	(4) LP (log)	(5) LP (log)	(6) LP (log)
Log-lag of US labour productivity	0.296*** (0.0212)	0.259*** (0.0220)	0.283*** (0.0218)	0.295*** (0.0212)	0.296*** (0.0217)	0.300*** (0.0216)
Log-lag of total capital intensity	0.310*** (0.0279)	0.314*** (0.0277)	0.309*** (0.0279)	0.309*** (0.0279)	0.310*** (0.0279)	0.309*** (0.0279)
Rail/air transport axis (lag) - 1	0.261** (0.126)					
Rail/air transport axis (lag) - 2		-0.161*** (0.0292)				
Rail/air transport axis (lag) - 3			-0.0640** (0.0292)			
Infrastructure density axis (lag) - 1				0.110 (0.147)		
Infrastructure density axis (lag) - 2					0.00914 (0.0238)	
Infrastructure density axis (lag) - 3						0.0281 (0.0243)
Constant	1.212*** (0.166)	1.176*** (0.158)	1.303*** (0.157)	1.307*** (0.159)	1.320*** (0.158)	1.310*** (0.157)
Observations	3,095	3,095	3,095	3,095	3,095	3,095
R-squared	0.934	0.934	0.934	0.934	0.934	0.934

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised; Source: estimated by the authors

Rail/air transport axis (lag)–1 is interacted with the average investment in transport equipment over the 2003–2018 period.
Rail/air transport axis (lag)–2 and *–3* are interacted with the intensity of use of intermediate inputs from the transport sectors in the US in 2006 and 2018, respectively.
The same interaction scheme applies to the *Infrastructure density axis (lag)*.

Table A26: Regression results with policy axes included one-by-one

VARIABLES	(1) LP (log)	(2) LP (log)	(3) LP (log)	(4) LP (log)	(5) LP (log)	(6) LP (log)	(7) LP (log)	(8) LP (log)	(9) LP (log)
Log-lag of US labour productivity	0.301***	0.306***	0.287***	0.274***	0.279***	0.261***	0.299***	0.296***	0.277***
	(0.0213)	(0.0213)	(0.0211)	(0.0212)	(0.0213)	(0.0215)	(0.0211)	(0.0306)	(0.0303)
Log-lag of total capital intensity	0.305***	0.311***	0.306***	0.320***	0.303***	0.300***	0.293***	0.313***	0.312***
	(0.0280)	(0.0278)	(0.0277)	(0.0277)	(0.0278)	(0.0277)	(0.0279)	(0.0410)	(0.0408)
Government capabilities axis (lag)	-0.0292**								
	(0.0130)								
Institutional framework quality axis (lag)		0.0179***							
		(0.00493)							
Macro policy uncertainty axis (lag)			-0.0246***						
			(0.00438)						
Financial market smoothness axis (lag)				0.0531***					
				(0.00772)					
R&D tax incentive axis (lag)					0.0277***				
					(0.00597)				
R&D expenditure axis (lag)						0.0566***			
						(0.00785)			
Trade facilitation axis (lag)							0.0355***		
							(0.00686)		
FDI restrictions axis (lag) - 1								0.00551	
								(0.00423)	
FDI restrictions axis (lag) - 2									-0.0280***
									(0.00481)
Constant	1.333***	1.279***	1.386***	1.345***	1.423***	1.566***	1.378***	1.311***	1.378***
	(0.156)	(0.157)	(0.156)	(0.155)	(0.157)	(0.159)	(0.156)	(0.246)	(0.246)
Observations	3,095	3,095	3,095	3,095	3,095	3,095	3,095	3,095	3,095
R-squared	0.934	0.934	0.934	0.935	0.934	0.935	0.934	0.934	0.935

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised; Source: estimated by the authors

FDI restrictions axis (lag)–1 is interacted with the US openness indicator measured in 1997.
FDI restrictions axis (lag)–2 is interacted with total capital intensity averaged over the 2003–2018 period.

Table A27: Sensitivity to country exclusion

VARIABLES	(1) AUT LP (log)	(2) BEL LP (log)	(3) CZE LP (log)	(4) DEU LP (log)	(5) DNK LP (log)	(6) ESP LP (log)	(7) EST LP (log)	(8) FIN LP (log)	(9) FRA LP (log)	(10) GBR LP (log)	(11) GRC LP (log)	(12) ITA LP (log)	(13) JPN LP (log)	(14) NLD LP (log)	(15) SVK LP (log)	(16) SVN LP (log)	(17) SWE LP (log)
Log-lag of US labour productivity	0.254***	0.245***	0.229***	0.232***	0.272***	0.248***	0.234***	0.281***	0.235***	0.232***	0.222***	0.267***	0.244***	0.256***	0.181***	0.235***	0.241***
	(0.0343)	(0.0341)	(0.0353)	(0.0342)	(0.0336)	(0.0348)	(0.0325)	(0.0343)	(0.0341)	(0.0341)	(0.0322)	(0.0337)	(0.0341)	(0.0354)	(0.0271)	(0.0328)	(0.0326)
Log-lag of total capital intensity	0.255***	0.282***	0.258***	0.263***	0.233***	0.275***	0.266***	0.306***	0.262***	0.272***	0.252***	0.270***	0.255***	0.261***	0.176***	0.265***	0.351***
	(0.0362)	(0.0377)	(0.0385)	(0.0360)	(0.0358)	(0.0372)	(0.0353)	(0.0384)	(0.0360)	(0.0357)	(0.0370)	(0.0366)	(0.0358)	(0.0362)	(0.0308)	(0.0354)	(0.0368)
Human capabilities axis (lag)	0.0754***	0.0762***	0.0763***	0.0772***	0.0646***	0.0888***	0.0823***	0.0415***	0.0715***	0.0486***	0.0757***	0.0969***	0.0823***	0.0751***	0.0786***	0.0810***	0.0795***
	(0.0149)	(0.0149)	(0.0155)	(0.0155)	(0.0148)	(0.0165)	(0.0148)	(0.0134)	(0.0154)	(0.0123)	(0.0150)	(0.0164)	(0.0187)	(0.0152)	(0.0147)	(0.0150)	(0.0150)
Infrastructure density axis (lag)	0.0948	0.0313	0.145	0.0969	0.257	0.153	-0.0356	0.0219	0.0704	0.172	0.105	0.108	0.193	0.251	0.212	0.00734	0.0765
	(0.222)	(0.244)	(0.224)	(0.223)	(0.231)	(0.221)	(0.219)	(0.222)	(0.225)	(0.222)	(0.228)	(0.231)	(0.225)	(0.264)	(0.197)	(0.239)	(0.219)
Government capabilities axis (lag)	-0.0137	-0.0172	-0.0246	-0.0178	-0.0209	-0.00998	-0.0136	-0.00694	-0.0201	-0.0179	0.0158	-0.0132	-0.0162	-0.0157	-0.0102	-0.0137	-0.0123
	(0.0172)	(0.0165)	(0.0172)	(0.0167)	(0.0166)	(0.0204)	(0.0164)	(0.0164)	(0.0169)	(0.0165)	(0.0145)	(0.0172)	(0.0171)	(0.0166)	(0.0174)	(0.0164)	(0.0161)
Institutional framework quality axis (lag)	0.00471	0.00639	-0.00884	0.00474	0.00212	0.00490	0.00534	0.00866*	0.00611	0.00522	0.00345	0.00500	0.00489	0.00435	0.00619*	0.00569	0.00663
	(0.00426)	(0.00424)	(0.00923)	(0.00428)	(0.00422)	(0.00427)	(0.00421)	(0.00449)	(0.00428)	(0.00424)	(0.00410)	(0.00425)	(0.00427)	(0.00442)	(0.00369)	(0.00421)	(0.00428)
Macro policy uncertainty axis (lag)	-0.0206**	-0.0206**	-0.0185*	-0.0217**	-0.0187**	-0.0228**	-0.0231**	-0.0205**	-0.0218**	-0.0177*	-0.0344***	-0.0208**	-0.0216**	-0.0209**	-0.0160	-0.0232**	-0.0211**
	(0.00922)	(0.00926)	(0.00951)	(0.00940)	(0.00937)	(0.00949)	(0.00939)	(0.00886)	(0.00943)	(0.00914)	(0.0111)	(0.00954)	(0.00948)	(0.00933)	(0.00976)	(0.00967)	(0.00920)
Financial market smoothness axis (lag)	0.0485***	0.0491***	0.0563***	0.0490***	0.0494***	0.0551***	0.0477***	0.0514***	0.0535***	0.0522***	0.0417***	0.0472***	0.0578***	0.0498***	0.0248***	0.0484***	0.0462***
	(0.0112)	(0.0115)	(0.0123)	(0.0112)	(0.0115)	(0.0117)	(0.0110)	(0.0112)	(0.0118)	(0.0118)	(0.0117)	(0.0112)	(0.0124)	(0.0113)	(0.00785)	(0.0111)	(0.0113)
Labour market rigidity axis (lag)	-0.0542***	-0.0531***	-0.0580***	-0.0603***	-0.0541***	-0.0589***	-0.0546***	-0.0567***	-0.0560***	-0.0553***	-0.0638***	-0.0559***	-0.0526***	-0.0568***	-0.0474***	-0.0571***	-0.0444***
	(0.00866)	(0.00863)	(0.00871)	(0.0158)	(0.00826)	(0.00910)	(0.00851)	(0.00856)	(0.00861)	(0.00851)	(0.00807)	(0.00862)	(0.00890)	(0.00872)	(0.00840)	(0.00854)	(0.00864)
Job matching policies axis (lag)	0.0298*	0.0230	0.0252*	0.0270	0.0392***	0.0246	0.0225	-0.00598	0.0207	0.0225	0.0228	0.0230	0.0221	0.0224	0.00767	0.0233	0.0221
	(0.0156)	(0.0150)	(0.0143)	(0.0166)	(0.0134)	(0.0156)	(0.0146)	(0.0159)	(0.0156)	(0.0146)	(0.0151)	(0.0150)	(0.0150)	(0.0164)	(0.0142)	(0.0146)	(0.0147)
Regulatory burden (NMRup) (lag)	-0.0772***	-0.0811***	-0.0876***	-0.0800***	-0.109***	-0.0764***	-0.0792***	-0.109***	-0.0798***	-0.0811***	-0.0771***	-0.0788***	-0.0863***	-0.0876***	-0.0472**	-0.0801***	-0.0856***
	(0.0244)	(0.0250)	(0.0237)	(0.0253)	(0.0231)	(0.0238)	(0.0231)	(0.0239)	(0.0253)	(0.0219)	(0.0239)	(0.0248)	(0.0247)	(0.0239)	(0.0218)	(0.0231)	(0.0229)
Contract enforcement inefficiency axis (lag)	-0.0186	-0.0158	-0.0129	-0.0143	-0.0323***	-0.00823	-0.0156	-0.0414***	-0.0169	-0.0122	0.00491	-0.0235	-0.0152	-0.0131	-0.000823	-0.0193	-0.0142
	(0.0122)	(0.0124)	(0.0128)	(0.0124)	(0.0115)	(0.0122)	(0.0120)	(0.0128)	(0.0122)	(0.0119)	(0.0152)	(0.0146)	(0.0122)	(0.0125)	(0.0120)	(0.0122)	(0.0120)
Difficulty to start business axis (lag)	-0.00158	-0.000817	-0.000163	0.00143	-0.00175	-0.00874	-0.00150	0.00743	-0.000267	-0.000974	-0.00266	0.00185	-0.00126	0.00110	-0.00234	-9.11e-05	-0.00123
	(0.00524)	(0.00551)	(0.00531)	(0.00543)	(0.00511)	(0.00586)	(0.00529)	(0.00595)	(0.00539)	(0.00528)	(0.00625)	(0.00531)	(0.00572)	(0.00543)	(0.00497)	(0.00590)	(0.00515)
Difficulty to exit business axis (lag)	-0.00228	-0.000998	-0.0332	-0.000981	0.0159***	-0.00111	-0.00161	0.000989	0.00107	-0.00539	0.00329	-0.000119	-0.000202	-0.000806	-0.00416	-0.00354	-0.00108
	(0.00733)	(0.00729)	(0.0232)	(0.00729)	(0.00498)	(0.00730)	(0.00722)	(0.00694)	(0.00745)	(0.00706)	(0.00726)	(0.00730)	(0.00736)	(0.00732)	(0.00743)	(0.00732)	(0.00711)
Green transition policies axis (lag)	0.0185***	0.0195***	0.0197***	0.0188***	0.0218***	0.0198***	0.0189***	0.0151***	0.0179***	0.0181***	0.0234***	0.0207***	0.0188***	0.0191***	0.0181***	0.0198***	0.0182***
	(0.00319)	(0.00325)	(0.00317)	(0.00314)	(0.00319)	(0.00323)	(0.00308)	(0.00331)	(0.00333)	(0.00314)	(0.00295)	(0.00377)	(0.00319)	(0.00337)	(0.00293)	(0.00318)	(0.00312)
R&D tax incentive axis (lag)	0.00583	0.00690	0.0103	0.00806	0.00529	0.00359	0.00724	0.00753	0.00387	0.00553	0.00587	0.00802	0.00667	0.00710	0.0143***	0.00738	0.00653
	(0.00585)	(0.00597)	(0.00637)	(0.00583)	(0.00592)	(0.00641)	(0.00576)	(0.00576)	(0.00856)	(0.00605)	(0.00581)	(0.00572)	(0.00581)	(0.00582)	(0.00550)	(0.00576)	(0.00588)
R&D expenditure axis (lag)	0.0347***	0.0336***	0.0412***	0.0333***	0.0390***	0.0344***	0.0338***	0.0211**	0.0353***	0.0392***	0.0309***	0.0308***	0.0341***	0.0353***	0.0352***	0.0339***	0.0333***
	(0.0128)	(0.00977)	(0.0103)	(0.00950)	(0.00992)	(0.0100)	(0.00932)	(0.00983)	(0.00952)	(0.00932)	(0.00936)	(0.00949)	(0.00957)	(0.00988)	(0.00804)	(0.00932)	(0.00931)
Trade facilitation axis (lag)	0.0340***	0.0277***	0.0302***	0.0263***	0.0268***	0.0235**	0.0264***	0.0255***	0.0277***	0.0304***	0.0339***	0.0278***	0.0300***	0.0293***	0.0105	0.0273***	0.0248***
	(0.0108)	(0.00943)	(0.0117)	(0.00925)	(0.00920)	(0.00978)	(0.00920)	(0.00942)	(0.00933)	(0.00921)	(0.00976)	(0.00926)	(0.00921)	(0.00946)	(0.00803)	(0.00921)	(0.00912)
FDI restrictions axis (lag)	-0.0279***	-0.0278***	-0.0274***	-0.0279***	-0.0267***	-0.0283***	-0.0289***	-0.148***	-0.0283***	-0.0223***	-0.0274***	-0.0284***	-0.0282***	-0.0277***	-0.0285***	-0.0284***	-0.0279***
	(0.00454)	(0.00450)	(0.00445)	(0.00452)	(0.00436)	(0.00453)	(0.00470)	(0.0298)	(0.00459)	(0.00323)	(0.00451)	(0.00456)	(0.00463)	(0.00447)	(0.00459)	(0.00459)	(0.00449)
Constant	2.364***	1.812***	1.990***	1.939***	1.956***	1.803***	1.941***	1.531***	1.938***	1.896***	2.036***	1.749***	1.917***	1.836***	2.476***	1.936***	1.506***
	(0.477)	(0.220)	(0.232)	(0.214)	(0.215)	(0.217)	(0.207)	(0.229)	(0.212)	(0.212)	(0.212)	(0.217)	(0.214)	(0.218)	(0.173)	(0.208)	(0.214)
Observations	2,885	2,885	2,885	2,885	2,885	2,885	3,050	2,885	2,885	2,885	2,885	2,885	2,885	2,885	2,885	3,050	3,030
R-squared	0.942	0.941	0.937	0.940	0.946	0.943	0.944	0.944	0.941	0.949	0.941	0.943	0.939	0.938	0.949	0.942	0.943

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised. ; Source: estimated by the authors
Country*time FE and country*industry FE

Table A28: Sensitivity to year exclusion

VARIABLES	(1) y2003 LP (log)	(2) y2004 LP (log)	(3) y2005 LP (log)	(4) y2006 LP (log)	(5) y2007 LP (log)	(6) y2008 LP (log)	(7) y2009 LP (log)	(8) y2010 LP (log)	(9) y2011 LP (log)	(10) y2012 LP (log)	(11) y2013 LP (log)	(12) y2014 LP (log)	(13) y2015 LP (log)	(14) y2016 LP (log)	(15) y2017 LP (log)	(16) y2018 LP (log)
Log-lag of US labour productivity	0.241***	0.231***	0.240***	0.242***	0.244***	0.242***	0.240***	0.239***	0.237***	0.243***	0.243***	0.241***	0.239***	0.242***	0.239***	0.247***
	(0.0327)	(0.0351)	(0.0358)	(0.0357)	(0.0348)	(0.0344)	(0.0334)	(0.0332)	(0.0325)	(0.0319)	(0.0336)	(0.0333)	(0.0333)	(0.0339)	(0.0348)	(0.0347)
Log-lag of total capital intensity	0.264***	0.244***	0.264***	0.260***	0.262***	0.267***	0.258***	0.271***	0.268***	0.265***	0.265***	0.262***	0.274***	0.267***	0.265***	0.267***
	(0.0353)	(0.0378)	(0.0375)	(0.0382)	(0.0378)	(0.0378)	(0.0365)	(0.0367)	(0.0359)	(0.0355)	(0.0356)	(0.0355)	(0.0362)	(0.0368)	(0.0372)	(0.0372)
Human capabilities axis (lag)	0.0769***	0.0762***	0.0754***	0.0757***	0.0816***	0.0769***	0.0766***	0.0793***	0.0765***	0.0805***	0.0842***	0.0777***	0.0760***	0.0746***	0.0739***	0.0691***
	(0.0148)	(0.0151)	(0.0156)	(0.0157)	(0.0161)	(0.0156)	(0.0153)	(0.0153)	(0.0151)	(0.0153)	(0.0160)	(0.0157)	(0.0155)	(0.0154)	(0.0152)	(0.0142)
Infrastructure density axis (lag)	0.116	0.364	0.158	-0.0109	0.0569	0.0958	0.0974	0.0939	0.0791	0.153	0.115	0.120	0.0941	0.128	0.139	0.119
	(0.221)	(0.222)	(0.241)	(0.233)	(0.234)	(0.230)	(0.228)	(0.220)	(0.229)	(0.231)	(0.226)	(0.237)	(0.223)	(0.223)	(0.226)	(0.223)
Government capabilities axis (lag)	-0.0142	-0.0131	-0.0281	-0.0224	-0.0153	-0.0142	-0.0165	-0.0107	-0.0134	-0.0138	-0.0143	-0.0141	-0.00809	-0.00843	-0.00932	-0.0120
	(0.0164)	(0.0172)	(0.0176)	(0.0171)	(0.0168)	(0.0166)	(0.0168)	(0.0160)	(0.0164)	(0.0156)	(0.0170)	(0.0169)	(0.0181)	(0.0184)	(0.0178)	(0.0179)
Institutional framework quality axis (lag)	0.00496	-0.000147	0.00376	0.00474	0.00471	0.00584	0.00509	0.00572	0.00472	0.00315	0.00449	0.00609	0.00719*	0.00638	0.00608	0.00541
	(0.00423)	(0.00533)	(0.00478)	(0.00459)	(0.00449)	(0.00432)	(0.00432)	(0.00421)	(0.00416)	(0.00429)	(0.00437)	(0.00433)	(0.00424)	(0.00428)	(0.00428)	(0.00426)
Macro policy uncertainty axis (lag)	-0.0214**	-0.0217**	-0.0210**	-0.0214**	-0.0221**	-0.0201**	-0.0210**	-0.0220**	-0.0216**	-0.0306***	-0.0213**	-0.0199**	-0.0207**	-0.0204**	-0.0207**	-0.0197**
	(0.00931)	(0.00946)	(0.00959)	(0.0100)	(0.00986)	(0.00963)	(0.00983)	(0.00948)	(0.00976)	(0.00996)	(0.00958)	(0.00919)	(0.00929)	(0.00949)	(0.00973)	(0.00952)
Financial market smoothness axis (lag)	0.0491***	0.0409***	0.0422***	0.0485***	0.0483***	0.0505***	0.0516***	0.0501***	0.0479***	0.0467***	0.0491***	0.0493***	0.0522***	0.0520***	0.0520***	0.0523***
	(0.0111)	(0.0107)	(0.0120)	(0.0118)	(0.0118)	(0.0119)	(0.0116)	(0.0111)	(0.0109)	(0.0108)	(0.0111)	(0.0113)	(0.0119)	(0.0118)	(0.0117)	(0.0118)
Labour market rigidity axis (lag)	-0.0548***	-0.0540***	-0.0500***	-0.0516***	-0.0516***	-0.0535***	-0.0574***	-0.0588***	-0.0569***	-0.0562***	-0.0561***	-0.0554***	-0.0528***	-0.0557***	-0.0582***	-0.0555***
	(0.00852)	(0.00949)	(0.00941)	(0.00941)	(0.00919)	(0.00890)	(0.00844)	(0.00848)	(0.00877)	(0.00864)	(0.00863)	(0.00866)	(0.00853)	(0.00909)	(0.00905)	(0.00853)
Job matching policies axis (lag)	0.0224	0.0145	0.0231	0.0219	0.0190	0.0176	0.0317*	0.0242	0.0247	0.0181	0.0212	0.0219	0.0249*	0.0219	0.0237	0.0260*
	(0.0147)	(0.0159)	(0.0153)	(0.0157)	(0.0154)	(0.0156)	(0.0162)	(0.0155)	(0.0158)	(0.0157)	(0.0149)	(0.0151)	(0.0148)	(0.0148)	(0.0147)	(0.0143)
Regulatory burden (NMRup) (lag)	-0.0814***	-0.0773***	-0.0723***	-0.0761***	-0.0789***	-0.0796***	-0.0826***	-0.0861***	-0.0817***	-0.0836***	-0.0867***	-0.0831***	-0.0793***	-0.0818***	-0.0854***	-0.0877***
	(0.0232)	(0.0238)	(0.0236)	(0.0237)	(0.0240)	(0.0239)	(0.0238)	(0.0235)	(0.0233)	(0.0232)	(0.0238)	(0.0240)	(0.0242)	(0.0249)	(0.0263)	(0.0268)
Contract enforcement inefficiency axis (lag)	-0.0164	-0.0255**	-0.0204	-0.0204	-0.0192	-0.0161	-0.0112	-0.0132	-0.0166	-0.0165	-0.0166	-0.0204	-0.0139	-0.0156	-0.0102	-0.00955
	(0.0120)	(0.0121)	(0.0126)	(0.0126)	(0.0125)	(0.0124)	(0.0123)	(0.0122)	(0.0121)	(0.0121)	(0.0121)	(0.0125)	(0.0131)	(0.0134)	(0.0136)	(0.0127)
Difficulty to start business axis (lag)	-0.000541	-0.00163	-0.00193	-0.000162	-0.000339	-0.000192	-0.00164	0.00160	-0.000140	0.00235	-0.00113	-0.000403	-0.000357	-0.00120	-0.000320	-0.00174
	(0.00526)	(0.00516)	(0.00618)	(0.00571)	(0.00548)	(0.00543)	(0.00535)	(0.00531)	(0.00523)	(0.00530)	(0.00526)	(0.00541)	(0.00558)	(0.00554)	(0.00563)	(0.00526)
Difficulty to exit business axis (lag)	-0.000760	0.00211	0.000715	0.00105	-0.000152	-0.00158	-0.00189	-0.00181	-0.000318	0.000821	-0.00134	-0.00106	-0.000224	-0.00224	-0.00215	-0.00200
	(0.00724)	(0.00771)	(0.00787)	(0.00789)	(0.00815)	(0.00739)	(0.00747)	(0.00757)	(0.00732)	(0.00709)	(0.00718)	(0.00762)	(0.00759)	(0.00744)	(0.00744)	(0.00717)
Green transition policies axis (lag)	0.0194***	0.0184***	0.0204***	0.0207***	0.0198***	0.0197***	0.0193***	0.0195***	0.0197***	0.0194***	0.0193***	0.0189***	0.0191***	0.0190***	0.0189***	0.0183***
	(0.00310)	(0.00396)	(0.00355)	(0.00336)	(0.00321)	(0.00319)	(0.00310)	(0.00310)	(0.00310)	(0.00309)	(0.00311)	(0.00324)	(0.00326)	(0.00319)	(0.00311)	(0.00316)
R&D tax incentive axis (lag)	0.00714	0.00634	0.00695	0.00937	0.00673	0.00600	0.00802	0.00704	0.00787	0.00585	0.00529	0.00828	0.00874	0.00664	0.00690	0.00691
	(0.00579)	(0.00629)	(0.00653)	(0.00639)	(0.00613)	(0.00605)	(0.00593)	(0.00597)	(0.00598)	(0.00580)	(0.00593)	(0.00589)	(0.00589)	(0.00597)	(0.00579)	(0.00587)
R&D expenditure axis (lag)	0.0346***	0.0365***	0.0347***	0.0343***	0.0326***	0.0329***	0.0349***	0.0349***	0.0357***	0.0345***	0.0368***	0.0338***	0.0345***	0.0325***	0.0345***	0.0346***
	(0.00936)	(0.00991)	(0.0101)	(0.00986)	(0.00973)	(0.00958)	(0.00930)	(0.00959)	(0.00974)	(0.00938)	(0.00993)	(0.00995)	(0.0100)	(0.00930)	(0.00974)	(0.00968)
Trade facilitation axis (lag)	0.0275***	0.0331***	0.0277***	0.0274***	0.0278***	0.0279***	0.0266***	0.0251***	0.0247***	0.0275***	0.0304***	0.0279***	0.0238**	0.0269***	0.0270***	0.0278***
	(0.00921)	(0.0107)	(0.0101)	(0.00994)	(0.00965)	(0.00930)	(0.00926)	(0.00938)	(0.00937)	(0.00896)	(0.00987)	(0.00944)	(0.00954)	(0.00936)	(0.00946)	(0.00943)
FDI restrictions axis (lag)	-0.0281***	-0.0415***	-0.0276***	-0.0268***	-0.0284***	-0.0286***	-0.0276***	-0.0288***	-0.0282***	-0.0288***	-0.0277***	-0.0276***	-0.0272***	-0.0268***	-0.0267***	-0.0259***
	(0.00452)	(0.00656)	(0.00535)	(0.00425)	(0.00435)	(0.00441)	(0.00453)	(0.00467)	(0.00466)	(0.00479)	(0.00459)	(0.00458)	(0.00450)	(0.00439)	(0.00437)	(0.00421)
Constant	1.897***	1.983***	1.881***	1.929***	1.894***	1.878***	1.940***	1.891***	1.909***	1.877***	1.894***	1.903***	1.858***	1.869***	1.902***	1.875***
	(0.208)	(0.232)	(0.224)	(0.228)	(0.225)	(0.223)	(0.215)	(0.213)	(0.210)	(0.203)	(0.210)	(0.208)	(0.211)	(0.217)	(0.219)	(0.223)
Observations	3,095	2,890	2,890	2,890	2,890	2,890	2,890	2,890	2,890	2,890	2,890	2,890	2,890	2,890	2,880	2,880
R-squared	0.942	0.945	0.944	0.943	0.943	0.942	0.941	0.941	0.941	0.942	0.941	0.941	0.942	0.943	0.944	0.945

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised. ; Source: estimated by the authors
Country*time FE and country*industry FE

Table A29: Sensitivity to industry exclusion

VARIABLES	(1) C10_C12 LP (log)	(2) C13_C15 LP (log)	(3) C16_C18 LP (log)	(4) C20 LP (log)	(5) C22_C23 LP (log)	(6) C24_C25 LP (log)	(7) C26 LP (log)	(8) C27 LP (log)	(9) C28 LP (log)	(10) C29_C30 LP (log)	(11) C31_C33 LP (log)	(12) J58_J60 LP (log)	(13) J61 LP (log)	(14) J62_J63 LP (log)
Log-lag of US labour productivity	0.241***	0.241***	0.241***	0.222***	0.241***	0.241***	0.116***	0.256***	0.227***	0.241***	0.241***	0.241***	0.258***	0.241***
	(0.0327)	(0.0327)	(0.0327)	(0.0363)	(0.0327)	(0.0327)	(0.0343)	(0.0325)	(0.0333)	(0.0327)	(0.0327)	(0.0327)	(0.0324)	(0.0327)
Log-lag of total capital intensity	0.264***	0.264***	0.264***	0.242***	0.264***	0.264***	0.241***	0.246***	0.263***	0.264***	0.264***	0.264***	0.217***	0.264***
	(0.0353)	(0.0353)	(0.0353)	(0.0359)	(0.0353)	(0.0353)	(0.0340)	(0.0367)	(0.0371)	(0.0353)	(0.0353)	(0.0353)	(0.0326)	(0.0353)
Human capabilities axis (lag)	0.0769***	0.0769***	0.0769***	0.0826***	0.0769***	0.0769***	0.0603***	0.0772***	0.0794***	0.0769***	0.0769***	0.0769***	0.0431***	0.0769***
	(0.0148)	(0.0148)	(0.0148)	(0.0170)	(0.0148)	(0.0148)	(0.0189)	(0.0147)	(0.0150)	(0.0148)	(0.0148)	(0.0148)	(0.0132)	(0.0148)
Infrastructure density axis (lag)	0.116	0.116	0.116	0.120	0.116	0.116	0.138	0.00651	0.123	0.116	0.116	0.116	-0.0668	0.116
	(0.221)	(0.221)	(0.221)	(0.222)	(0.221)	(0.221)	(0.219)	(0.220)	(0.225)	(0.221)	(0.221)	(0.221)	(0.215)	(0.221)
Government capabilities axis (lag)	-0.0142	-0.0142	-0.0142	-0.0150	-0.0142	-0.0142	-0.0176	-0.0183	-0.0153	-0.0142	-0.0142	-0.0142	-0.0270*	-0.0142
	(0.0164)	(0.0164)	(0.0164)	(0.0165)	(0.0164)	(0.0164)	(0.0167)	(0.0162)	(0.0177)	(0.0164)	(0.0164)	(0.0164)	(0.0155)	(0.0164)
Institutional framework quality axis (lag)	0.00496	0.00496	0.00496	0.00422	0.00496	0.00496	0.0113***	0.00187	0.00372	0.00496	0.00496	0.00496	0.00457	0.00496
	(0.00423)	(0.00423)	(0.00423)	(0.00414)	(0.00423)	(0.00423)	(0.00437)	(0.00456)	(0.00441)	(0.00423)	(0.00423)	(0.00423)	(0.00418)	(0.00423)
Macro policy uncertainty axis (lag)	-0.0214**	-0.0214**	-0.0214**	-0.0191**	-0.0214**	-0.0214**	-0.0214**	-0.0263***	-0.0257**	-0.0214**	-0.0214**	-0.0214**	-0.0447***	-0.0214**
	(0.00931)	(0.00931)	(0.00931)	(0.00932)	(0.00931)	(0.00931)	(0.00931)	(0.00959)	(0.0109)	(0.00931)	(0.00931)	(0.00931)	(0.0145)	(0.00931)
Financial market smoothness axis (lag)	0.0491***	0.0491***	0.0491***	0.0506***	0.0491***	0.0491***	0.0396***	0.0424***	0.0483***	0.0491***	0.0491***	0.0491***	0.0510***	0.0491***
	(0.0111)	(0.0111)	(0.0111)	(0.0112)	(0.0111)	(0.0111)	(0.0111)	(0.0113)	(0.0109)	(0.0111)	(0.0111)	(0.0111)	(0.0105)	(0.0111)
Labour market rigidity axis (lag)	-0.0548***	-0.0548***	-0.0548***	-0.0556***	-0.0548***	-0.0548***	-0.0567***	-0.0485***	-0.0550***	-0.0548***	-0.0548***	-0.0548***	-0.0250**	-0.0548***
	(0.00852)	(0.00852)	(0.00852)	(0.00853)	(0.00852)	(0.00852)	(0.00856)	(0.00899)	(0.00874)	(0.00852)	(0.00852)	(0.00852)	(0.0117)	(0.00852)
Job matching policies axis (lag)	0.0224	0.0224	0.0224	0.0221	0.0224	0.0224	0.0187	0.0163	0.0218	0.0224	0.0224	0.0224	-0.00460	0.0224
	(0.0147)	(0.0147)	(0.0147)	(0.0150)	(0.0147)	(0.0147)	(0.0142)	(0.0149)	(0.0152)	(0.0147)	(0.0147)	(0.0147)	(0.0144)	(0.0147)
Regulatory burden (NMRup) (lag)	-0.0814***	-0.0814***	-0.0814***	-0.0610***	-0.0814***	-0.0814***	-0.0406*	-0.0856***	-0.0774***	-0.0814***	-0.0814***	-0.0814***	-0.151***	-0.0814***
	(0.0232)	(0.0232)	(0.0232)	(0.0236)	(0.0232)	(0.0232)	(0.0208)	(0.0235)	(0.0235)	(0.0232)	(0.0232)	(0.0232)	(0.0189)	(0.0232)
Contract enforcement inefficiency axis (lag)	-0.0164	-0.0164	-0.0164	-0.0140	-0.0164	-0.0164	-0.00608	-0.0153	-0.0177	-0.0164	-0.0164	-0.0164	-0.0109	-0.0164
	(0.0120)	(0.0120)	(0.0120)	(0.0122)	(0.0120)	(0.0120)	(0.0123)	(0.0126)	(0.0122)	(0.0120)	(0.0120)	(0.0120)	(0.0128)	(0.0120)
Difficulty to start business axis (lag)	-0.000541	-0.000541	-0.000541	0.00329	-0.000541	-0.000541	-0.00559	-2.66e-05	0.000679	0.000541	-0.000541	0.000541	-0.0162*	0.000541
	(0.00526)	(0.00526)	(0.00526)	(0.00537)	(0.00526)	(0.00526)	(0.00501)	(0.00523)	(0.00547)	(0.00526)	(0.00526)	(0.00526)	(0.00939)	(0.00526)
Difficulty to exit business axis (lag)	-0.000760	-0.000760	-0.000760	-0.00105	-0.000760	-0.000760	-0.00763	-9.82e-06	-0.000648	-0.000760	-0.000760	-0.000760	0.0204**	-0.000760
	(0.00724)	(0.00724)	(0.00724)	(0.00739)	(0.00724)	(0.00724)	(0.00718)	(0.00720)	(0.00744)	(0.00724)	(0.00724)	(0.00724)	(0.00816)	(0.00724)
Green transition policies axis (lag)	0.0194***	0.0194***	0.0194***	0.0223***	0.0194***	0.0194***	0.0177***	0.0198***	0.0192***	0.0194***	0.0194***	0.0194***	0.0199***	0.0194***
	(0.00310)	(0.00310)	(0.00310)	(0.00308)	(0.00310)	(0.00310)	(0.00299)	(0.00320)	(0.00311)	(0.00310)	(0.00310)	(0.00310)	(0.00316)	(0.00310)
R&D tax incentive axis (lag)	0.00714	0.00714	0.00714	0.00951	0.00714	0.00714	-0.00716	0.00870	0.00682	0.00714	0.00714	0.00714	0.0104*	0.00714
	(0.00579)	(0.00579)	(0.00579)	(0.00698)	(0.00579)	(0.00579)	(0.00691)	(0.00569)	(0.00581)	(0.00579)	(0.00579)	(0.00579)	(0.00596)	(0.00579)
R&D expenditure axis (lag)	0.0346***	0.0346***	0.0346***	0.0394***	0.0346***	0.0346***	0.0405***	0.0312***	0.0347***	0.0346***	0.0346***	0.0346***	0.0307***	0.0346***
	(0.00936)	(0.00936)	(0.00936)	(0.0112)	(0.00936)	(0.00936)	(0.0116)	(0.00945)	(0.00940)	(0.00936)	(0.00936)	(0.00936)	(0.00928)	(0.00936)
Trade facilitation axis (lag)	0.0275***	0.0275***	0.0275***	0.0297***	0.0275***	0.0275***	0.0140	0.0222**	0.0349***	0.0275***	0.0275***	0.0275***	0.0139	0.0275***
	(0.00921)	(0.00921)	(0.00921)	(0.00932)	(0.00921)	(0.00921)	(0.00935)	(0.00920)	(0.0103)	(0.00921)	(0.00921)	(0.00921)	(0.00860)	(0.00921)
FDI restrictions axis (lag)	-0.0281***	-0.0281***	-0.0281***	-0.0300***	-0.0281***	-0.0281***	-0.0284***	-0.0288***	-0.0289***	-0.0281***	-0.0281***	-0.0281***	-0.00951**	-0.0281***
	(0.00452)	(0.00452)	(0.00452)	(0.00585)	(0.00452)	(0.00452)	(0.00482)	(0.00449)	(0.00461)	(0.00452)	(0.00452)	(0.00452)	(0.00377)	(0.00452)
Constant	1.897***	1.897***	1.897***	2.039***	1.897***	1.897***	2.428***	1.962***	1.949***	1.897***	1.897***	1.897***	2.250***	1.897***
	(0.208)	(0.208)	(0.208)	(0.222)	(0.208)	(0.208)	(0.199)	(0.214)	(0.210)	(0.208)	(0.208)	(0.208)	(0.200)	(0.208)
Observations	3,095	3,095	3,095	2,885	3,095	3,095	2,883	2,883	2,883	3,095	3,095	3,095	2,840	3,095
R-squared	0.942	0.942	0.942	0.942	0.942	0.942	0.945	0.946	0.942	0.942	0.942	0.942	0.948	0.942

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note: all variables are standardised. ; Source: estimated by the authors
Country*time FE and country*industry FE

6. Simulations

We calculate the simulation as follow:

$$Simul_c^{Policy} = \left(Policy_{\substack{best \\ pract}} - Policy_c \right)^{2018} \times \hat{\beta} \times \sum_i (Exp_i^+ \times W_{c,i}^{2018})$$

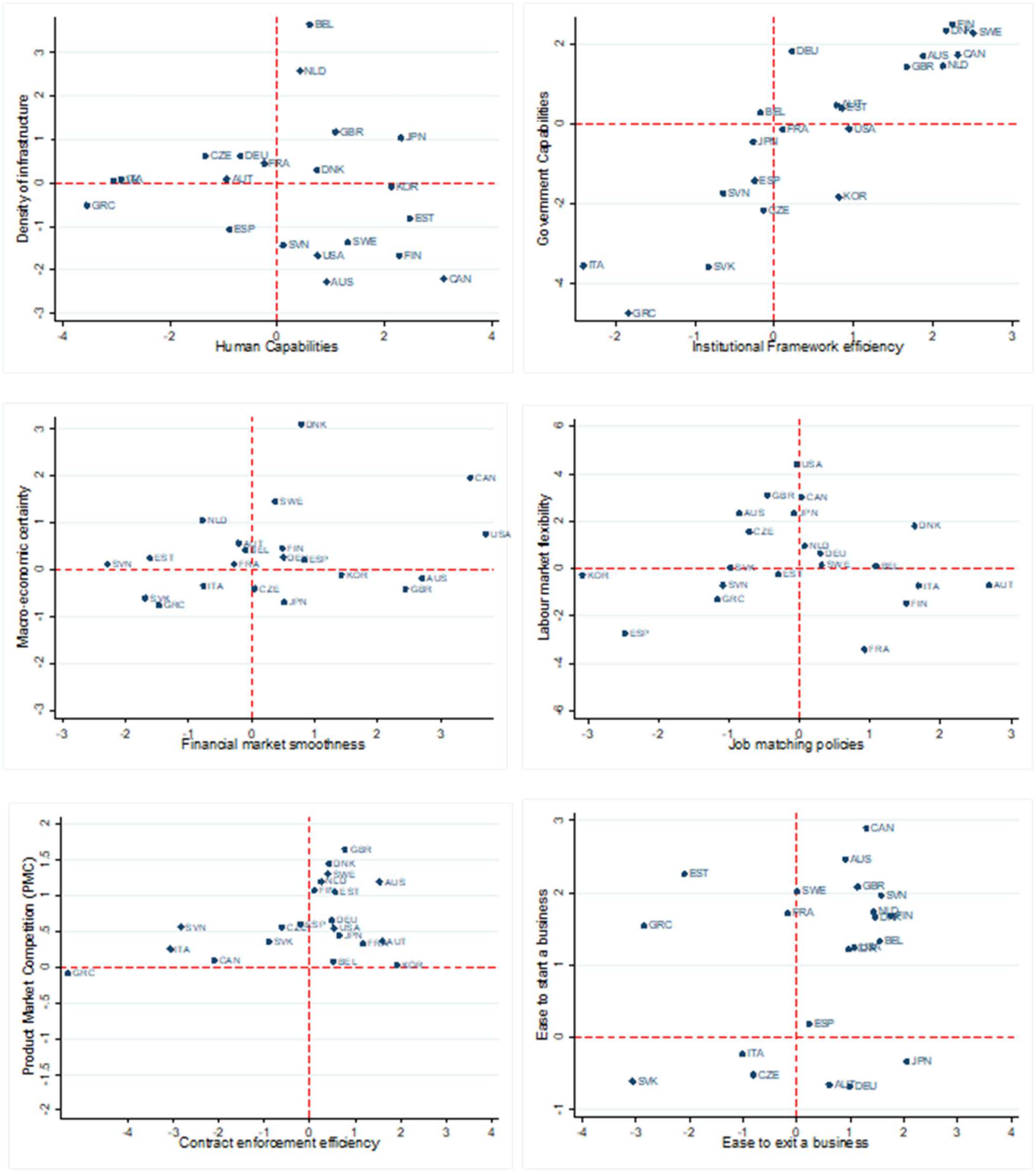
First, we calculate the relative delta for each country. Figure A2 presents cross-country policy patterns and table 4 in the main text summarizes Best Practice country by policy axis, representing the score of the policy axis in 2018. We multiply this by the estimated coefficient $\hat{\beta}$ (from table A18 col 1). To account for the different effects across industries, we use the same exposure variables as in the regression.

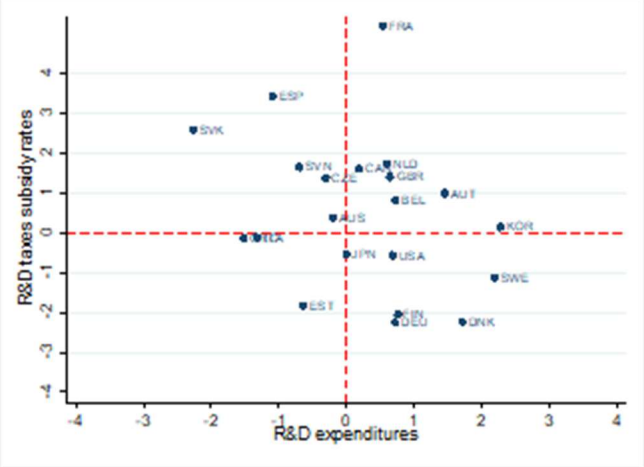
The exposure variable is standardized, so it is possible that some industries have a negative effect. However, a sector that is only slightly affected by the policy should not, in the simulation, have a negative impact. We therefore recalculate the exposure variable so that it takes only positive values. The calculation is as follows:

$$Exp_i^+ = Exp_i + |MIN\ Exp_i|$$

Thus, under this assumption, sectors not affected by the policies have a simulated value equal to zero. Finally, to aggregate at the national level, we weight the sectoral effects by the share of sector i in the country's total employment in market industry 2018 ($W_{c,i}^{2018}$).

Figure A2: Cross-country policy patterns (2018)




R&D taxes subsidy rates
R&D expenditures
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USA
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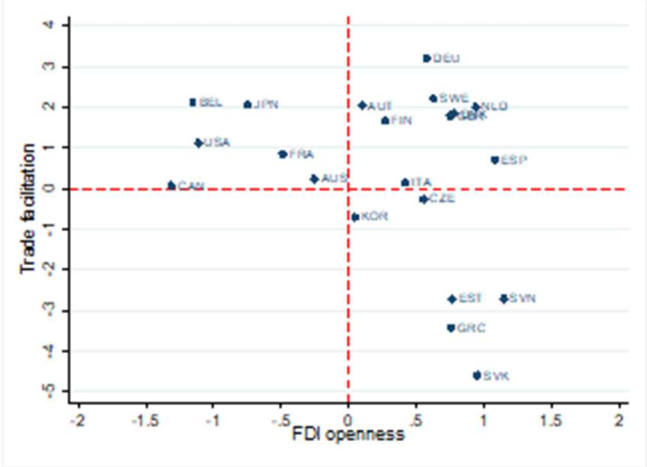
Trade facilitation
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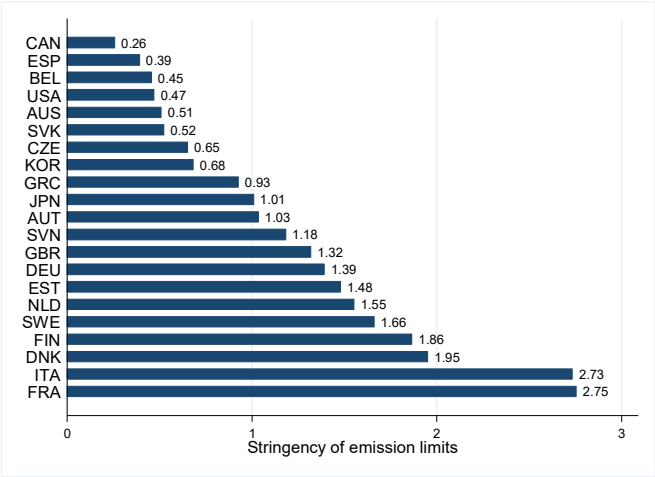
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USA 0.47
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CZE 0.65
KOR 0.68
GRC 0.93
JPN 1.01
AUT 1.03
SVN 1.18
GBR 1.32
DEU 1.39
EST 1.48
NLD 1.55
SWE 1.66
FIN 1.86
DNK 1.95
ITA 2.73
FRA 2.75
Stringency of emission limits