

Judyta Cabańska
Ida Musiałkowska
Ewa Mińska-Struzik
(Editors)

Resilient and transforming Europe



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POZNAŃ UNIVERSITY
OF ECONOMICS
AND BUSINESS

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Preface

1. Resilience and transformation in the European context

In an era of unprecedented global upheaval, the concepts of **resilience** and **transformation** have emerged as defining characteristics of Europe's response to contemporary challenges. Resilience, understood as “the capacity of a system to adapt successfully to significant challenges that threaten its function, viability, or development” (Masten, 2018), has become a cornerstone of European policy discourse. Building on decades of research across multiple disciplines (Southwick et al., 2014), resilience encompasses not only the ability to bounce back from crises but to emerge stronger, more adaptive, and better prepared for future challenges, which scholars term “adaptive resilience” (Bonanno, 2004; Norris et al., 2008).

Transformation, on the other hand, represents the fundamental restructuring of economic, social, and institutional systems to address long-term challenges and opportunities. Unlike incremental change, transformation involves paradigmatic shifts that reshape the very foundations of how societies operate, produce, consume, and govern. In the European context, transformation is intrinsically linked to the pursuit of sustainability, digitalisation, and enhanced competitiveness in a multipolar world.

2. Key challenges and disruptions shaping contemporary Europe

The past decade has witnessed an extraordinary confluence of crises that have tested Europe's resilience and accelerated its transformation. Since the onset of the eurozone crisis in 2009, the EU has faced numerous challenges, including a massive influx of refugees, Brexit, the coronavirus pandemic, and the Russian

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invasion of Ukraine (Jehne, 2022). The 2008 financial crisis further exposed structural weaknesses in the European Monetary Union, leading to prolonged sovereign debt crises that questioned the viability of European integration. The migration crisis of 2015–2016 also challenged the principles of solidarity and burden-sharing among Member States, while the Brexit referendum of 2016 marked the first instance of a member state choosing to leave the Union, fundamentally altering the EU's political landscape (Jones et al., 2021).

The COVID-19 pandemic, beginning in 2020, represented perhaps the most comprehensive test of European resilience in the Union's history. The health crisis quickly evolved into an economic and social catastrophe, forcing unprecedented policy responses, including the temporary suspension of fiscal rules, the creation of the Next Generation EU recovery fund, and the rapid development of common procurement mechanisms for vaccines and medical equipment (Boin et al., 2020; Schmidt, 2020).

The euro, migration, and COVID-19 crises originated in systemic failures, to which the EU responded by developing capacity – most extensively in the euro and COVID crises, in which the costs of disintegration were highest and national crisis management capability was most limited (Schimmelfenning, 2024). Russia's invasion of Ukraine in February 2022 further intensified these challenges, creating a geopolitical crisis that forced Europe to confront its strategic dependencies, particularly in the energy sector. Putin's war against Ukraine has already caused thousands of deaths and significant economic damage globally, representing what European leaders describe as the third asymmetric shock in 15 years (European External Action Service, 2022). The war has accelerated Europe's quest for strategic autonomy, reshaped supply chains, and prompted a fundamental reassessment of the continent's security architecture. At the same time, it has highlighted the urgent need for energy independence and an accelerated green transition.

The climate crisis represents perhaps the most fundamental long-term challenge, requiring nothing short of a complete transformation of Europe's economic model. The European Green Deal, launched in 2019, is the most ambitious attempt to decarbonise an advanced economy while maintaining competitiveness and social cohesion. However, the path to climate neutrality by 2050 requires navigating complex trade-offs between environmental imperatives, economic competitiveness, and social justice.

Technological disruption, driven by artificial intelligence, digitalisation, and the emergence of new industrial paradigms, presents both opportunities and challenges for European societies. While these technologies offer pathways to enhanced productivity and sustainability, they also raise concerns about job displacement, privacy, and the concentration of technological power in the hands of a few global players, many of whom are based outside Europe.

3. Structure and contributions of this volume

This volume brings together cutting-edge research and analysis from leading scholars to examine how Europe is building resilience while undergoing fundamental transformations across four key dimensions: geopolitical and institutional resilience, trade and global positioning, green and energy transformation, and economic and social resilience.

Part I: Geopolitical and institutional resilience

The volume opens with Adam A. Ambroziak's analysis of **The need for a common response from EU Member States to geopolitical challenges: Fair and open strategic autonomy**. This chapter introduces the concept of fair and open strategic autonomy as a framework for coordinating EU responses to global challenges while maintaining openness to trustworthy partners. The analysis examines the complex interdependencies between trade policy, competition policy, and industrial policy in building European strategic autonomy.

Agnieszka Kłos-Sosnowska explores **Fiscal policy coordination in the European Union and dilemmas in its enforcement**, examining the persistent challenges in implementing fiscal rules across Member States. The chapter reveals the dichotomy between theoretical frameworks and practical implementation, highlighting ongoing tensions in European economic governance.

The question of financial integration and risk-sharing is addressed by Joanna Bogołębska, Ewa Feder-Sempach, and Ewa Stawasz-Grabowska in their analysis of **Can debt mutualisation make the euro area more resilient? An overview of proposals for common safe asset creation**. This chapter provides a comprehensive review of proposals for creating common eurozone safe assets, in addition to examining their potential to strengthen monetary union resilience and enhance the international role of the euro.

Tomasz Dorożyński, Anetta Kuna-Marszałek, and Bogusława Dobrowolska contribute an empirical study on **Governance quality and investment attractiveness: Empirical evidence from OECD countries**. Their research demonstrates the critical relationship between institutional quality and foreign direct investment flows, with particular attention to differences between EU and non-EU OECD members.

The section concludes with Piotr Idczak and Ida Musiałkowska's examination of **EU support for the recovery process and developing the economic and business environment in Ukraine after the large-scale conflict with Russia in 2022**. This chapter analyses the unprecedented €84.6 billion EU support

package for Ukraine, examining how crisis response mechanisms have evolved to address complex geopolitical challenges while building long-term resilience.

Part II: Trade, cooperation and global positioning

The second part begins with Małgorzata Czermińska, Joanna Garlińska-Bielawska, and Marta Ulbrych's analysis of **The potential for trade cooperation between the European Union and selected countries of the Southern African Development Community in light of the provisions of the Economic Partnership Agreement**. This chapter examines how trade liberalisation through Economic Partnership Agreements contributes to both trade creation and economic development in partner regions.

This section includes a chapter by Justyna Majewska, Szymon Truskolaski, and Łukasz Bryl entitled **Resilience of the Polish and German economies to external shocks in the context of Polish accession to the EU**. The authors analyse the impact of the 2004 EU enlargement on Poland's and Germany's ability to withstand external shocks, including the financial crisis, the sovereign debt crisis, and the ongoing effects of the pandemic.

Łukasz D. Wróblewski provides insights into **Cross-border cooperation in the EU in light of economic fluctuations: The case of the Polish-German borderland**. His analysis reveals important lessons about the relationship between formal cooperation frameworks and actual economic integration, showing how territorial cooperation initiatives may not always align with real economic linkages.

Marcin Jurczak's chapter on **Polish transport in a changing Europe – 20 years of change** offers a comprehensive assessment of how EU investment has transformed Poland's transport infrastructure over two decades, providing insights into the long-term effects of European integration on national development.

The section concludes with Piotr Trąpczyński, Łukasz Puślecki, and Zuzanna Maleszewska's examination of **Development of post-transition country firms' legitimization strategies in advanced economies: A mixed-method study of Polish subsidiaries in Germany**. This chapter provides novel insights into how firms from emerging economies build legitimacy in advanced markets, contributing to our understanding of contemporary patterns of European economic integration.

Part III: Green and energy transformation

The third part addresses Europe's green transformation, beginning with Agata Kwiatkowska, Letycja Józefczak, and Olga Jankowska's analysis of **Green growth**

vs. degrowth: Implications for climate neutrality and socio-economic stability in Europe. This chapter examines one of the most fundamental debates in sustainability discourse and explores whether traditional growth paradigms can be reconciled with environmental imperatives.

Kamilla Marchewka-Bartkowiak, Iustina Alina Boitan, and Filip Teodor Iorgulescu contribute empirical research on **Climate transition policies and non-household electricity prices – impact assessment across the European Union.** Their analysis provides crucial insights into how carbon pricing and climate policies affect electricity markets, with important implications for industrial competitiveness.

Zuzanna Puwł examines **The European Union's energy security based on renewables,** analysing whether renewable energy sources can serve as Europe's shield against external energy dependencies. This chapter is particularly relevant in light of the energy crisis triggered by the war in Ukraine.

Grzegorz Mazur contributes an analysis of **Defining environmental goods in international trade,** reviewing the definitions of environmental goods developed by organisations such as the World Trade Organisation and the Organisation for Economic Co-operation and Development. Mazur highlights the key challenges involved, including differing approaches to classification, dual-use products and the dynamic nature of environmental technologies.

Magdalena Śliwińska explores **The role of Fair Trade in sustainable transition of Europe.** This latter chapter examines how the Fair Trade movement contributes to sustainable transformation across social, market, and regulatory dimensions.

Part IV: Economic and social resilience in transforming Europe

The final section addresses the social and economic dimensions of European transformation. Dorota Czyżewska-Misztal analyses **EDIHs in Poland as intermediaries supporting digital transformation of SMEs,** examining how European Digital Innovation Hubs facilitate the digital transformation of small and medium enterprises, which form the backbone of the European economy.

Marceli Hązła provides a forward-looking analysis of **Implications of selected digital solutions for the globalisation process,** which explores how artificial intelligence, automation, and other digital technologies may reshape global economic relationships and contribute to emerging “techno-geopolitics.”

Zbigniew Bentyn, Sylwia Konecka, and Maciej Szymczak examine **The cold chain as a resilience feature of the supply chain,** analysing how specialised logistics technologies can enhance supply chain resilience while navigating sustainability challenges.

Judyta Cabańska, in her chapter **Labour migration and workforce short-ages: Building resilience in post-pandemic Europe**, examines how post-pandemic labour shortages, driven by demographic ageing and structural weaknesses, have increased the importance of labour migration in building resilient European labour markets, while also highlighting challenges related to integration and skills recognition.

The volume concludes with Alicja Hadryś, Monika Guzek, and Agata Linkiewicz, whose chapter **Preliminary research findings on the impact of gender diversity in boards on sustainable development policies** demonstrates that gender diversity on corporate boards facilitates the effective implementation of sustainable development policies.

Conclusions

Together, these contributions provide a comprehensive examination of how Europe is navigating the complex intersection of resilience-building and transformation in an era of multiple, interconnected crises. The volume, which is an effect of research coordinated by the Jean Monnet Centre of Excellence “Resilient and transforming Europe” TRANSFORM EU, demonstrates that European resilience is not simply a matter of returning to previous states of equilibrium but about building adaptive capacity for continuous transformation in response to evolving challenges. As Jean Monnet famously observed, “Europe will be forged in crises, and will be the sum of the solutions adopted for those crises” (Monnet, 1978). As Europe faces an uncertain future marked by climate change, geopolitical competition, technological disruption, and social change, the insights provided in this volume offer valuable guidance for policymakers, scholars, and practitioners working to build a more resilient and sustainable European future.

Judyta Cabańska
Ida Musiałkowska
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I
GEOPOLITICAL
AND INSTITUTIONAL RESILIENCE

1. The need for a common response from EU Member States to geopolitical challenges: Fair and open strategic autonomy

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Abstract: Geopolitical turbulence frames this chapter's examination of fair and open strategic autonomy as a common EU response to competitiveness and dependency pressures. The discussion draws on EU institutional debates and Treaty provisions governing trade, competition and industrial policy. It shows that a workable autonomy agenda must preserve open relations with trustworthy partners while enforcing fair competition inside the Single Market and in external relations. Common Commercial Policy tools, state-aid control and industrial coordination are presented as mutually dependent instruments, not separate policy silos. The chapter also warns against government failure, sectoral favouritism, unequal Member State capacities and potential retaliation by third countries. A credible European strategy therefore requires precise instruments, inclusive coordination with business, and acceptance by all Member States.

Keywords: strategic autonomy, competition policy, trade policy, Common Commercial Policy, industrial policy, European Union.

Introduction

A discussion on strategic autonomy began in the European Union (EU) shortly after the 2008–2010 economic and financial crisis. At the time, the concept focused primarily – through France – on military, political security, and defence dimensions (European Commission, 2013). Only with Brexit, growing competitive pressure from China, and the protectionist actions of President D. Trump's administration in the US has the discussion on strategic autonomy shifted to economic and social challenges, particularly the issue of dependence on unpredictable third-country partners in many areas. Both the EU's major partners, namely China (the Belt and Road Initiative of 2013, the Made

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in China programme of 2015) and the US (Chips and Science Act and the Inflation Reduction Act of 2022), have their own industrial policies aimed (directly or indirectly) at undermining the EU's position. Huge subsidies in China and the discriminatory system of preferences in the US make the EU less attractive investment-wise, not only for third-country companies but also for European ones.

The above-mentioned actions by the major world economies, coupled with disruptions to supply and production chains resulting from the COVID-19 pandemic and the war in Ukraine, have undermined the foundations of the EU's previous economic policies across the trade, industrial, and market dimensions. Instead of open, horizontal policies, a debate has emerged over assertive (closed) and sectoral (interventionist) policies in these areas. On that basis, numerous definitions of strategic autonomy have been developed. This chapter adopts the one proposed by Grevi (2019), which states that strategic autonomy "is about setting objectives, making decisions and mobilising resources in ways that do not primarily depend on the decisions and assets of others."

However, according to different researchers, strategic autonomy should consist of different elements, including only military defence and security (Katsioulis, 2022; Ochman & Biziewski, 2020; Zandee et al., 2020). Other authors argue for a broader scope, including other dimensions: economic (especially energy: Ryon, 2020), technological (Grevi, 2019; Darnis, 2021) and digital (Van den Abeele, 2021), or even political (Lefebvre, 2021), or only the foreign policy dimension (Beaucillon, 2023). Other works adopt a horizontal approach, identifying institutional, material, and political autonomy (Helwig, 2020). At this same time, some researchers call for more restrictive rules regarding European sovereignty, power, autonomy, and strategic responsibility (Dupré, 2022) or, in contrast, for openness from the European Union while seeking strategic autonomy (Van den Abeele, 2021).

The above analyses overlook both the current policy choices and the legal basis of the concept of strategic autonomy (in the economy). Therefore, this chapter aims to identify the objectives, the scope of possible action (from a legal and political perspective), and the interdependencies between the three economic dimensions: trade, industry, and market (competition), within the framework of the concept of fair and open strategic autonomy proposed by the author. To this end, we have analysed the policy debate within the EU institutions and a current treaty framework for coordinated (common) actions to address the problem of competitiveness, including resilience of the EU economy.

1.1. The political framework

Even before the outbreak of the COVID-19 pandemic, the European Council, in *A new Strategic Agenda 2019–2024*, underlined that “in a world of increasing uncertainty, complexity and change, the EU needs to pursue a strategic course of action and increase its capacity to act autonomously to safeguard its interests” (European Council, 2019). The importance of this approach was confirmed in the Commission Communication released in May 2020, just two months after the COVID-19 outbreak, which addressed the breakdown in supply and production chains, and stated the importance of “strategic autonomy while preserving the benefits of an open economy” (European Commission, 2020). This meant that the Commission did not want to introduce any protectionist mechanism, which was certainly not accepted by all Member States. At the same time, it noted “the need to reduce dependency and strengthen security of supply.”

In September 2020, ministers responsible for competitiveness in EU Member States supported the aforementioned concept, albeit limiting it to “sensitive and key technological sectors” (Council of the European Union, 2020). Just one month later, in October 2020, the European leaders confirmed that “[A]chieving strategic autonomy while preserving an open economy is a key objective of the Union” (European Council, 2020). This meant that strategic autonomy was no longer a foreign and defence policy concept, but also an economic one. Moreover, they requested the Commission to “identify strategic dependencies, particularly in the most sensitive industrial ecosystems (...), and to propose measures to reduce these dependencies, including by diversifying production and supply chains, ensuring strategic stockpiling, as well as fostering production and investment in Europe.”

However, this position proved insufficient for some countries. During its presidency of the Council of the EU, France forced European leaders to adopt much stronger commitments to “take further decisive steps to build (...) European sovereignty” (Versailles Declaration, 2022). The French tone was somewhat softened a few months later by the European Council, which, firstly, came back to “strategic autonomy”, secondly, listed “the most sensitive areas such as critical raw materials, semi-conductors, health, digital and food, and by pursuing an ambitious and robust trade policy, as well as by fostering investment” (European Council, 2022). In 2023, European leaders specified that those objectives can be achieved by strengthening the industrial and technological base, enhancing economic resilience, and securing connectivity, global market access, and productivity (European Council, 2023).

A detailed political outline of this vision, reflecting the positions of individual EU Member States, can be found in the Conclusions of the Competitiveness Council of May 2024. This provides a detailed reference to a range of factors that impact and ensure the EU's competitiveness (Council of the European Union, 2024). This list is significant because it outlines the scope of the instruments and their functions that Member States have agreed to (unanimously). Among these, four are worth highlighting: a) the reduction of strategic dependencies on third countries in strategic sectors, b) the emphasis on the coordinating nature of the EU Industrial Policy, c) the launch of a discussion on the financing of industrial policy, and d) aligning actions with other policies, including the Single European Market, EU Competition Policy, EU Industrial Policy, and the Common Commercial Policy.

1.2. The legal framework

A response in the real economy to new tendencies in the world, including protectionism, interventionism, and discriminatory actions by third countries, could involve action at three theoretical levels in the European Union: purely national, purely EU, and mixed (national and EU).

In a purely national action model, a wide range of instruments under broad industrial policy can, in theory, be used to make national economic actors more competitive. Such instruments tend to be both interventionist (offensive) and protectionist (defensive). The former are characterised primarily by various legal and financial measures to intervene in the free market, such as subsidies for domestic companies. In contrast, the latter approach (defensiveness) is predominant in trade policy tools and administrative policies that regulate market entry for products or traders. As mentioned, both types of instruments may be effective in protecting against third countries in the short term, but could disrupt the targeted market and relations with external partners over time. Nevertheless, due to the complexity and advancement of EU integration processes and treaty provisions, the purely national actions model is not available to the EU Member States.

As regards a purely EU (common) model, it is worth noting that the European Union has exclusive competence over certain economic policy instruments, including the European Commission's authorisation of state aid (under EU Competition Policy) and the use of Common Commercial Policy tools. Both areas of economic policy are strictly regulated and controlled by existing legislation to maintain a level playing field within the European

Single Market. Such an approach should ensure EU Member States use the instruments effectively.

However, it is impossible to apply a single common model in the European Union, as the EU lacks exclusive competence in industrial policy, or even shared competence with the Member States. On the basis of the Treaty, in the areas of industry, the Union has competence to carry out actions to support, coordinate, or supplement the actions of the Member States. Therefore, the current model, available under the EU law, is a mixed one, combining national and EU elements. Firstly, industrial policy in the EU is implemented by individual Member States, although the European Commission seeks to coordinate their actions through some forums (e.g., Industrial Forum, Industrial Alliances, Important Projects of Common European Interests, European Commission, 2021). Secondly, EU Member States can support companies using both national and European funds available to them (e.g., through Cohesion Policy or the National Recovery Resilience Plan), although only after gaining Commission approval (or under many exemptions, e.g., General Block Exemption Regulation, European Commission, 2014). Thirdly, EU state aid rules are so diverse that it is difficult to claim that Member States are fully pursuing EU objectives when granting national financial support (even if such measures comply with EU law, they are not necessary to achieve EU objectives (Ambroziak, 2023, 2024).

It is therefore necessary to rebuild understanding and acceptance of the new interrelationships between the three pillars of EU economic policy: external trade, competition, and industrial policy.

1.3. The concept

Although treaty provisions on industrial policy do not currently mandate unified action or oversight by EU institutions as they do for trade and competition policy, they are justified at the EU level by the logic of intervention. This is because the objective of making the Union's industry more competitive must be pursued while maintaining a level playing field in the European Single Market. This requires strict adherence to EU Competition Policy and Common Commercial Policy rules, with mutual interplay between them (Figure 1.1). Otherwise, instruments supporting companies in one country would undermine the competitiveness of businesses in other EU Member States. Indeed, boosting the competitiveness of a national entity through interventionist-protectionist instruments inevitably can harm the position of other businesses within the European Single Market.

First and foremost, FOSA should fulfil the EU's main economic objective, i.e., the creation of a European internal market which “shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy (...)” (TEU, 2016, Article 3). At the same time, it should take account of specific Treaty objectives: the EU's Industrial Policy should “ensure that the conditions necessary for the competitiveness of the Union's industry exist” (TFEU, 2016, Article 173); its trade policy “shall contribute, in the common interest, to the harmonious development of world trade, the progressive abolition of restrictions on international trade and foreign direct investment, and the lowering of customs duties and other barriers” (TFEU, 2016, Article 131); and its state aid policy should protect the European Single Market from distortions of competition (TFEU, 2016, Article 107).

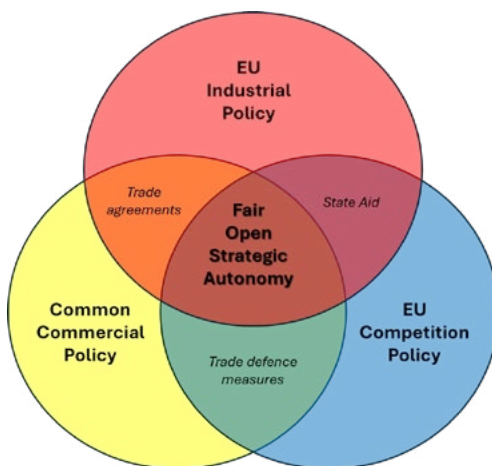


Figure 1.1. Three policies of fair and open strategic autonomy

Source: own elaboration.

In light of the above, the following inter-linkages between the areas depicted can be identified. Firstly, while various regulatory and financial instruments can be used to implement Industrial Policy objectives at the EU level, the latter must comply with the strict state-aid rules under EU Competition Policy. The idea is to ensure a level playing field within the European Single Market. At the same time, competitiveness can be enhanced by ensuring that European companies have access to components and (strategic) raw materials from reliable trading partners from outside the EU. This can be achieved by concluding free trade agreements with third countries within the framework of the (OPEN) Common Commercial Policy. The uniform application of this policy should ensure both

the creation of a level playing field for all EU Member States in their trade relations with third countries and a stronger position in building partnerships with them. At the same time, the Common Commercial Policy should be assertive to ensure (FAIR) relations with third countries by protecting the European Single Market against unfair practices from outside the EU that undermine internal competition.

Therefore, taking into account the internal and external factors of the European Union, the coherent system seems to be based on the following concept of fair and open strategic autonomy (FOSA) (Figure 1.1):

- Fair — ensuring a level playing field in the European Single Market, both among Member States and with third-country partners;
- Open — maintaining open (non-protectionist) relations with third countries, provided the condition of fair play is met;
- Strategic — aligning all policy, programming, legislative, and financial actions with EU priorities;
- Autonomy — ensuring economic security amid an unstable global geopolitical landscape by: a) increasing autonomy across the entire or strategic parts of the product lifecycle: from conception, development research, innovation, and design to production, sales, service, recycling, and disposal; b) reducing reliance on single suppliers in favour of multiple third-country suppliers.

In addition to the positive aspects of adopting a common EU approach through FOSA, it is important to note its potential negative economic consequences. The most important of these is the decision to intervene in free-market activities by designating sectors as strategic, supporting them by means of state aid, enabling their development through targeted agreements and trade partnerships with third countries, and protecting them from unfair competition from other global players. As this issue is crucial to FOSA's success, it poses a high risk of government failure. To avoid arbitrarily 'picking winners', it is necessary to structure and institutionalise the coordination process between the Commission and Member States, with significant input from business, to identify strategic areas for aforementioned actions.

Another key problem concerns the stark disparities between EU Member States in terms of their economic development, industrial and service structure, scientific and research potential and, consequently, their needs and expectations. Because sector contributions to GDP differ across Member States, the areas impacted by FOSA would need to address different industries in each country. Sectors with high international interdependence in global value chains and significant participation in international trade may be particularly vulnerable. Implementing FOSA would require efforts to make the EU more attractive investment-wise at

the level of individual components or semi-finished products that have previously been supplied to the EU from third countries. Shortening these supply and production chains would fundamentally reshape trade in intermediate goods, which would inevitably affect international trade in final goods and services.

Furthermore, the introduction of certain necessary requirements under FOSA, including productive investment within the EU, can be expected to significantly increase the prices of finished products manufactured in the EU. To ensure autonomy in the production of critical/strategic goods, the EU might feel compelled to introduce appropriate protective measures or interventionist actions to safeguard domestic producers. Setting aside any potential concerns about compliance with international trade regulations under the WTO framework, such steps would almost certainly provoke retaliatory actions from third countries. However, the negative effects of using such instruments at the EU level could be mitigated or eliminated by the above-mentioned diversification of supply chains (including those within the EU), as well as by the Union acting as a single economic bloc under the Common Commercial Policy.

Conclusions

In summary, after years of crises triggered by the COVID-19 pandemic and the war in Ukraine, which led to increased intervention in the Single European Market, Member States are gradually returning to a pre-crisis, more restrained approach to state aid. However, this does not signal a complete return to the notion that ‘the best industrial policy is no industrial policy’. As with any post-crisis period, broader and deeper integration among the European countries can be expected. At the same time, given the new and more serious challenges facing the EU, it is likely that state (financial and regulatory) intervention in the economy will continue, albeit at the EU level.

In summary, the adoption of FOSA, understood as a set of interventionist and protectionist instruments available at the EU level, should minimise the risk of competitive distortions in the European Single Market while strengthening the EU’s competitive position in the global economy (in trade relations). However, this concept requires precise definitions, with its instruments clearly specified, thereby taking into account the potential positive and negative consequences not only within the EU but also for third-country partners. Furthermore, its implementation should be accepted by all Member States, yet this can only be achieved if FOSA’s benefits outweigh its costs, not only at the EU-wide level but also within each individual Member State. Ultimately, the best way to gain acceptance for the activities carried out under the FOSA would be to involve

both the EU Member States and, crucially, the business community in the decision-making process, as industry leaders best understand the challenges posed by shifting geopolitics.

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2. Fiscal policy coordination in the European Union and dilemmas in its enforcement

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Abstract: EU fiscal governance is examined as a system caught between common rules and uneven national implementation. The chapter follows the evolution of coordination from the Maastricht framework and Stability and Growth Pact through the six-pack, two-pack, Fiscal Compact, European Semester and 2024 reform. Descriptive, normative and diachronic analysis is used to trace how surveillance has become more complex while still struggling to secure compliance. Five tensions shape the discussion: rigidity versus flexibility, national priorities versus collective interest, responsibility versus solidarity, technocratic indicators versus political bargaining, and legal norms versus limited implementation. The chapter shows that soft-law recommendations depend heavily on trust and political will. Stronger fiscal resilience demands reliable reporting, credible enforcement, better national alignment and sanctions that are realistic enough to be applied.

Keywords: fiscal policy, budgetary policy, fiscal rules, coordination of economic policies.

Introduction

Fiscal policy coordination is one of the fundamental elements of economic governance in the European Union. Its importance stems from the need to ensure the stability of the public finances of the Member States, to limit the negative spillover effects of national budgetary policies, and to maintain the economic stability of the European Union as a whole, particularly the euro area. Unlike monetary policy, which has been centralized within the euro area and entrusted to the European Central Bank, fiscal policy remains within the competence of the Member States. This creates the need to develop coordination mechanisms that, on the one hand, respect the budgetary sovereignty of the Member States and, on the other hand, ensure that national fiscal policies are consistent with the economic and fiscal objectives of the European Union.

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The development of the EU framework for fiscal policy coordination reflects the lessons learned from successive economic and financial crises. The fiscal surveillance system has undergone gradual evolution, beginning with the establishment of the convergence criteria in the Maastricht Treaty and the adoption of the Stability and Growth Pact, followed by the reforms introduced in the aftermath of the global financial crisis through the so-called Six-Pack and Two-Pack legislative packages, as well as the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union, and culminating in the reform of the EU fiscal rules applicable since 2024. These reforms were intended to enhance the effectiveness of fiscal surveillance, improve the transparency of the rules, and adapt them to the diverse fiscal situations of the Member States. At the same time, they have resulted in an increasingly complex system of legal norms, procedures, and supervisory instruments, the practical application of which has generated considerable controversy both in the academic literature and in political debate.

A particularly significant issue in the discussion on the effectiveness of EU fiscal policy coordination concerns the enforcement of the established fiscal rules. Experience to date demonstrates that formally binding provisions are not always applied uniformly across all Member States. In practice, decisions concerning the initiation of the excessive deficit procedure, the application of corrective measures, or the imposition of sanctions are often influenced by political, economic, and institutional considerations. Consequently, a tension arises between the normative character of the EU fiscal rules and their actual implementation, raising questions about the effectiveness and credibility of the EU's system of economic governance as a whole.

The aim of this chapter is to examine the issue of Member States' compliance with the EU fiscal rules within the framework of the coordination of economic policies and to identify the dichotomy in the enforcement of those rules. The research hypothesis assumes that the ongoing evolution of the fiscal policy coordination framework has led to growing discrepancies between the theoretical assumptions underlying the principles established in European Union law and their practical implementation by the Member States. To test this hypothesis, the chapter employs descriptive, normative, and diachronic research methods, enabling an analysis of the evolution of the EU's legal and institutional framework and an assessment of its functioning in practice.

The structure of the chapter follows the adopted research objective. The first part provides the theoretical background for the analysis of fiscal policy and its relationship with monetary policy. The second part outlines the evolution of the coordination of economic policies within the European Union, with particular emphasis on the development of fiscal surveillance instruments. The third part

analyses selected provisions of the reform of the EU fiscal rules applicable since 2024 in comparison with the previous legal framework, seeking to determine whether the new solutions simplify the system or, conversely, increase its complexity and interpretative challenges. The fourth part discusses five principal manifestations of the dichotomy in the enforcement of fiscal rules within the European Union, namely the discrepancies between legal norms and their practical application, the tension between flexibility and fiscal discipline, the conflict between the uniformity of the rules and the diversity of Member States' fiscal situations, the contrast between the technical nature of fiscal surveillance and its political dimension, and the divergence between the formal equality of Member States before the law and the differentiated practice of enforcing fiscal obligations.

The chapter contributes to the current debate on the future of EU economic governance, particularly in the context of the challenges posed by high levels of public debt, the need to finance the green and digital transitions, increasing expenditure on security and defence, and the necessity of maintaining the long-term sustainability of public finances. Assessing the effectiveness of the new framework for fiscal policy coordination is of considerable importance both for the further development of European Union economic law and for the practical conduct of fiscal policy by the Member States.

2.1. Fiscal and monetary policy in the Keynesian and monetary theories

The current conditions and challenges of conducting stabilising fiscal policy in the euro area are the subject of intense debate among economists. Fiscal (budgetary) policy refers to broadly defined state activities related to public finances and the budget. In Polish academic literature, the term “tax policy” is also used, since a number of economists believe that “fiscal policy” can be understood only as tax regulation (Oręziak, 2009, p. 45). Used interchangeably, the two terms cover a wide range of government activities, including designing tax policy, managing budgetary expenses, financing the social security system, and the activities of other public institutions, both governmental and municipal. Fiscal policy and monetary policy work together to shape the macroeconomic equilibrium. On the one hand, central bank actions in monetary policy affect the conditions under which governments conduct fiscal policy; on the other, fiscal policy decisions affect central bank actions. In the economic literature, the combination of these two policies is referred to as the “policy mix”.

In economic theory, the dispute over the conduct of fiscal policy is mainly between Keynesians and monetarists. Both for proponents of the Keynesian

and monetarist theories, the primary role of fiscal policy is macroeconomic stabilisation. Keynesians believed that money and monetary policy play a role in shaping economic activity in the short run, e.g., through the central bank's ability to stimulate the economy by lowering interest rates and increasing the demand for credit. In their view, monetary policy has only a limited impact on the level of aggregate output and the course of the business cycle. In their interpretation, the monetary policy merely complements fiscal policy, whose greater effectiveness was attributed to its ability to affect aggregate demand more quickly and directly and to the greater predictability of its effects (Cargill, 2001, p. 116; Espinosa-Vega, 1998, p. 15; Kiedrowska & Marszałek, 2003, p. 73).

In Keynesian theory, fiscal policy is countercyclical, meaning that it operates in the opposite direction to the business cycle (Keynes, 2003; Markowski, 2018, p. 77). During a recession, it should be deployed in an expansionary manner by increasing fiscal spending and/or reducing taxes, as such actions have a positive effect on aggregate consumer spending and consequently increase aggregate demand, real income and employment levels (Birol & Gencer, 2014, pp. 106–119). Expansionary fiscal policy leads to budget deficits and public debt; however, this should not be viewed negatively, as the incurrence of public debt can help counteract short-term declines in economic activity. The additional spending made possible by moving away from a balanced budget creates the multiplier effect that leads to increased employment and output. In the long run, the debt resulting from the deficit can be repaid through increased GDP (Owsiak, 2002, pp. 46–47). When an economy shows signs of overheating and the threat of rising inflation looms, fiscal policy should be tightened to curb public spending, raise taxes, and reduce demand pressures. In each of the above cases, the extent of fiscal action depends on the value of the fiscal multiplier, which measures the overall output growth generated by additional government spending to mitigate the effects of the crisis (Kiedrowska & Marszałek, 2003, p. 75; Wildowicz-Szumańska, 2021, pp. 118–119).

Unlike Keynesians, monetarists took a very different view of fiscal policy, attributing to it a much more limited role. In their view, fiscal policy serves mainly to correct social inequalities and to allocate resources but is unable to solve business cycle problems (Kiedrowska & Marszałek, 2003, p. 76). According to monetary theory, crises are most often caused by a reduction in the availability of money, while an excessive increase in the money supply leads to inflation. For this reason, monetarists contend that only monetary policy should be used to support the economy, as it has the ability to self-regulate (Wildowicz-Szumańska, 2021, p. 119).

From the creation of the euro area until the 2008 crisis, the relationship between fiscal and monetary policy stemmed from the widespread recognition

that each is limited to its own separate spheres of influence. Levy noted that fiscal policy affects resource allocation, savings, investment and consumption, while monetary policy focuses on demand management. This approach may have led to marginalising the need to coordinate them. In the economic discourse, it has been argued that a common currency area does not increase the requirement for cooperation between fiscal and monetary policy. If the functions of both policies are performed systematically, coordination becomes unnecessary (Barczyk & Lubiński, 2009; Markowski, 2019, p. 150). In order to reflect on coordination and application of the “policy mix”, it is crucial to take into account that the euro area was established during the period of neoliberalism, i.e. during the period of popularity of monetary theory and new classical economics, while the idea of coordination of fiscal and monetary actions is symptomatic of Keynesian theory (Barczyk & Lubiński, 2009; Markowski, 2019, p. 150).

2.2. Evolution of the coordination of economic policies in the EU

Coordination of the Member States’ economic policies had already been provided for in the 1957 Treaty of Rome, which led to the formal development of procedures and the establishment of relevant committees (Apel, 1998, p. 29). Since the mid-1960s, the European Commission has prepared special medium-term economic programmes. In general, these have mainly contained recommendations and guidelines on price stability, exchange rates, structural policies and, to a lesser extent, public finance or regional policies. However, macroeconomic data and forecasts for individual countries were not always consistent and comparable. Moreover, there has been a lack of alternative scenarios for economic development, while recommendations and guidelines were not binding, as they were not subject to consultation with the Commission (Szeląg, 2003, p. 14). By the end of the 1960s, the problem of the inadequacy of the adopted mechanisms of economic policy coordination became apparent. At that time, the Commission prepared and submitted to the Council a document on the coordination of economic policies and monetary cooperation, known as the Barre Plan (European Commission, 1969). This was followed a year later by the Werner Plan (Council – Commission of the European Communities, 1970), which envisaged the creation of an economic and monetary union within ten years, i.e. by the end of 1980. However, the breakthrough in the introduction of mechanisms for coordinating economic policies, including fiscal policies, only appeared when the Maastricht Treaty came into force in 1993. This document introduced provisions for an Economic and Monetary Union (EMU), including a single monetary policy

for the euro area. Authorisations and responsibilities for carrying out the fiscal policy remained the remit of individual Member States, while the EU's role in the fiscal policy is limited to coordination and monitoring (Articles 5(1) and 121(1) TFEU). The European Union has neither the competence nor the instruments to carry out its own fiscal policy (no fiscal union), and its actions are limited to monitoring national budgets and assessing their compliance with collectively agreed fiscal policy rules, such as the Maastricht criteria for public debt and deficit limits. The purpose of such supervision is to limit the potential negative effects of decentralised management of the economic policy within a monetary union (Dermine, 2022, p. 8). The autonomous economic policies of individual Member States affect both the unified monetary policy and the exchange rate policy of the euro area. Consequently, a significant risk exists that inappropriate, irresponsible or unilateral economic actions focused solely on the national interests of a select few countries could destabilise the euro area as a whole and threaten the common interests of its members (European Commission, 2002).

In practice, many countries have struggled to comply with the fiscal policy restrictions set out in the Maastricht Treaty. Although the conditions for convergence were rigorously defined, once countries met them and entered the euro area, they often lost the incentive to continue complying with them, especially as regards avoiding excessive budget deficits. Consequently, three years after the adoption of the Maastricht Treaty, the Stability and Growth Pact (SGP)¹ was developed to clarify the fiscal rules. This document contained detailed provisions on fiscal criteria, their implementation, monitoring, and enforcement. The adoption of the Pact was intended to prevent euro area countries from taking an excessively casual approach to the rules stemming from the convergence criteria.² The rules established in the Pact apply to all countries of the European Union, but the Pact's corrective part applies only to the euro area countries (Panico & Vázquez Suárez, 2007, p. 3). The purpose of the preventive function is to ensure that the fiscal policy is balanced over the economic cycle, i.e. that

¹ The Stability and Growth Pact is an agreement of the European Union Member States concluded on 17 June 1997 during the European Council summit in Amsterdam.

² The Stability and Growth Pact consists of three documents: 1) Resolution of the European Council. (1997). Resolution of the European Council on the Stability and Growth Pact Amsterdam, 17 June 1997, Official Journal, C 236, Volume 40, 2 August 1997 (resolution is an act without legally binding force) – it is a political commitment of all parties involved in the implementation of the Stability and Growth Pact (Commission, Member States and the Council of the EU) to fully implement the budgetary surveillance process while respecting the set deadlines. 2) EU Council Regulation No. 1466/97 of July 7, 1997, on the strengthening of the surveillance of budgetary positions and the coordination of economic policies – the provisions contained in this regulation are of preventive nature. 3) Council Regulation (EC) No 1467/97 of July 7, 1997, on speeding up and clarifying the implementation of the excessive deficit procedure – the provisions contained in this regulation are of a corrective nature.

the medium-term budgetary objective, which is specific to each member state, is achieved. On the other hand, if the national budget deficit exceeds 3% of GDP or the public debt exceeds 60% of GDP (Treaty values), EU countries will take corrective measures.

In the late 1990s and early 2000s, Europe struggled to maintain its economic and fiscal rules. It was a period of economic stagnation characterised by near-zero economic growth. Budget deficits increased in most countries as a result of automatic stabilisers, and certain countries, such as Portugal and the Netherlands, exceeded the deficit limits set by the Stability and Growth Pact. Inflation exceeded 2% for most of that period, and the European Central Bank was criticised for being slow to cut interest rates. France and Germany, the euro area's largest economies, also exceeded the budget deficit limit during this difficult time (Table 2.1). Despite these problems, the rules of the Stability and Growth Pact continued to apply. However, because of the limitations of monetary and fiscal policies and the difficulties in complying with the Pact, the major euro area countries began to push for greater flexibility and mitigation of its strict rules (Zsolt de Sousa, 2004, pp. 7–8).

Table 2.1. EU Member States' budget deficits from 2000 to 2005

State	2000	2001	2002	2003	2004	2005
Belgium	-0,1	0,2	0,0	-1,9	-0,2	-2,7
Bulgaria	0,1	0,7	-1,1	0,0	1,8	1,6
Czechia	-3,6	-5,8	-6,4	-6,9	-2,4	-3,0
Denmark	1,9	1,1	0,0	-0,1	2,1	5,0
Germany	-1,6	-3,0	-3,9	-3,7	-3,3	-3,3
Estonia	-0,1	0,2	0,4	1,8	2,4	1,1
Ireland	4,9	1,0	-0,5	0,3	1,3	1,6
Greece	-4,1	-5,5	-6,0	-7,8	-8,8	-6,2
Spain	-1,2	-0,5	-0,3	-0,4	-0,1	1,2
France	-1,3	-1,4	-3,2	-4,1	-3,5	-3,5
Croatia	-8,8	-4,6	-4,6	-4,6	-5,7	-3,0
Italy	-2,4	-3,2	-2,9	-3,2	-3,5	-4,1
Cyprus	-2,2	-2,1	-4,1	-5,9	-3,7	-2,2
Latvia	-2,7	-1,9	-2,3	-1,6	-1,2	-0,5
Lithuania	-3,2	-3,5	-1,9	-1,3	-1,4	-0,3
Luxembourg	5,5	5,6	2,0	0,3	-1,4	-0,2
Hungary	-3,0	-4,0	-8,8	-7,2	-6,6	-7,8
Malta	-5,5	-6,1	-5,3	-8,9	-4,2	-2,8

State	2000	2001	2002	2003	2004	2005
Netherlands	1,2	-0,4	-2,0	-3,1	-1,8	-0,5
Austria	-2,4	-0,7	-1,4	-1,8	-4,8	-2,5
Poland	-4,0	-4,7	-4,8	-6,0	-5,0	-3,9
Portugal	-3,2	-4,8	-3,3	-5,7	-6,2	-6,1
Romania	-4,6	-3,5	-1,9	-1,4	-1,1	-0,8
Slovenia	-3,6	-4,5	-2,4	-2,6	-1,9	-1,3
Slovakia	-12,6	-7,2	-8,2	-3,1	-2,3	-2,9
Finland	6,9	5,0	4,1	2,4	2,2	2,7
Sweden	3,1	1,4	-1,4	-1,2	0,2	1,8

Source: (Eurostat, n.d.).

The PSW was reformed in 2005, easing the criteria for assessing whether a country has an excessive deficit and extending the deadlines applicable to this procedure.

During the crisis that began in 2007, the importance of coordinating fiscal and monetary policies increased significantly. The recession was largely the result of mistakes in monetary policy implementation (such as maintaining low interest rates and inadequate supervisory mechanisms) and insufficient restrictiveness of the fiscal policy, mainly manifested in the growing public debt and budget deficits of Member States (e.g., Spain, Greece and Portugal) (Table 2.2). Inadequate coordination between these two policies exacerbated the crisis, as the fiscal policy was characterised by a lack of fiscal discipline and low taxes, which were implemented in parallel with lax monetary policy (Owsiak, 2012, pp. 47–62). During the 2008 crisis, the EC witnessed a reassessment of views on the role of fiscal policy, resulting in a greater emphasis on the coordination of fiscal policy with monetary policy and a turn to Keynesian theories. Corsetti et al. point out that in the event of a recession, a joint monetary and fiscal policy may be necessary to satisfactorily stabilise the economy (Corsetti et al., 2016, pp. 1–29).

In 2011, the “Six-Pack” was adopted, i.e. a legislative package (five regulations and a directive) containing rules that apply to EU countries in and outside the euro area. The EU regulations (Regulation (EU), 2011a, 2011b, 2011c, 2011d, 2011e) apply to EU countries, except for Regulations No. 1173/2011 and No. 1174/2011, which apply to euro area countries. Two of the five regulations, i.e. Regulation No. 1175/2011 and Regulation No. 1177/2011, are at the same time regulations amending the PSW, meaning that they are consequently part of it. On the other hand, according to Council Directive 2011/85/EU of November 8, 2011, on requirements for the fiscal framework of the Member States, the Member States should establish institutions and mechanisms to independently

monitor compliance with fiscal rules, such as limits on the budget deficit or public debt. The Fiscal Council operates as an independent expert and advisory body, acting as a guardian of financial stability by assessing and monitoring the government's fiscal policy.³

Table 2.2. Budget deficit of EU Member States from 2007 to 2011

State	2007	2008	2009	2010	2011
Belgium	0,1	-1,1	-5,4	-4,1	-4,3
Bulgaria	0,0	1,4	-4,4	-3,7	-1,7
Czechia	-0,6	-2,0	-5,4	-4,2	-2,7
Denmark	5,0	3,2	-2,8	-2,7	-2,1
Germany	0,3	-0,1	-3,2	-4,4	-0,9
Estonia	2,7	-2,6	-2,2	0,2	1,1
Ireland	0,3	-7,0	-13,9	-32,1	-13,6
Greece	-6,7	-10,2	-15,2	-11,4	-10,5
Spain	1,9	-4,6	-11,3	-9,5	-9,7
France	-3,0	-3,5	-7,4	-7,2	-5,3
Croatia	-2,1	-2,3	-7,0	-6,7	-7,6
Italy	-1,3	-2,6	-5,1	-4,2	-3,6
Cyprus	3,2	0,9	-5,4	-4,7	-5,7
Latvia	-0,6	-4,3	-9,5	-8,6	-4,3
Lithuania	-0,8	-3,1	-9,1	-6,9	-8,9
Luxembourg	4,4	3,4	-0,2	-0,3	0,7
Hungary	-5,1	-3,8	-4,7	-4,4	-5,2
Malta	-2,0	-4,1	-3,1	-2,2	-3,0
Netherlands	-0,2	0,1	-5,2	-5,3	-4,4
Austria	-1,4	-1,5	-5,3	-4,4	-2,6
Poland	-1,9	-3,6	-7,3	-7,5	-5,0
Portugal	-2,9	-3,7	-9,9	-11,4	-7,7
Romania	-2,8	-5,4	-9,5	-7,1	-5,6
Slovenia	0,0	-1,4	-5,8	-5,6	-6,6
Slovakia	-2,1	-2,5	-8,1	-7,5	-4,3
Finland	5,1	4,2	-2,5	-2,5	-1,0
Sweden	3,3	1,9	-0,9	-0,1	-0,4

Source: (Eurostat, n.d.).

³ In Poland, on 22 October 2024, the Government adopted the draft act on the Fiscal Council and submitted it to the Sejm. The Fiscal Council began carrying out its tasks in 2026, while its members were elected in 2025.

The preventive part (Regulation (EU), 2011e, f) focuses on the achievement and maintenance of medium-term budgetary objectives by Member States. These are set in structural terms, i.e. after adjusting the nominal balance for the impact of the business cycle and after adjusting for one-off and temporary measures. In addition, the objectives are tailored individually to each country, taking into account its economic and budgetary situation in relation to financial stability. In addition, the scope of the information required in the stability and convergence programmes has been broadened. These programmes should also include an analysis of the costs and benefits of significant structural reforms that directly lead to improvements in public finances in the long run. The corrective part (Regulation (EU), 2011f) clarifies and strengthens the rigour of the excessive deficit procedure. If general government debt exceeds the reference value, the debt-to-GDP ratio is considered to be sufficiently diminishing and approaching the reference value at a satisfactory pace if, over the previous three years, its distance from the reference value has been decreasing at an average rate of 1/20 per year, based on the changes over the previous three years for which data are available.

The next step in strengthening the fiscal discipline of the euro area countries and the fiscal surveillance mechanisms was the adoption by the European Commission of two regulations, known as the “Two-Pack”, and the signing of the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union, known as the Fiscal Compact. The regulations (Regulation (EU), 2013a, b) of the “Two-Pack” introduce certain obligations and procedures for all euro area countries, as well as for euro area countries subject to an excessive deficit procedure. The reform also introduces a system of progressive surveillance by the Council and the Commission to ensure timely and sustainable correction of excessive deficits and enable early identification of risks of a Member State not complying with the provisions of the Stability and Growth Pact. The Fiscal Pact introduces the “Budget Pact”, which contains recommendations closely linked to the procedures provided for in Articles 119-144 of the TFEU, Protocol No. 12 to the TFEU, the provisions of the Stability and Growth Pact and the “Six-Pack”. The economic indicators mentioned in the Treaty are also subject to the provisions of the Pact, the “Six-Pack” and the TFEU, which they faithfully reflect.

Furthermore, in 2015, the Commission established the European Fiscal Board (European Commission, 2016), following a recommendation in the Five Presidents’ Report (European Commission, 2017) to create an advisory European Fiscal Board to strengthen the EU’s governance framework by such actions as coordinating and complementing the work of national independent fiscal accountability bodies, and providing independent public assessment of the performance of budgets and their implementation against EU budgetary objectives.

A further change in the coordination of macroeconomic policies, including fiscal policy came in 2024, following the review of the effectiveness of the economic surveillance framework and as a result of economic shocks, including the impact of the combination of reforms and investments under the post-COVID-19 pandemic recovery and resilience instrument.⁴

Table 2.3. EU Member States' budget deficit from 2020 to 2023

State	2020	2021	2022	2023
Belgium	-9,0	-5,4	-3,6	-4,4
Bulgaria	-3,8	-3,9	-2,9	-1,9
Czechia	-5,8	-5,1	-3,2	-3,7
Denmark	0,3	4,1	3,3	3,1
Germany	-4,3	-3,6	-2,5	-2,5
Estonia	-5,4	-2,5	-1,0	-3,4
Ireland	-5,0	-1,5	1,7	1,7
Greece	-9,8	-7,0	-2,5	-1,6
Spain	-10,1	-6,7	-4,7	-3,6
France	-8,9	-6,6	-4,8	-5,5
Croatia	-7,2	-2,5	0,1	-0,7
Italy	-9,4	-8,7	-8,6	-7,4
Cyprus	-5,7	-1,8	2,7	3,1
Latvia	-4,4	-7,2	-4,6	-2,2
Lithuania	-6,5	-1,1	-0,6	-0,8
Luxembourg	-3,4	0,5	-0,3	-1,3
Hungary	-7,6	-7,2	-6,2	-6,7
Malta	-9,4	-7,6	-5,5	-4,9
Netherlands	-3,7	-2,2	-0,1	-0,3
Austria	-8,0	-5,8	-3,3	-2,7
Poland	-6,9	-1,8	-3,4	-5,1
Portugal	-5,8	-2,9	-0,3	1,2
Romania	-9,3	-7,2	-6,3	-6,6
Slovenia	-7,6	-4,6	-3,0	-2,5
Slovakia	-5,3	-5,2	-1,7	-4,9
Finland	-5,6	-2,8	-0,4	-2,7
Sweden	-2,8	0,0	1,2	-0,6

Source: (Eurostat, n.d.).

⁴ https://ec.europa.eu/commission/presscorner/detail/pl/ip_22_6562 (retrieved December 31, 2024).

Table 2.4. General government debt 2020–2023

State	2020	2021	2022	2023
Belgium	111,9	107,9	104,3	105,2
Bulgaria	24,6	23,9	22,6	23,1
Czechia	37,7	42,0	44,2	44,0
Denmark	42,3	36,0	29,8	29,3
Germany	68,8	69,0	66,1	63,6
Estonia	18,6	17,8	18,5	19,6
Ireland	58,1	54,4	44,4	43,7
Greece	207,0	195,0	172,7	161,9
Spain	120,3	116,8	111,6	107,7
France	114,9	113,0	111,9	110,6
Croatia	86,1	77,5	67,8	63,0
Italy	155,0	147,1	140,5	137,3
Cyprus	114,9	99,3	85,6	77,3
Latvia	42,7	44,4	41,8	43,6
Lithuania	46,2	43,4	38,1	38,3
Luxembourg	24,6	24,5	24,7	25,7
Hungary	79,3	76,7	74,1	73,5
Malta	52,2	53,9	51,6	50,4
Netherlands	54,7	51,7	50,1	46,5
Austria	82,9	82,5	78,4	77,8
Poland	57,2	53,6	49,2	49,6
Portugal	134,9	124,5	112,4	99,1
Romania	46,7	48,5	47,5	48,8
Slovenia	79,6	74,4	72,5	69,2
Slovakia	58,8	61,1	57,7	56,0
Finland	:	:	73,5	75,8
Sweden	40,2	36,7	33,2	31,2
Norway	:	:	:	:

Note: : – not available.

Source: (Eurostat, n.d.).

Between 2020 and 2023, Member States faced high budget deficits and public debt. An analysis of Eurostat data (Table 2.3 and Table 2.4) shows that only a small number of countries experienced a downward trend in these indicators, following a sharp deterioration in public finance indicators in 2020 and 2021,

driven by the need to mobilise financial assistance from national funds to rescue Member State economies. It should also be noted that, as of March 2020, a general exit clause of the Stability and Growth Pact was triggered in response to the crisis caused by the COVID-19 pandemic. The temporary relinquishment from the standard budgetary requirements of the Pact allowed Member States to respond flexibly to the exceptional economic circumstances that prevailed at the time. According to the Communication of the European Commission of November 9, 2022, this clause was in force until the end of 2023.

On 23 April 2024, the European Parliament adopted legislation governing the coordination of economic policies, including an overhaul of the EU's fiscal rules to make them simpler, more investment-friendly, better adapted to each country's situation, and more flexible (European Council, 2024a; European Council, 2024b; European Parliament, 2024). These new rules include provisions that grant Member States more freedom in their fiscal policy. In particular, the time to achieve the objectives of the national plans has been extended by three additional years compared to the standard four years. This additional time can be granted for any reason the Council deems appropriate, not only if certain criteria are met, as originally proposed. Countries with excessive debt would be subject to safeguards, requiring them to reduce their debt by an average of 1% per year if this debt exceeds 90% of GDP, and by an average of 0.5% per year if their debt is between 60% and 90% of GDP. These rules are less restrictive than the current requirement that each country reduce its debt by 1/20th of the amount above 60% each year. If a country's deficit exceeds the 3% of GDP threshold, the requirement would be to reduce it to 1.5% during periods of growth to build a spending buffer against difficult economic conditions. As a result of the European Commission's new rules, it will now be more difficult for a Member State to become subject to the excessive deficit procedure if it is making the necessary investments, as any domestic expenditure related to the co-financing of EU-funded programmes will be excluded from the government's expenditure calculations. The legislation requires Member States to clarify in their national plans how they will invest in EU priority areas, such as climate and digital transformation, energy security and defence. The new rules are designed to encourage and facilitate the implementation of key reforms and investments by Member States. When reporting on a Member State's deviation from the expenditure path, the Commission will take the investments already made in the above-mentioned priority areas into account in its assessment, thus giving the Member State the opportunity to make a case for not being subject to the excessive deficit procedure.

For Member States facing serious public debt management challenges, a deviation from the agreed fiscal adjustment path will, in principle, trigger the excessive deficit procedure. The social dimension will also be strengthened

within the European Semester process. The Commission will assess both the implementation of the principles of the European Pillar of Social Rights and the risks to social convergence. Member States must therefore ensure that their national plans also contribute to social objectives.

2.3. The dichotomy in the enforcement of fiscal rules in the EU

The legal order adopted in the EU with respect to the economic governance framework considers the differences among Member States' fiscal situations, public debt and economic challenges. Moreover, it includes a very comprehensive system of economic policy coordination and monitoring. As a rule, the introduction of any fiscal governance reform is preceded by an analysis of the economic situation of individual EU Member States, taking into account current regional and global conditions. It is assumed that any new arrangement should facilitate the process of economic coordination and monitoring, including the pursuit of prudent fiscal policies, aiming at a gradual, realistic, sustainable and growth-friendly reduction of debt and deficit ratios to prudent levels, considering employment and social objectives. However, an analysis of the fiscal policy coordination reforms introduced from the adoption of the Stability and Growth Pact until 2024 shows that some tension exists between the theoretical assumptions of the fiscal policy coordination rules introduced at the EU level and the practical implementation of these rules. Facilitating the application of economic policy coordination mechanisms in practice means making the solutions introduced by the EU more difficult and complicated. This aspect of the dichotomy is also pointed out by Dermine. The thematic scope of economic policy coordination mechanisms has been expanded to include key fiscal variables such as public debt, deficit, structural balance, or expenditure levels. This allows EU institutions to analyse and challenge all relevant factors shaping national fiscal systems. The procedures and mechanisms supporting the system have been significantly expanded and improved, resulting in a more intensive, intrusive and restrictive surveillance model. The euro area countries are now subject to a rigorous regime of reporting requirements, monitoring procedures and review mechanisms, resulting in constant interaction with EU institutions, as well as systematic assessment and scrutiny of their fiscal policies. On the one hand, the complex procedural architecture underlying today's EU fiscal governance system provides national authorities with a robust and flexible framework for the conduct of fiscal policy; on the other, it requires countries to continuously provide justifications for the selecting and using particular instruments over others to implement these

policies. Fiscal surveillance in the post-crisis era is characterised by an even more difficult approach to enforcement and compliance (Dermine, 2022, p. 8). As pointed out in the European Commission Communication, November 9 2022, “the established economic governance framework did not sufficiently allow for differential treatment of Member States, despite their different fiscal situations” (European Commission, 2022).

The problem of the dichotomy in enforcing responsible fiscal policies in Member States can be observed in several dimensions:

1. **Rigidity vs. flexibility of fiscal rules.** The fiscal rules established by EU institutions contain clauses permitting certain expenditures to be excluded, their amount to be reduced for the purpose of assessing budget deficit and public debt indicators, or temporarily suspended in exceptional situations, such as in the event of a severe economic crisis (e.g., COVID-19). Such flexibility, to the extent that it allows for crisis response, has been criticised as undermining its effectiveness and consistency of enforcement.
2. **National interest vs. community interest.** Member States frequently prioritise their own economic agendas over collective rules, leading to divergent perceptions of national and EU objectives. Member States often prefer pro-cyclical fiscal policies and thus do not take advantage of periods of economic prosperity to build up fiscal buffers. Such behaviour is related to political economy, the competence of policymakers and a number of political factors that can impede good fiscal policy (Balassone & Franco, 2001). Furthermore, the enforcement of these fiscal rules can sometimes be selective, exacerbating tensions between countries that favour strict fiscal discipline and countries that are more likely to break the rules due to higher fiscal needs.
3. **Accountability vs. solidarity.** This dimension is related to the previous one. The established framework for economic governance, including the coordination of Member States’ fiscal policies, is based on Member States’ responsibility for their public finances. At the same time, the EU implements the principle of solidarity, which forms the basis for cooperation between Member States and their joint action and support. In practice, the principle of solidarity means expressing the willingness to help each other in crisis situations, to pursue EU goals together and to take into account the interests of other Member States, e.g., in the form of aid funds or post-crisis reconstruction programmes. At times, Member States may take advantage of this principle, as it can encourage greater indebtedness in the expectation of community support at a later date.
4. **Technocratic nature of rules vs. political decisions.** EU fiscal rules are formulated in a technocratic manner and are based on precise mathematical

criteria. In contrast, decisions addressed to Member States, such as the existence of an excessive deficit, depend on political decisions, which often lead to conflicts and different interpretations in the European Council and the European Commission.

5. Normative assumptions vs. practice. While fiscal rules have been introduced in EU legislation to maintain fiscal stability and cap public deficits (up to 3% of GDP) and public debt (up to 60% of GDP), in practice, many Member States do not comply with these rules (Tables 2.1, 2.2, 2.3 and 2.4). Governments frequently fail to meet the established criteria, while sanctions for non-compliance are rarely applied or prove ineffective. The normative assumptions of fiscal policy coordination in the EU, arising from the difference between the declared and actual need for Member States to enforce fiscal rules, also involve the application of so-called hard law and soft law (Chrostek, 2022, pp. 183–208; Trubek et al., 2005, pp. 1–34). Hard EU law includes binding rules such as treaties, regulations and directives, while soft law includes non-binding instruments such as recommendations, opinions and guidelines (Treaty, 2012, Art. 288, 2012). The current system of fiscal governance in the euro area is based on hard law instruments (e.g., TFEU, regulations). According to various treaty procedures, the European institutions, starting with the Council of the EU, are competent to adopt decisions, i.e. acts that have explicit binding legal effects on their addressees (Treaty, 2012, Art. 288, § 4). However, as regards the most relevant elements of this regulatory system, the instructions which the EU addressed to national fiscal authorities are often contained in legal acts that are considered soft law, e.g. opinions addressed by the Commission to a Member State when an assessment of the budgetary situation and the level of government debt shows that an excessive deficit exists or may occur (Treaty, 2012, Art. 126, § 5), or recommendations: if the Council concludes that an excessive deficit exists, it shall, upon a recommendation from the Commission, adopt without undue delay recommendations addressed to the Member State concerned to submit its information on corrective instruments (Treaty, 2012, Art. 126, § 7).

Fiscal policy coordination is therefore based on cooperation and mutual trust that the guidelines provided by the EU institutions through these instruments will be consistently followed at the national level. However, do Member States actually implement the guidelines and recommendations addressed to them by the European institutions? Data from the European Commission show (Table 2.5) that a total of 3818 recommendations were issued under the European Semester procedure in the period of 2020–2023, of which 1190 were related to

the fiscal framework and fiscal management. Only 5% of all recommendations were fully implemented, while 12% of country-specific recommendations were implemented in the case of fiscal frameworks. Some progress was made in implementing 40% of the recommendations, of which 25% were related to the fiscal framework.

Table 2.5. Recommendations to Member States under the European Semester 2020–2023

Specification	CSR No Longer Relevant	Full Implementation	Limited Progress	No Progress	Not Assessed / No Input to Add	Some Progress	Substantial Progress	No data
Number of recommendations – total 3818	286	193	933	125	110	1526	430	215
Percentage of implementation – total (%)	7	5	24	3	3	40	11	6
Number of recommendations – fiscal framework 1190	179	148	134	54	94	293	172	116
Percentage of implementation – fiscal Framework (%)	15	12	11	5	8	25	14	10

Source: based on European Commission, Country-specific recommendations database, https://ec.europa.eu/economy_finance/country-specific-recommendations-database/ (accessed 03.01.2025).

Reflecting on the use of soft and hard law in the area of fiscal policy coordination in the EU, Trubek et al. indicate the reasons why soft law is used for fiscal policy coordination in the EU. These reasons include reducing the costs of negotiation, as soft law reduces the degree of commitment, delegation and/or precision, thus allowing for cooperative agreements. Furthermore, it fosters compromise, since soft law can accommodate divergent national circumstances through flexible implementation. This in turn helps countries deal with the domestic political and economic consequences of an agreement. Finally, it lays the groundwork for hard law, meaning that soft law can be seen as a precursor to hard law. Soft law can also eventually evolve into binding rules when uncertainty is reduced and there is a higher degree of consensus (Chikin, 2000; Hillgenberg, 1999, pp. 499–515; Lipson, 1991; Reinicke, 2000; Trubek et al., 2005, pp. 11–12).

Conclusions

The scale and accelerating pace of global economic and political change, which poses a range of risks to the economic and social order of the world, countries and regions, make economic and financial security increasingly important. Ensuring the sustainability of public finances embodies the principles that governments should adhere to, regardless of the current level of debt. Controlling public debt and its issuance when necessary is of paramount importance for the smooth functioning of the economy. The Economic and Monetary Union project established a mechanism for coordinating fiscal policies in the European Union. The project has been modified since 2005 in response to regional and global challenges. A key element in the effectiveness of rule-based fiscal policy is not only the proper design of the rule system but also the establishment of a mechanism to ensure compliance. An effective and comprehensive system of fiscal surveillance should include widespread and unavoidable sanctions, prompt and reliable procedures for their application, and reliable reporting. This is true at both the national and supranational levels. It is crucial to harmonise EU rules with national standards. However, the full implementation of national standards requires prior compliance with EU legislation. There is a certain discrepancy between the theoretical assumptions of the established principles of fiscal policy coordination at the EU level and the practical implementation of these rules. The problematic dichotomy in the enforcement of responsible fiscal policies in EU Member States can be seen in five dimensions:

- Firstly, EU fiscal rules combine rigour with flexibility to respond to crises but are sometimes criticised for undermining effectiveness.
- Secondly, national interests often take precedence over community interests, leading to tensions between proponents of fiscal discipline and rule-breaking countries.
- Thirdly, the principle of solidarity, while promoting cooperation and assistance in crises, can be used to justify debt.
- Fourthly, the technocratic nature of fiscal rules sometimes contradicts political choices, leading to conflicts of interpretation.
- Fifthly, normative assumptions are often poorly implemented in practice, as illustrated by the European Commission's data: only 12% of the 2020–2023 fiscal frameworks recommendations have been fully implemented.

The use of soft law facilitates negotiation and implementation but can act as a precursor to more binding rules. Ultimately, while fiscal policy coordination in the EU requires mutual trust, practice reveals gaps in the implementation of the recommendations.

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3. Can debt mutualisation make the euro area more resilient? An overview of proposals for common safe asset creation

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Abstract: Could common safe assets make the euro area less fragile? This chapter reviews proposals developed after the global financial and sovereign-debt crises, including Eurobonds, blue-red bonds, sovereign bond-backed securities, E-bonds and debt issued by a euro-area budget. The comparison considers guarantee structures, moral hazard, institutional demands, Treaty constraints and political feasibility. Common euro-area safe assets are shown to offer external and internal benefits: a stronger international role for the euro, relief for global safe-asset scarcity, weaker sovereign-bank feedback loops, smoother monetary transmission and deeper financial integration. No design, however, eliminates trade-offs between credibility, risk sharing, incentives and legal complexity. The chapter suggests that debt mutualisation remains difficult, yet renewed geopolitical uncertainty and questions about the dollar dominance may again make the issue central.

Keywords: safe assets, Economic and Monetary Union, public debt, debt mutualisation.

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Introduction

A safe asset is a simple debt instrument that provides investors with the promise of retaining its value during adverse economic events (Caballero et al., 2017). Generally, safe assets are low-risk investments that guarantee a fixed value of money without the default risk of the issuer. Safe assets are characterised by their high liquidity and limited inflationary and idiosyncratic risk (Bogołębska et al., 2024, pp. 4–7). The ability of a country to serve as a source of safe assets depends primarily on the fiscal capacity of its sovereign, which determines its ability to service its obligations. The limitations of the fiscal capacity are best described by the ‘Laffer curve’, according to which, after reaching a special threshold, a further increase in public debt translates into a loss of a safe issuer status (Schuknecht, 2018). Moreover, the commitment of the central bank to maintain the price and exchange rate stability is a crucial determinant for a public debt instrument to be named a safe asset.

Economists continue to debate whether the private sector can also produce safe assets (Gorton, 2016; Kacperczyk et al., 2021, pp. 495–535). The general consensus is of only partial substitutability of public and private assets, with its scope depending mostly on market conditions, the quality of the issuer, the time horizon of issuance, or the scope of government support to prevent the run on debt. Ultimately, private-label securities lack the simplicity and value-preserving qualities of public debt.

Apart from the division into private and public producers of safe assets, an alternative classification into global and regional providers is used. Although a general consensus is lacking, it is widely acknowledged that the issuers of the ‘big four’ currencies (the United States, the euro area, Japan, and Great Britain) are global safe asset providers (Aizenman et al., 2019). Thus, a global provider of safe assets is compatible with an international currency issuer (Bogołębska et al., 2019, pp. 65–81). However, the fragmented markets of sovereign debt within the EMU mean that it does not fully seize the opportunities the common monetary area creates. In addition, market participants’ perceptions concerning the relative risks of sovereign bonds change over time (Bletzinger et al., 2022). It is often pointed out that the EMU lacks euro-denominated safe assets when compared to US (Brunnermeier et al., 2011, pp. 1–4; Brunnermeier et al., 2018; Gorton et al., 2012, pp. 101–106).

The project of transforming the euro area into real global safe asset provider is unprecedented, since it will be the first example of producing such assets within the monetary union, with its own currency already highly internationalised. There is a broad consensus that a common safe asset would benefit the

euro area in a number of ways. The potential benefits overlap and are mutually reinforcing. Furthermore, they can be analysed from two complementary perspectives – external (global) and internal (intra-union) views (Bogołębska et al., 2022).

3.1. Benefits from the common safe assets – global perspective

A common safe asset within the EMU should yield benefits in the international field, mainly by influencing the international monetary system. First of all, the greater attractiveness of the euro as a reserve currency would strengthen its international role. Due to the concept of network externalities, using the currency in its reserve function should be followed by other functions of international currency. The ability of the EMU to produce safe public debt instruments can stimulate demand for them because of the many functions' safe assets perform: as collateral in financial market transactions, a store of value, a benchmark for price formations, hedging and valuing riskier assets, for solvency and liquidity regulations, to name the most important ones (see more: Bogołębska et al., 2024, p. 6). Ongoing processes of foreign reserves diversification in the global economy will surely enhance demand for euro-denominated debt stemming from central banks. These processes may be triggered by financial sanctions, geopolitical tensions, fear about the sustainability of US debt, and phenomena stimulating the de-dollarisation trends. Furthermore, by hampering international cooperation, ongoing geoeconomic fragmentation (GEF) can weaken the capacity of the Global Financial Safety Net (GFSN) to support crisis countries and complicate the resolution of future sovereign debt crises (Aiyar et al., 2023).

The development of a common safe asset within EMU can, in effect, translate into the determination of the euro's exchange rate. Jiang et al. (2021) analysed the effects of the supply of dollar safe assets on the nominal dollar exchange rate. With safe asset suppliers, who experience capital inflows in periods of heightened market stress, the currency is subject to appreciation pressures, which may prove troublesome for domestic monetary policy. Thus, the emergence of a similar channel can be anticipated in the case of the euro.

It is commonly highlighted that adding a new global safe asset to the current stock can contribute to curtailing the global shortage of safe assets. This phenomenon, although not unanimously perceived in the literature, is found to result from both a decrease in their supply and an increase in demand (Bo-

gołębska et al., 2024). Among the factors that contributed to decreased supply, the limited capacity of reserve currency issuing countries to provide public debt should be noted. However, as GEF may translate into more severe crises (given lower international risk sharing, higher financing costs, reduced scope for coordination across countries), in effect, a risk of increased, self-defeating competition for scarce safe assets arises (Aiyar et al., 2023). Adding a new category of global safe assets to the international monetary system could make it more symmetrical. Re-channelling the destabilising flight-to-safety capital flows to a larger number of safe asset providers can help create a stable global financial architecture.

Within the discussion on the global scarcity of safe assets and its effects on the real economy, the literature points out that an increase in the supply of safe assets affects safe real interest rates. Ferreira and Shousha (2021), using a cross-country model with many economic drivers for the neutral rates (real rates consistent with both economic activity and inflation at their trends) of 11 advanced countries, find that changes in the net supply of safe assets account for a third of the variance of these rates since the 1960s. They estimate that a larger net safe asset supply between the 2008 financial crisis and the first half of 2020 raised neutral real rates by nearly 1.5 percentage points. The role of safe asset supply in global interest rates determination verifies the prediction that in financially open economies interest rates are determined by global market forces, and global co-movements of neutral rates can be explained by global spillovers. Thus, the power to influence global neutral rates reveals another dimension of the consequences of safe assets in the euro area.

However, as Arslanalp and Eichengreen (2023) reiterate, the relationship between issuance and downgrades for present purposes, between additional issuance and loss of safe-asset status, is nonlinear: high-quality issuers can continue to issue safe assets until their safe-asset status is abruptly lost. In fact, additional public debt issuance does not necessarily translate into alleviating the global safe asset shortage, especially in an environment of higher interest rates. This poses challenges for prompt and reliable debt-service payments, and also means that the current episode of public debt does not guarantee that the EMU's public debt assets are perceived as safe on a permanent basis.

Creating the mechanisms of debt mutualisation can also enhance the credibility of the euro area in the eyes of international investors, all of which should bolster efforts to enhance Europe's self-sufficiency and independence. Creating a common safe asset could be a further step to a higher level of integration, namely a political union, and render the euro area more stable.

3.2. Benefits from the common safe assets – monetary union's perspective

The benefits of common EU safe assets can be grouped with respect to categories of beneficiaries, economic sectors, or some aggregates. Firstly, there should be benefits for the banking system. As a euro area safe asset should reduce the interdependence between sovereigns and domestic banking sectors, by diversifying away from national sovereign bonds, the banking sector automatically reduces its home bias and becomes less dependent on the position of the sovereign. The interconnectedness of debt and banking sector problems is best illustrated by the sovereign-bank nexus, also referred to as the 'diabolical loop', and was particularly detrimental during the euro-area sovereign debt crisis, transmitting sovereign distress to the real economy. If sovereign debt loses value due to the deterioration of the creditworthiness of the public sector, the financial sector balance sheet worsens as a consequence of its high exposure to domestic public debt. Weak bank balance sheets, in turn, lead governments to execute bailouts, increasing government spending and further worsening their fiscal position (Bogołębska et al., 2024, p. 123). Additionally, when adapting a common debt instrument, the bank receives the high-quality collateral needed to secure wholesale funding and central bank liquidity (Bini Smaghi & Marcussen, 2019). It might also prove useful to the sovereign in solving banking crises. Crises in the EMU would be far less damaging if banks held liquid euro-denominated assets not sensitive to sovereign risk (Zettelmeyer & Leandro, 2018, pp. 1–13).

Secondly, there are benefits for central banking and monetary policy within the EMU. The project should support the effective transmission of monetary policy across all euro area countries by facilitating its 'singleness'. The ECB's conduct of monetary policy during the Global Financial Crisis (henceforth GFC) was largely impaired by financial fragmentation in the EMU along the national lines of creditworthiness and the resulting divergent sovereign bond yields. A common debt instrument should ensure the smooth transmission of ECB monetary policy through the sovereign bond markets to the borrowing costs of households and businesses, and ultimately to aggregate demand (Spurga & Šreiberytė, 2021).

Thirdly, a liquid market for a euro safe asset should foster financial development and integration in the EMU, accelerating progress toward banking and capital market unions. (Alogoskoufis et al., 2020). This may happen by:

- facilitating both the diversification and de-risking of banks' sovereign portfolios,

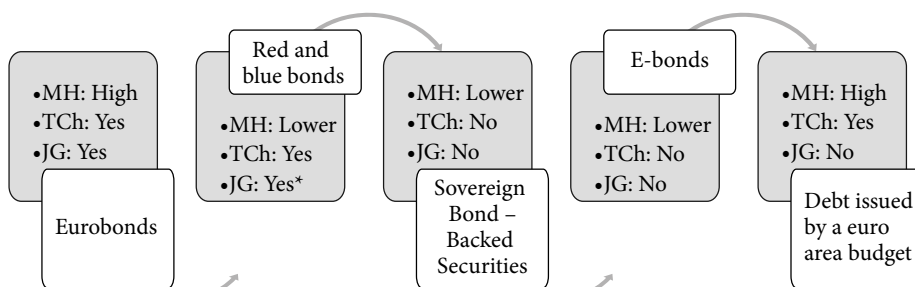
- introducing an additional financial instrument with a different risk-return profile, allowing markets to develop a proper euro area term structure,¹
- supporting the development of a single securities market in the EU.

The financial stability benefits of gradually neutering the sovereign-bank loop would resolve the political impasse delaying the banking union (Braun, 2018).

A common safe asset should also foster financial stability in the euro area by eliminating or reducing the problem of destabilising capital flight from vulnerable countries to safe havens (e.g., German bunds) in times of distress. Despite the fact no exchange rate risk existing inside the EMU, the bloc suffered flight-to-safety capital flows from its peripheral countries to a few core countries. On the microlevel benefits, a euro-area safe asset should benefit European citizens by funding common projects aimed at addressing the challenges of green and digital transitions.

3.3. An insight into various proposals

Since the GFC, numerous proposals for creating a euro-area safe asset have flourished. These vary in terms of the guarantee structure for a joint debt instrument, the risk of moral hazard entailed and the options to address it, and the need to introduce changes to the Treaty on the Functioning of the European Union (henceforth Treaty). The proposals of creating a common euro safe asset backed by full or partial guarantees by Member States (MS) have one main drawback – they may imply that more creditworthy issuers would pay for risks created by less creditworthy ones. For this reason, the search evolved into solutions without requiring any state guarantees, towards a ‘synthetic asset’ (Figure 3.1).



Notes: MH – Moral Hazard, TCh – Treaty Changes, JG – Joint Guarantee, *partial.

Figure 3.1. Euro-area safe asset proposals

Source: based on the cited literature.

¹ More about decreasing the flight to safety occurrence and its magnitude in sovereign bond markets in the article by Janus (2023).

3.3.1. Eurobonds (Eurobond 1, Eurobond 2)

The conceptual baseline for “Eurobonds” emerged at the height of the sovereign debt crisis, focusing on a framework where all Eurozone member states would become collectively liable for the total pool of issued debt (Bonnevay, 2010; De Grauwe & Moesen, 2009, pp. 1–4).

The Eurobond 1 proposal was the most radical in terms of creating a ‘genuine’ euro-area safe asset, while at the same time, entailing the greatest risk of moral hazard. The concept envisaged several and joint guarantee structure of common debt, implying a pooling of credit risk. In other words, it made each guaranteeing MS liable for the share of any other MS, should the latter fail to honour its obligations (Spurga & Šreiberytė, 2021). The issuance of Eurobonds 1 based on a joint and several guarantee structure would violate Article 125 of the Treaty (the no bailout clause). Hence, this proposal of debt mutualisation would require Treaty changes.

As a more pragmatic alternative, the Eurobond 2 proposal envisioned the creation of a common debt instrument under several but not joint guarantees, meaning that each MS would be liable for its share of the bond (the interest payments and principal redemption). Such a share would be fixed, reflecting, e.g., the ECB capital key. The amount of funding secured would match the same weights as those applied in the guarantee structure. As such, from an investor’s perspective, Eurobond 2 would resemble a diversified portfolio composed of national EMU sovereign bonds. In effect, the credit rating of the new debt instrument would be close to a weighted average granted to the individual MS. This stands in contrast to the Eurobond 1 proposal, for which expected benefits include a decrease in borrowing costs for participating MS. Eurobond 2 would still present some moral hazard challenges, though significantly lower than those associated with Eurobond 1. At the same time, because the proposal did not envisage joint liability, no changes to the Treaty would be required, rendering this proposal more easily deployable.

3.3.2. Red and blue bonds

The Eurobond 1 proposal involves a complete substitution of national issuance. A modification of this proposal (known as the blue-red approach) was brought forward by Delpla and Weizsäcker (2011). It assumed only a partial replacement of the national issuance. More specifically, the authors proposed the issuance of two types of bonds: blue and red ones. The former would be low-risk, high-credit-rating bonds. They would finance each country’s debt up

to 60% of GDP (according to the concept of debt sustainability as reflected by the Maastricht convergence criteria). These blue bonds would be jointly and severally guaranteed. As such, they would constitute 'true' EMU safe assets. On the other hand, their launch would inevitably require Treaty changes. In contrast, the red bonds (any debt issued beyond the 60% threshold) would be riskier for potential investors and would be guaranteed only by the national issuer.

3.3.3. Sovereign Bond-Backed Securities

The concept of Sovereign Bond-Backed Securities (SBBS) was advanced by Brunnermeier et al. (2016), evolved from the idea of tranching, originally proposed by Beck et al. (2011) and Brunnermeier et al. (2011). Beck et al. (2011) proposed a European security backed by a basket of sovereign bonds based on the ECB capital key weights (which reflect the relative size of nominal GDP and population) – in effect, a single tranche SBBS. Similarly, Brunnermeier et al. (2011) proposed the creation of European Safe Bond ('ESBies') based on a combination of diversification and tranching. The idea of "single-tranche SBBS" has the distinct advantage of not requiring any new institutions for financial intermediaries. However, Zettelmeyer and Leandro (2018) argue that 'pure diversification' proposals (or single-tranche SBBS) only modestly enhance the protection of the median euro area bank against sovereign risk.

The concept of SBBS was found to be feasible and developed by the European Systemic Risk Board (ESRB, 2018). Consequently, the European Union Commission proposed the necessary regulatory changes to facilitate the development of the SBBS market as a means of fostering financial integration (European Commission, 2018). The general idea was to use financial engineering overcome joint guarantees, the main political obstacle to Eurobonds (Gabor & Vestergaard, 2018). In essence, an issuer of these assets, being a private or a public intermediary (financial institution such as the European Investment Bank), would purchase a diversified portfolio of euro-denominated sovereign bonds (according to fixed shares, like those in the ECB's capital) and would subsequently use them as collateral to issue its own securities, a process comparable to a securitisation operation.

The project envisages two tranches – a senior one (the senior SBBS tranche) and a junior one (the junior SBBS tranche). As Brunnermeier and Huang (2018) put it metaphorically, 'tranching is like building a second, stronger line of defence within a fort'.

The senior SBBS tranche would be protected against losses of up to 30% on the underlying bond portfolio, rendering it a euro area safe asset. The junior SBBS

tranche would bear greater risk. The creation of SBBS should help delink banks from their sovereigns (thus eliminating the ‘diabolical loop’) and curtail destabilising capital flows among the euro area. This is because, in times of heightened market stress, capital would flow from more to less risky asset classes (i.e. from junior SBBS to senior SBBS) rather than from countries with worse macroeconomic foundations to EMU safe havens (core versus periphery division).

The SBB proposal entails no joint liability nor fiscal transfers, hence no amendments to the Treaty would be required. Instead, sovereign bonds with different risk profiles (e.g., German and Greek) would be bundled together to generate a safe asset via market process. Furthermore, the risk of moral hazard is relatively low (as compared to Eurobond 1), since each MS remains fully responsible for managing its debt and providing for its own credit spreads. Beyond protecting against a variety of risks (including correlated defaults), this proposal has other merits:

- SBBS could deliver a relatively large volume of safe assets while maintaining liquid national bond markets,
- would not lead to redistribution across countries.

3.3.4. E-bonds

The concept of E-bonds (Monti, 2010; Leandro and Zettelmeyer, 2018a,b) combines some features of ESBies and SBBS proposals. E-bonds involve neither tranching nor public capital. Instead, the framework provides for an intermediary who would hold a portfolio of government debt and issue securities – E-bonds, backed by this portfolio. Because E-bonds would be issued in a single tranche, the riskiness would depend on the share of each sovereign’s debt that the intermediary holds (Zettelmeyer & Leandro, 2018, pp. 1–13).

3.3.5. Debt issued by a euro area budget

The main drawback of this proposal would be the necessity to establish new institutions or euro area Sovereign Wealth Funds, and a suitable accountability structure (Zettelmeyer & Leandro, 2018, pp. 1–13). Alternatively, Ubide (2015) argues that the optimal solution would be to create supranational bonds issued by a euro area budget. Debt service could be financed by allocating tax revenue (value-added tax or corporate tax) to the budget or through contributions from Member States. The required safety would be achieved through the commitment

that the common budget has priority access to revenues over national budgets. In practice, this would mean that a Member State would first be obliged to pay its designated contribution to the euro area budget before it could use the tax revenue to service national debts. The main advantage of this proposal lies in its diversification of revenue streams.

Conclusions

The mutualisation of eurozone debt is a politically complex and economically demanding issue. After the GFC, sovereign debt crisis, and COVID-19 pandemic, the EMU was forced to move from national borrowing to new hybrid models of debt creation, such as common safe assets and Eurobonds. These common safe assets offer numerous benefits: reducing debt levels, boosting public finance sustainability, and strengthening the attractiveness of the euro. While many alternative proposals have evolved to mitigate the main shortcomings, these proposals differ in significant areas: the safety of safe assets produced, particularly in times of market turmoil, the mechanisms of production (guarantees, tranching, and pooling, new institutions involved), their impact on sovereign borrowing costs, and their different risk-mitigating capabilities. Because no single proposal is free of drawbacks, there is still no consensus on the proper design of the safe asset. However, SBBS have recently been proposed by the European institutions for potentially addressing safe asset shortages and excessive bank-sovereign linkages in the euro area.

For the time being, the debate on concept of public debt mutualisation within the EMU has cooled. This seems to be attributable to other issues dominating the EU integration agenda: global challenges such as military spending, green and digital transformation, and post-COVID-19 recovery, which involved fiscal expansions at the national level. However, the risk of rising geo-economic tensions stemming from the Trump presidency and uncertainty surrounding the future of the dollar in the international monetary system will reignite interest in this issue.

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4. Governance quality and investment attractiveness: Empirical evidence from OECD countries

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Abstract: Institutional quality becomes the lens through which this chapter studies investment attractiveness across OECD countries. Using Worldwide Governance Indicators for 2004–2023, the authors construct a synthetic governance-quality index, apply hierarchical clustering, compare EU and non-EU OECD members to link governance dimensions with inward FDI stock as a share of GDP. Scandinavian and selected Western European economies occupy the strongest positions, whereas Colombia, Mexico and Türkiye show the weakest scores. EU members within the OECD display less dispersion, suggesting that integration may foster institutional cohesion. Overall, governance quality and all six WGI dimensions are positively associated with investment attractiveness, with some variation between EU and non-EU groups. The chapter underlines that transparent, effective and accountable institutions remain decisive for attracting foreign capital.

Keywords: governance quality, investment attractiveness, FDI, OECD countries.

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Introduction

Over the past few decades, FDI worldwide has increased significantly. Average annual global FDI inflow rose from approximately 992.8 bln USD between 2000 and 2004 to about 2043.9 bln USD between 2015 and 2019, representing an increase of around 106% (Bothner, 2024). In 2020, the COVID-19 pandemic caused an unprecedented collapse in global FDI (886.2 bln USD), which reached volumes of 1834.5 bln USD and 1466.6 bln USD in the following two years. In 2023, FDI flows decreased to 1364.2 bln USD, continuing a downward trend and staying below levels recorded before the pandemic for the second year in a row (OECD Statistics, 2025). According to IMF data and the IMF's Coordinated Direct Investment Survey, which provides detailed information on direct investment positions between countries, FDI between advanced economies grew by 880 bln USD (3.6%). In contrast, those from advanced economies to emerging markets and developing economies rose by 538 bln USD (7.6%) (IMF, 2025).

High-income countries continue to receive the largest share of global FDI; however, their dominance is decreasing, e.g. the share of non-OECD economies in global capital inflows surpassed that of OECD economies for the first time in 2012 (Dellis, 2024). Nevertheless, when considering FDI inflows from 2010 to 2022, the top 10 host countries still mainly consist of developed economies, including seven OECD members (Figure 4.1).

Capital flows, particularly in the form of FDI, are crucial for the economy, as they influence GDP and exports, indirectly contributing to job creation, and supporting local market development (Chipalkatti et al., 2021). FDI can accelerate economic growth (Emako, 2022; Paul & Feliciano-Cestero, 2021), although some studies show that the relationships between FDI and economic growth are far from stable (Bénétrix et al., 2023). The final effects depend on the domestic conditions of the host country, e.g., human capital, economic and technological conditions, degree of openness of its economy (Forte & Moura, 2013), economic stability (Alguacil et al., 2011), development of financial markets (Alfaro & Chauvin, 2020), and better-developed institutions (Baiaashvili & Gattini, 2020). Institutional factors positively mediate the relationship between FDI and economic growth within different country income groups. Specifically, countries with better-developed institutions than their income group counterparts experience a significantly positive impact of FDI on growth.

To attract FDI, a country should strive to improve the investment climate. Traditional location advantages, such as low labour costs and the availability of raw materials, remain important; however, the country's credibility, political and economic stability, and effective tax policy and legal regulations significantly

determine its investment attractiveness. All these factors create what is known as *good governance*, which ensures transparency in the operation of institutions, increases their efficiency, supports the economy's competitiveness, and builds trust among entrepreneurs. Governance is the responsible, accountable, and transparent exercising of power, based on the principles of efficiency, legitimacy, and consensus (Munshi, 2004, p. 51).

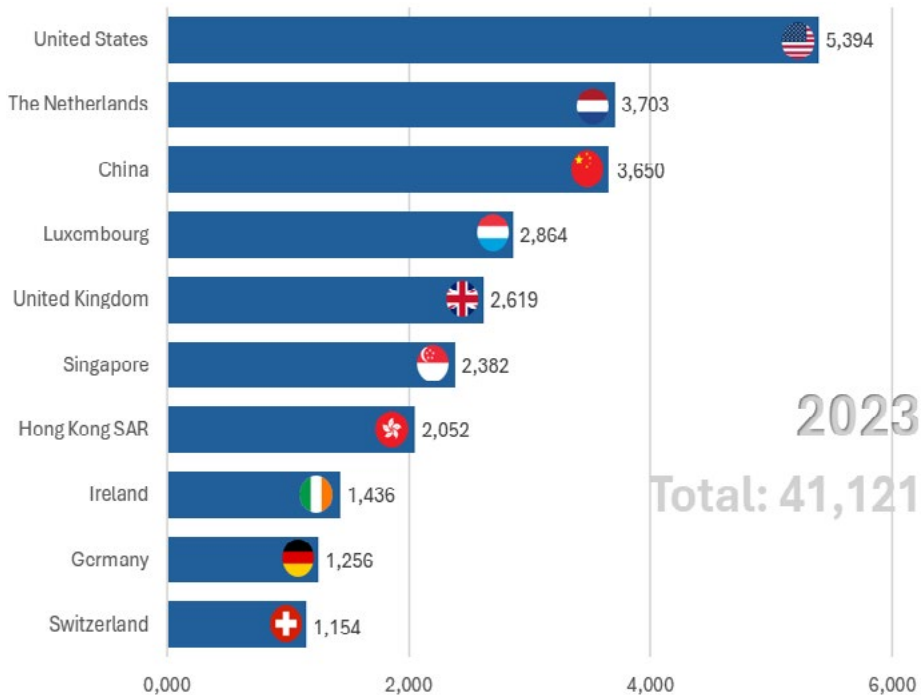


Figure 4.1. Top 10 FDI recipients (2010–2022; bln of USD)

Source: (IMF, 2025).

Many authors equate governance with institutional quality (Huther & Shah, 1999; Kaufmann et al., 2003; Zhuang et al., 2010), with institutional quality measures reflecting the quality of governance and institutions in a country. According to Kaufmann et al. (1999, p. 1), governance is “the traditions and institutions by which the authority in a country is exercised.” Kaufmann and Kraay (2007) use the terms “governance”, “institutions”, and “institutional quality” interchangeably throughout their discussion.

The relevance of good governance is considered an element of the investment attractiveness of a country, and numerous empirical studies have demonstrat-

ed that countries with strong institutions attract more FDI (Belfqi et al., 2021; Buchanan et al., 2012; Dobrowolska et al., 2020, 2021, 2023; Dorożyński et al., 2024; Globerman & Shapiro, 2002; Hayat, 2019; Jadhav, 2012; Khan et al., 2024; Peres et al., 2018; Sabir et al., 2019; Tabash et al., 2024). Therefore, as North posited, “institutions matter” (North, 1990). Extensive literature shows that strong governance structures marked by political stability, high regulatory quality, and effective control of corruption greatly enhance the inflow of FDI, with an optimal level of institutional development being essential for “the materialization of the growthenhancing effect of FDI” (Yeboua, 2020, p. 2). Many findings support the viewpoint that higher-quality institutions foster the transmission channels from FDI to the host economy via technology transfer or knowledge diffusion, while poor institutional quality results in increased uncertainty (i.e. higher cost of doing business) (Guenichi & Omri, 2024). While most studies focus on the macro scale, some are conducted at the firm level. For example, Haddad and Verriest (2025) indicate that more substantial property rights, better regulatory quality, and more developed financial markets lead to increased investment from MNCs. A stable and business-friendly environment may support spillovers from FDI because it affects the business operating conditions and can potentially determine how efficiently FDI resources are employed (Baiashvili & Gattini, 2020).

On the other hand, some studies find a negative and insignificant relationship between institutional factors and FDI inflows (Nondo et al., 2016; Subasat & Bellos, 2013). Poor institutions act like a tax, raising investment costs and thus impeding foreign investment (Buchanan et al., 2012). This is why governments should carefully “adjust policies and institutions”, otherwise, they may adversely affect not only the size of FDI inflow but “can also be detrimental to economic growth” (van Bon, 2019).

Researchers examining the effect of institutional quality on FDI inflows usually focus on developing, emerging and transition economies (Busse & Hefeker, 2007; Dorożyński & Kuna-Marszałek, 2016; Hossain & Rahman, 2017; Kurul & Yalta, 2017; Wernick et al., 2009), or compare developing and developed countries (Buchanan et al., 2012; Khan et al., 2024; Qureshi et al., 2020; Sabir et al., 2019). Developed countries are rarely examined in this context.

Given this backdrop, the chapter attempts to answer the following questions: Is there any relationship between the quality of governance and FDI inflow? What is the role of governance in stimulating FDI inflows into the OECD, which consists of countries differentiated by their economic development? Which of the six dimensions of governance quality impacts the most FDI inward stock as a per cent of GDP in OECD members? Do EU countries that are members of OECD differ in institutional quality from non-EU OECD countries? This last question is important to our analysis because EU Member States (both “old” and “new”)

have been the focus of our research on multiple occasions (i.e. Dobrowolska et al., 2021, 2023; Dorożyński et al., 2024). Comparing some EU countries with a group of other advanced economies can also offer valuable insights. Moreover, distinguishing this group of countries is related to the book's theme, which focuses on EU countries.

Hence, the principal goal of the chapter is to assess the governance quality in OECD countries and to examine the relationship between GQ and FDI inward stock as a per cent of GDP. Various statistical methods are used, such as hierarchical cluster analysis, contingency analysis, synthetic index values, and descriptive statistics. We used Worldwide Governance Indicators to assess the QG in the OECD members for 2004–2023. WGI captures the GQ in six dimensions: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. Many researchers commonly use them in institutional analysis as a measure (e.g., Ajide & Raheem, 2016; Khan et al., 2022; Shah & Afridi, 2015).

The choice of OECD countries as an example is motivated by two reasons. Firstly, OECD countries generally have highly effective and inclusive institutions that promote political stability, the rule of law and the mitigation of corruption. These strong institutions might play a vital role in attracting FDI by ensuring regulatory stability, protecting property rights, and enhancing transparency. Strong governance frameworks in OECD countries have contributed to lower perceived risks and increased attractiveness for investors. Secondly, OECD countries attract a substantial share of global FDI inflows. The US, UK, Japan, Germany, and France are among the largest destinations for FDI, reflecting their market size and investment-friendly policies. OECD countries have historically been both significant sources and recipients of FDI, and this dual role has both shaped the economic landscape of member countries and has contributed to global supply chains.

4.1. Governance quality based on the Worldwide Governance Indicators

Governance quality and its components have been assessed for many years by different institutions and international organisations. The most popular measure of GQ based on aggregate data and international comparative studies include rankings published by the World Bank, the European Central Bank, the International Institute for Management Development, and the World Economic Forum. Unfortunately, institutional quality indicators are usually highly correlated

(Buchanan et al., 2012; Globerman & Shapiro, 2002; Ullah & Khan, 2017). To avoid this problem, we used aggregate and individual governance measures, such as the Worldwide Governance Indicators.¹ The WGIs report aggregates and individual governance indicators for over 200 countries and territories over the period 1996–2023 for six dimensions of governance:

1. *Voice and Accountability* captures perceptions of the extent to which a country's citizens can participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
2. *Political Stability and Absence of Violence and Terrorism* measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism;
3. *Government Effectiveness* captures perceptions of the quality of public services, the quality of the civil service, and the degree of its independence from political pressures. It also encompasses the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies;
4. *Regulatory Quality* measures the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and foster private sector development;
5. *Rule of Law* captures perceptions of the extent to which agents have confidence in and abide by the rules of society, in particular, the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence;
6. *Control of Corruption* measures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption and the “capture” of the state by elites and private interests.

These aggregate indicators combine the opinions of numerous enterprises, citizens, and expert survey respondents in developed and developing countries. They are based on over 30 individual data sources comprising various surveys, experts, non-governmental organisations, international organisations, and companies' opinions.²

¹ WGI were initiated by Kaufmann and Kraay in 1999 and developed by Zoido and Mastruzzi.

² These data sources are rescaled and combined to create the six aggregate indicators mentioned above, using a statistical methodology known as an *unobserved components model*. A key feature of the methodology is that it generates margins of error for each governance estimate. These margins of error need to be taken into account when making comparisons across countries and over time (Kaufmann et al., 2010).

4.2. The relationship between the GQ and FDI inflow to the OECD Countries

Based on the findings of studies assessing the quality of governance in the OECD Member States and published in the Worldwide Governance Indicators Reports, in the first step of our analysis we used hierarchical cluster analysis methodology³ to identify countries that represent similar GQ. With Ward's method,⁴ we obtained a dendrogram which shows a hierarchical structure arranged in order of descending similarities between the components in the set (see Figure 4.2).

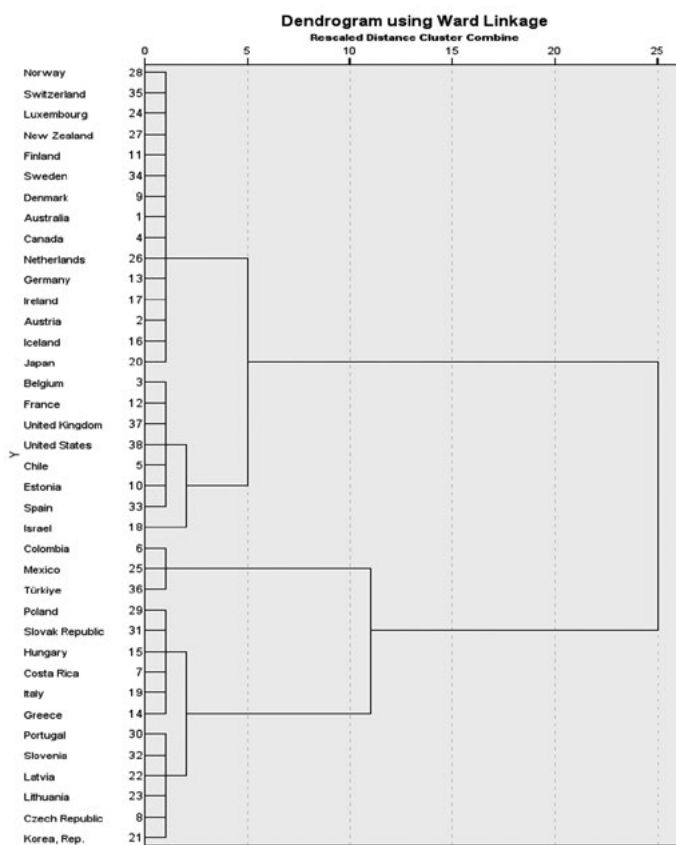


Figure 4.2. Dendrogram for the OECD countries based on Ward's linkage method

Source: own compilation using PS IMAGO.

³ Hierarchical cluster analysis is used to identify homogenous groups of elements based on selected characteristics in a given set of data (Lasek, 2002; James et al., 2014).

⁴ Ward's method is one of the agglomeration methods used in hierarchical cluster analysis.

This allowed us to divide all of the OECD Member States into five groups that represent similar levels of GQ:

- Group 1_{gq}: Norway, Switzerland, Luxembourg, New Zealand, Finland, Sweden, Denmark, the Netherlands, Australia, Canada, Germany, Ireland, Austria, Iceland, Japan;
- Group 2_{gq}: Belgium, France, United Kingdom, United States, Chile, Estonia, Spain, Israel;
- Group 3_{gq}: Colombia, Mexico, Türkiye;
- Group 4_{gq}: Poland, the Slovak Republic, Hungary, Costa Rica, Greece, Italy;
- Group 5_{gq}: Portugal, Slovenia, Latvia, Lithuania, the Czech Republic, the Republic of Korea.

Although hierarchical cluster analysis helped distinguish five groups of countries with similar GQ, it failed to identify which group performs better. Hence, in the second step, we compared the quality of governance among the five groups of countries. We constructed a synthetic index of governance quality for each OECD country based on the data from 2004 to 2023. This measure is the sum of percentile ranks⁵ for the countries published by the WGI for six governance dimensions over the period in question. The overall ranking of the OECD countries based on the synthetic index is presented in Figure 4.3.

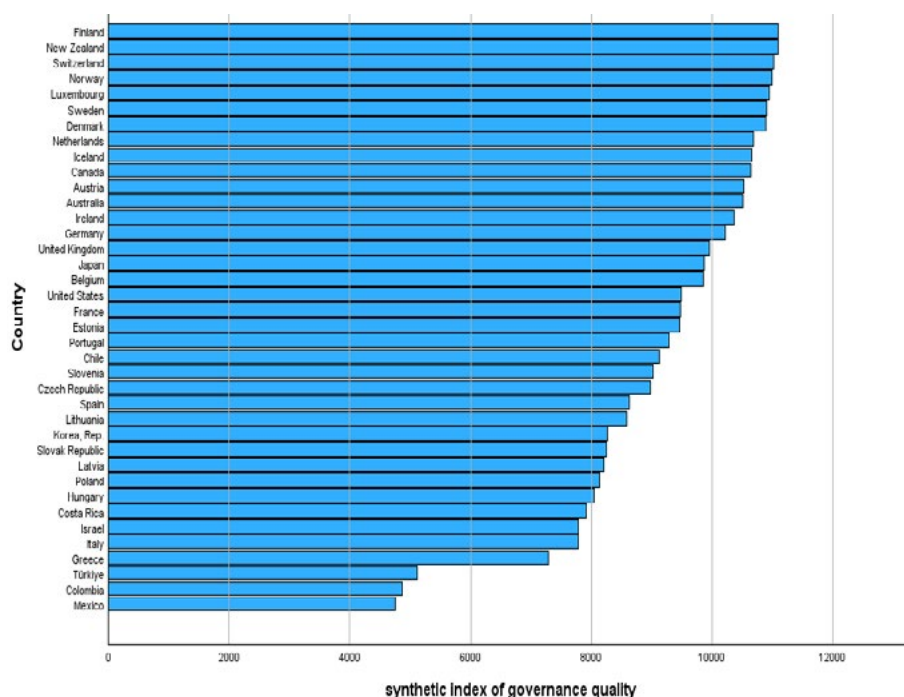


Figure 4.3. Synthetic index of governance quality in OECD countries, 2004–2023

Source: own compilation using PS IMAGO.

⁵ Percentile ranks from 0 (the lowest) to 100 (the highest).

Using the synthetic index of governance quality, we calculated the index's mean value for the five countries groups (see Table 4.1).

Table 4.1. The mean value of the synthetic index of governance quality for the OECD Member States, 2004–2023

Group	Country	Mean of the synthetic index of governance quality
Group 1 _{gq}	Norway, Switzerland, Luxembourg, New Zealand, Finland, Sweden, Denmark, Netherlands, Australia, Canada, Germany, Ireland, Austria, Iceland, Japan	10701.93
Group 2 _{gq}	Belgium, France, United Kingdom, United States, Chile, Estonia, Spain, Israel	9229.12
Group 3 _{gq}	Colombia, Mexico, Turkiye	4908.05
Group 4 _{gq}	Poland, Slovak Republic, Hungary, Costa Rica, Greece, Italy	7907.78
Group 5 _{gq}	Portugal, Slovenia, Latvia, Lithuania, Czech Republic, Republic of Korea	8727.80

Source: own compilation using PS IMAGO.

The ranking revealed that the highest GQ was reported by countries from Group 1_{gq}: Norway, Switzerland, Luxembourg, New Zealand, Finland, Sweden, Denmark, Netherlands, Australia, Canada, Germany, Ireland, Austria, Iceland, and Japan. At the other extreme is Group 3_{gq}: Colombia, Mexico and Turkiye, where investors can expect the lowest governance quality. We also examined the relevance of the six dimensions of GQ. The results are presented in Figures 4.4–4.9 and confirm the institutional quality leadership of New Zealand and North European Countries. Mexico, Colombia and Turkiye rank lowest in five of the six individual categories. The exception is political stability and absence of violence partial ranking, in which Israel is one of the worst. The so-called EU-13 new Member States occupy the second part of the ranking, which implies a significant distance to the governance quality of OECD leaders.

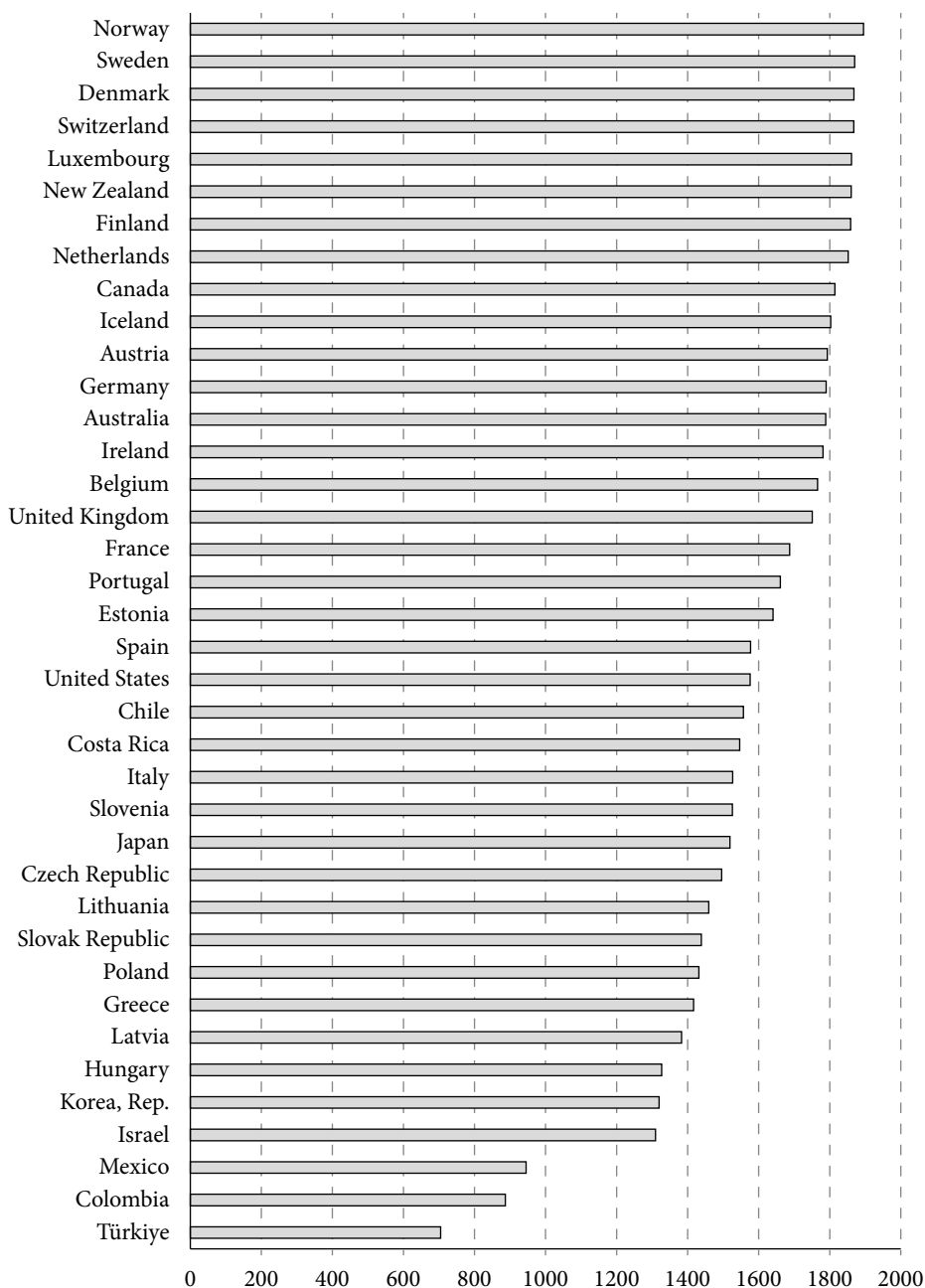


Figure 4.4. SIGQ ranking for a voice and accountability in the OECD countries, 2004–2023

Source: own compilation using PS IMAGO.

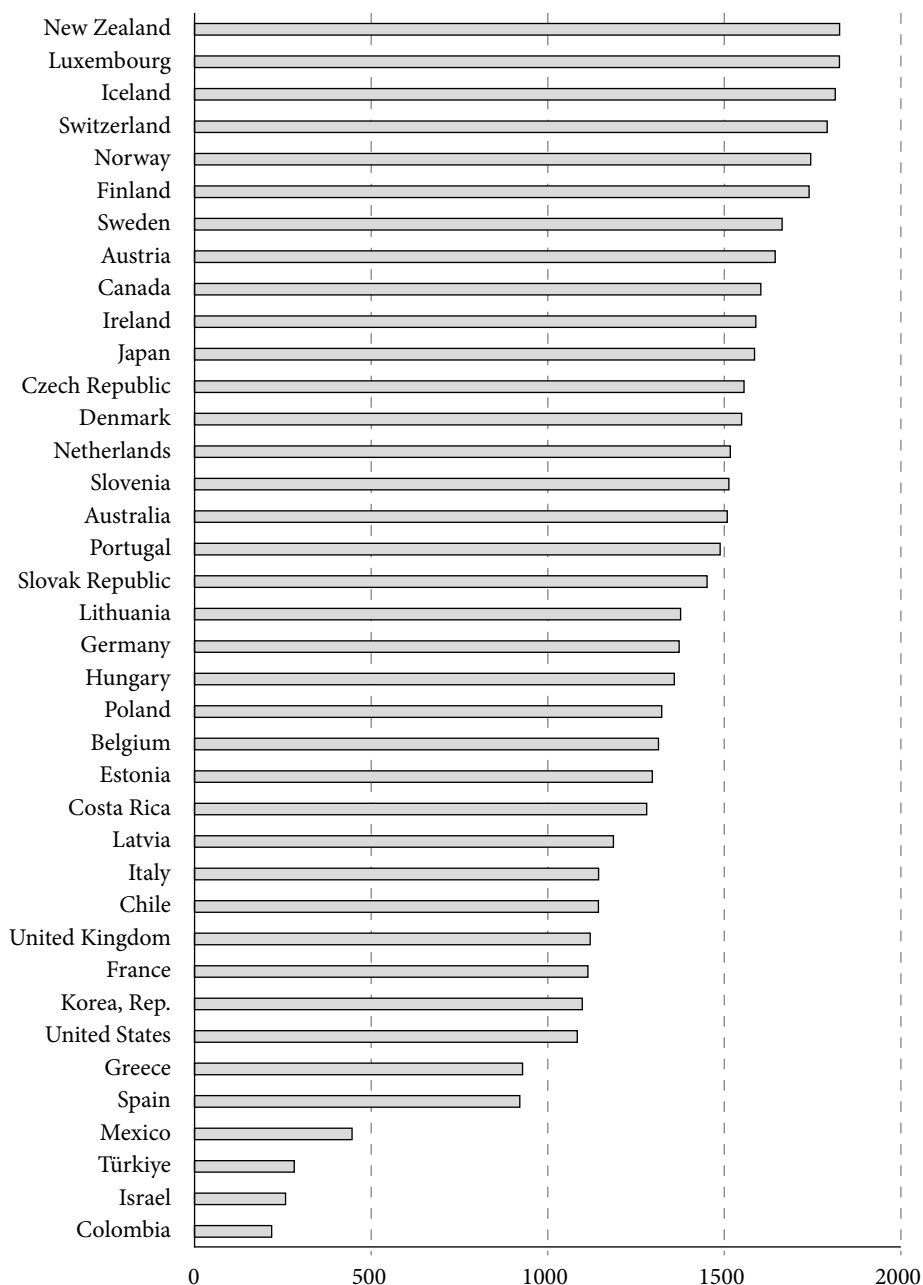


Figure 4.5. SIGQ ranking for political stability and absence of violence in OECD countries, 2004–2023

Source: own compilation using PS IMAGO.

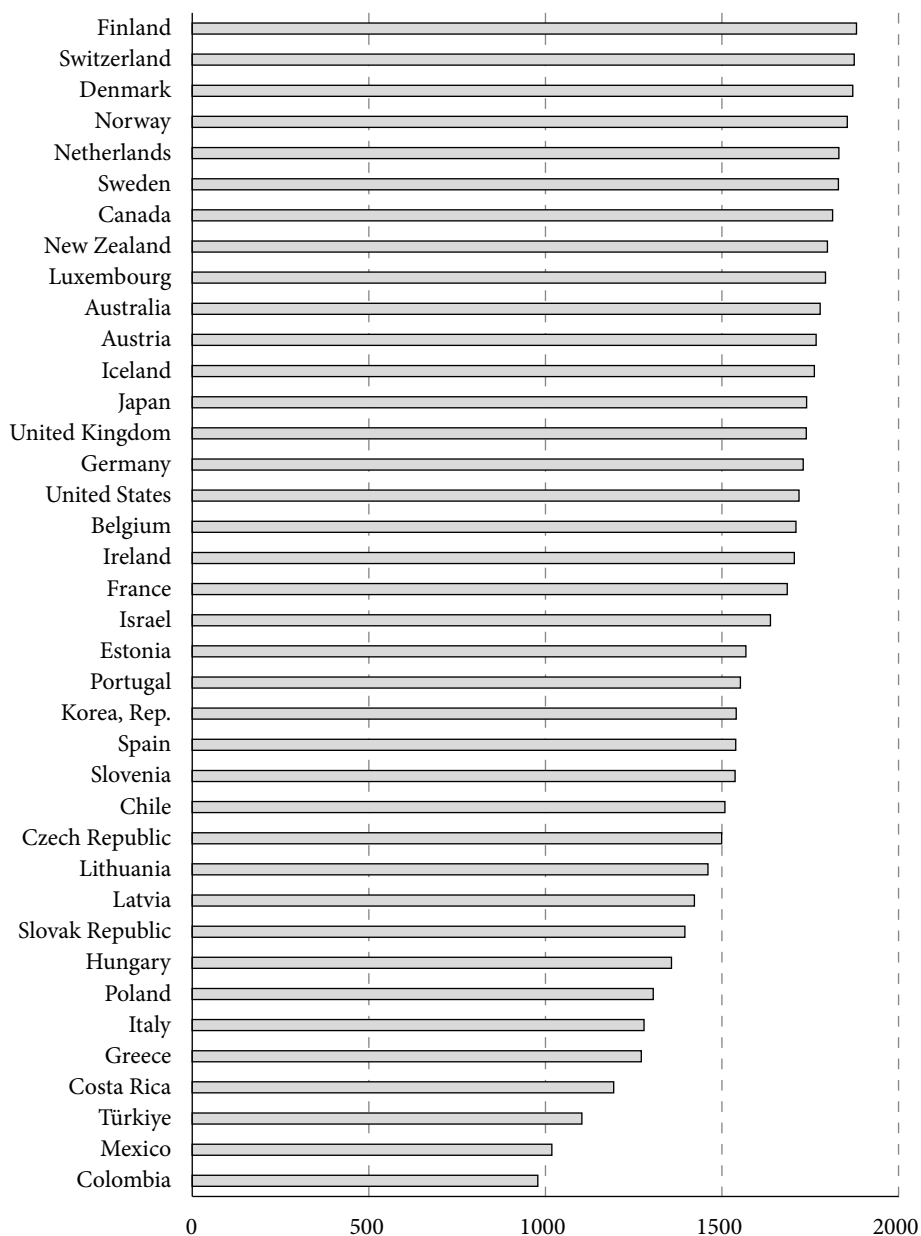


Figure 4.6. SIGQ ranking for government effectiveness in OECD countries, 2004–2023

Source: own compilation using PS IMAGO.

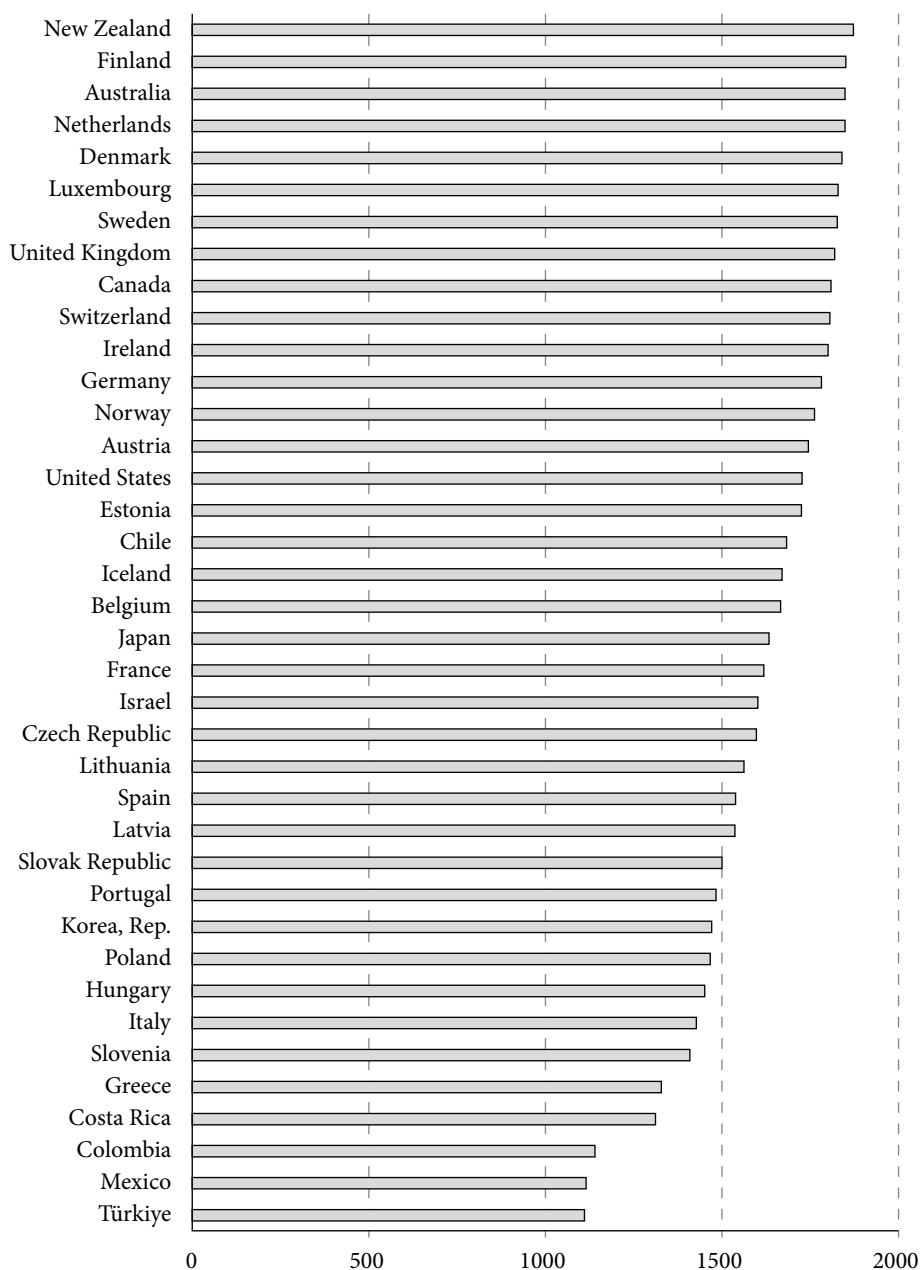


Figure 4.7. SIGQ ranking for regulatory quality in OECD countries, 2004–2023

Source: own compilation using PS IMAGO.

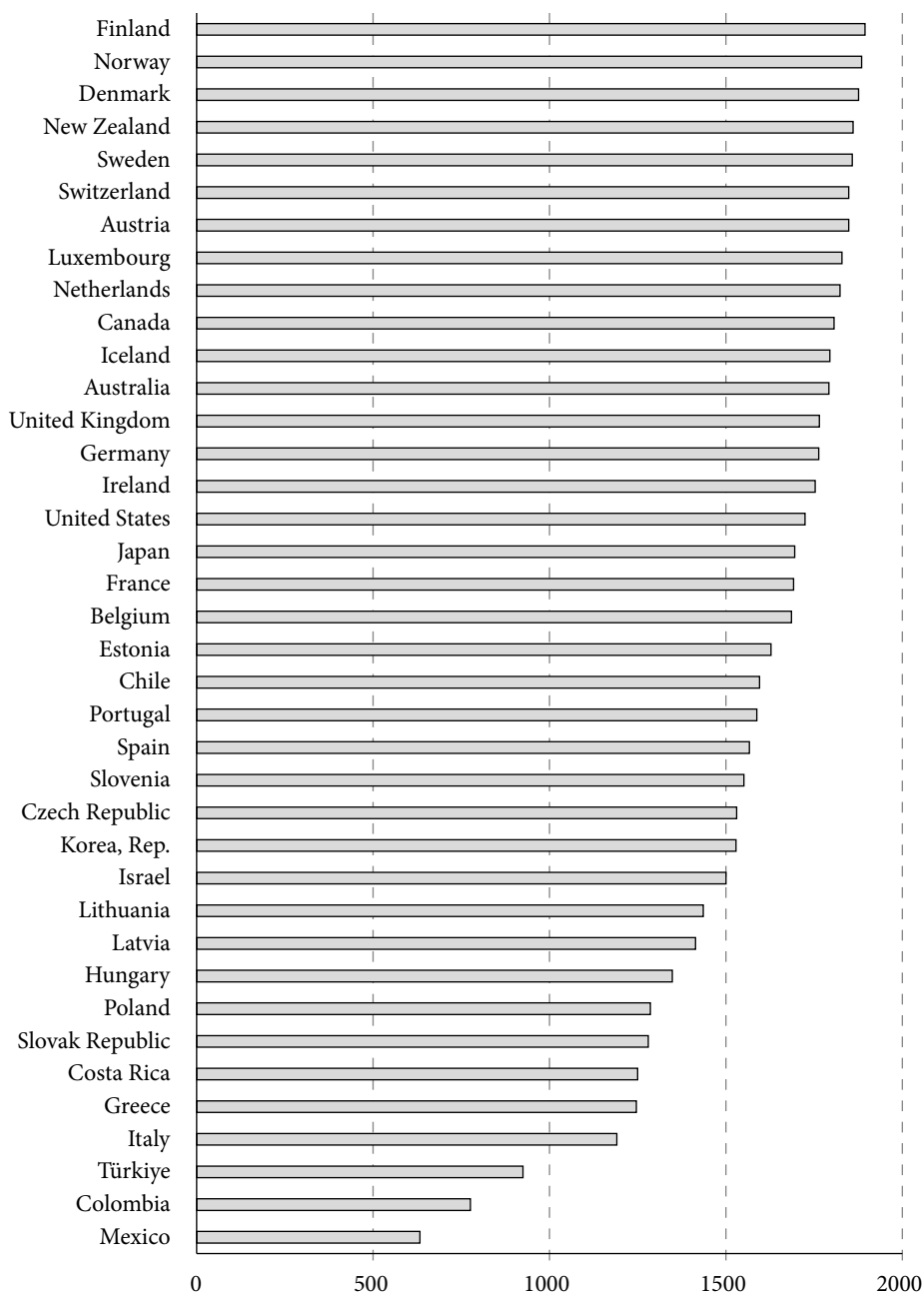


Figure 4.8. SIGQ ranking for rule of law in OECD countries, 2004–2023

Source: own compilation using PS IMAGO.



Figure 4.9. SIGQ ranking for control of corruption in OECD countries, 2004–2023

Source: own compilation using PS IMAGO.

Table 4.2 presents the descriptive statistics of FDI inward stock as a per cent of GDP for the OECD Member States at the end of 2023. It is clear from the table that the data are highly variable, skewed, and exhibit high kurtosis. The 5% trimmed mean and M-estimators differ significantly from the mean, indicating heterogeneity in the examined population. The minimum value was recognised for Japan, while the maximum value was for Luxembourg.

Table 4.2. Statistics for FDI inward stock as a per cent of GDP in the OECD at the end of 2023

Descriptives	Statistic	Standard error
Mean	96.49	
95% Confidence Interval for Mean – Lower Bound	24.45	
95% Confidence Interval for Mean – Upper Bound	169.53	
5% Trimmed Mean	59.72	
Variance	48 039.01	
Standard deviation	219.18	
Minimum	5.89	
Maximum	1 375.81	
Range	1 369.92	
Interquartile range	39.11	
Skewness	5.68	0.383
Kurtosis	33.66	0.750
Percentiles 20	30.77	
Percentiles 40	43.52	
Percentiles 60	58.63	
Percentiles 80	82.38	
M-Estimators		
Huber's M-Estimator ^a	51.56	
Tukey's Biweight ^b	47.45	
Hampel's M-Estimator ^c	48.88	
Andrews' Wave ^d	47.46	

Notes: a. The weighting constant is 1.339.

b. The weighting constant is 4.685.

c. The weighting constants are 1.700, 3.400, and 8.500.

d. The weighting constant is $1.340 \cdot \pi$.

Source: own compilation using PS IMAGO.

Given the circumstances, in the third step of our analysis, we divided the countries into five groups arranged in ascending order of FDI inward stock as

a per cent of GDP based on measures of position such as quintiles. We transformed the FDI inward stock as a per cent of the GDP variable measured on a numerical scale into a variable measured on an ordinal scale. As a result, we produced the following groups of countries:

Group 1_{fdi}: Belgium, United Kingdom, Estonia, Switzerland, Netherlands, Ireland, Luxembourg;

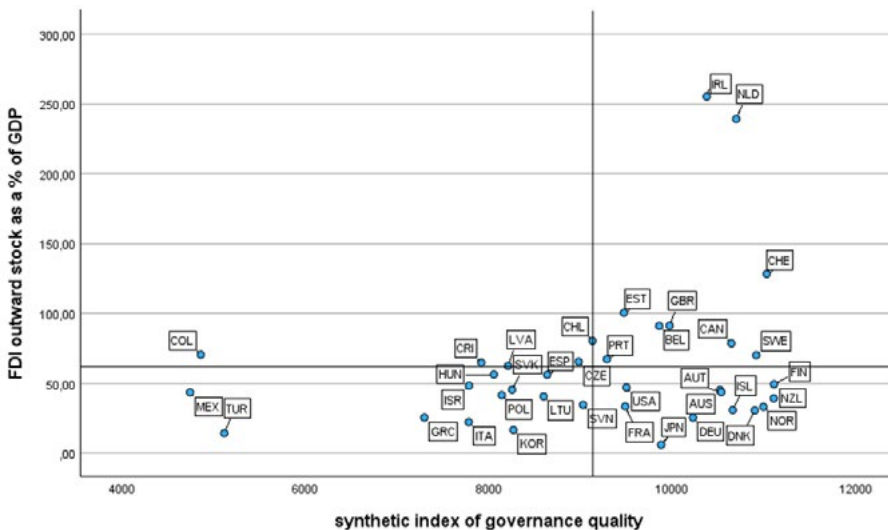
Group 2_{fdi}: Latvia, Costa Rica, Czech Republic, Sweden, Portugal, Colombia, Canada, Chile;

Group 3_{fdi}: Austria, Australia, Slovak Republic, United States, Israel, Finland, Spain, Hungary;

Group 4_{fdi}: Lithuania, Poland, Mexico, New Zealand, Slovenia, France, Norway, Iceland;

Group 5_{fdi}: Greece, Italy, Germany, Denmark, Korea Rep., Türkiye, Japan.

In the fourth step, we assessed the relationship between the OECD countries GQ from 2004–2023 and FDI inward stock as a per cent of GDP at the end of 2023. The correlation analysis started with drafting a scatterplot for the variables (Figure 4.10).

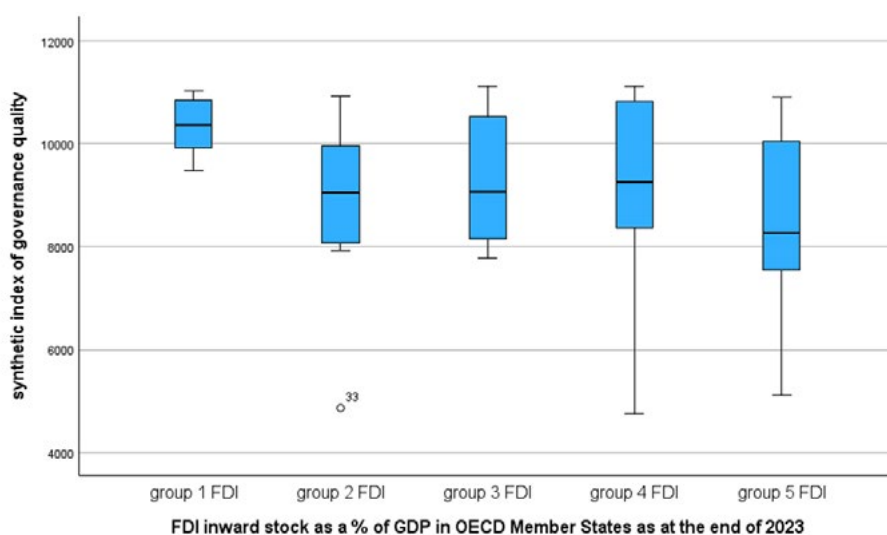


Note: Due to the extreme outlier, we omitted Luxembourg from the Figure.

Figure 4.10. Scatterplot for the SIGQ and FDI inward stock as a per cent of GDP

Source: own compilation using PS IMAGO.

The scatterplot confirms the conclusions drawn in the previous step, suggesting a huge differentiation of FDI inward stock as a per cent of GDP among the OECD Member States, which is largely due to the values of this variable for Luxembourg. For this reason, we decided to assess the degree to which the synthetic index of governance quality differs across the five distinguished groups of OECD countries arranged in ascending order of FDI as a per cent of GDP based on the measures of position such as quintiles (see Figure 4.11).



° number 33 – Colombia.

Figure 4.11. Boxplot for the SIGQ in groups of countries based on the FDI inward stock as a per cent of GDP at the end of 2023

Source: own compilation using PS IMAGO.

The highest median of the synthetic index of governance quality among the OECD Members was reported for Group 1_{fdi}, which means that the countries with the largest inflows of FDI inward stock as a per cent of GDP are those of offering the highest institutional quality to potential investors. The median values are lower in Group 2_{fdi} and Group 3_{fdi}, which comprise countries with moderate levels of FDI inward stock as a % of GDP. The results for Group 4_{fdi}, which contains countries reporting the lowest levels of FDI inward stock as a per cent of GDP, are coherent with the SIGQ values.

In the next step of our analysis, we evaluated the SIGQ for all OECD countries by EU and non-EU members. Figure 4.12 shows that EU Member States within the OECD structure have a higher average SIGQ value than non-member

countries. In addition, non-EU countries are characterised by a wide diversity of the quality of governance. A markedly low quality of governance applies to three countries: Colombia, Mexico, and Turkiye.



Figure 4.12. Violin graph for the SIGQ by EU and non-EU OECD Countries

Source: own compilation using PS IMAGO.

A detailed analysis individual dimensions of governance quality also shows that OECD EU countries perform better than OECD non-EU countries. The largest differences between SIGQ averages are recognised in the three following areas: political stability and absence of violence, a voice and accountability and the rule of law (see Table 4.3).

Table 4.3. The mean value of individual dimensions of SIGQ for OECD EU and non-EU countries, 2004–2023

Name	Mean value of SIGQ for OECD		
	EU countries	non-EU countries	total
Synthetic index of governance quality	9424	8810	9182
A voice and accountability	1642	1493	1583
Political stability and absence of violence	1391	1179	1307
Government effectiveness	1597	1554	1580
Regulatory quality	1637	1571	1611
Rule of law	1602	1508	1565
Control of corruption	1556	1505	1536

Source: own compilation using PS IMAGO.

In the last step of the study, we assessed the relationship between the GQ for EU and non-EU OECD countries from 2004 to 2023 and FDI inward stock as a per cent of GDP as of the end of 2023. The correlation analysis started with drafting the scatterplot for the variables (see Figure 4.13 and 4.14).

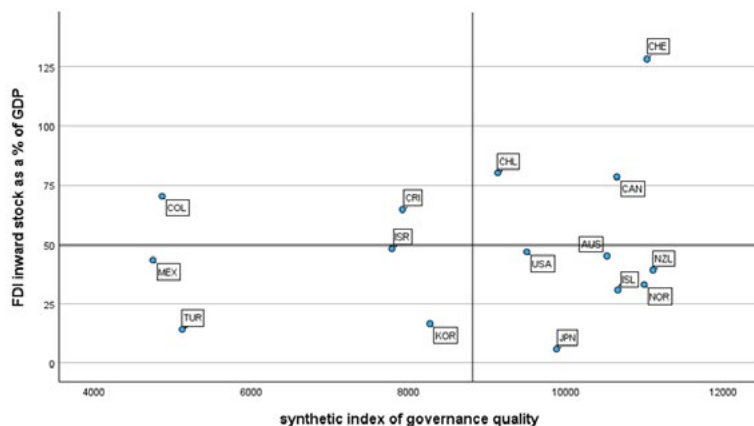
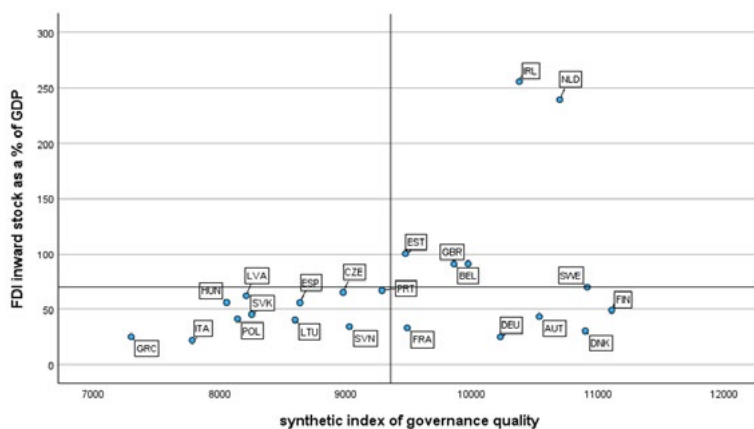


Figure 4.13. Scatterplot for the SIGQ and FDI inward stock as a per cent of GDP for OECD non-EU countries

Source: own compilation using PS IMAGO.



Due to the extreme outlier, we omitted Luxembourg from the Figure.

Figure 4.14. Scatterplot for the SIGQ and FDI inward stock as a per cent of GDP for OECD EU countries

Source: own compilation using PS IMAGO.

We used the contingency coefficient to assess the strength of the correlation between the overall value and six dimensions of GQ and FDI inward stock as a per cent of GDP (Table 4.4). Its value for the six dimensions of GQ for EU and non-EU OECD countries shows a significant, positive correlation between the GQ and FDI inward stock as a per cent of GDP. It is worth noting that the relationship is stronger for non-EU OECD countries.

Table 4.4. Contingency coefficients between the six dimensions of GQ and FDI inward stock as a per cent of GDP

Dimensions of GQ	Contingency coefficient values	
	EU countries	non-EU countries
Voice and accountability	0.606	0.732
Political stability and absence of violence	0.555	0.766
Government effectiveness	0.705	0.742
Regulatory quality	0.666	0.660
Rule of law	0.645	0.725
Control of corruption	0.701	0.685
Overall SIGQ value	0.687	0.704

Source: own compilation using PS IMAGO.

Conclusions

The principal goal of the chapter was to assess the governance quality in the OECD countries and to examine the relationship between the GQ and FDI inward stock as a per cent of GDP, reflecting the investment attractiveness of different countries. The literature review and our statistical analysis lead us to the following conclusions:

1. Most economists and IB researchers agree that institutional quality is one of the primary determinants of investment attractiveness. Numerous theoretical and empirical studies confirmed that higher levels of GQ encourage MNEs. In contrast, weak and ineffective organisational, legal and procedural environments discourage foreign investors due to political and legal instability, bureaucracy, lack of accountability and transparency, inactive mechanisms to reduce corruption and other formal and informal constraints.
2. The OECD countries differ significantly in terms of the overall governance quality, as measured by the WGI and its six main dimensions. At the same time, we found that the countries covered by the study can be divided into

several groups representing similar quality of governance. Using hierarchical cluster analysis, we selected five groups. The countries in these groups show similar characteristics, e.g., political stability, rule of law and control of corruption. Statistical analysis revealed a positive correlation between governance quality and foreign direct investment inflow.

3. Among OECD EU countries, the values of the contingency coefficients between the six dimensions of governance and FDI as a per cent of GDP indicate that government effectiveness, control of corruption and regulatory quality exert the biggest influence on FDI. In turn, among OECD non-EU countries, the quality of governance measured with political stability and absence of violence, government effectiveness, voice and accountability and rule of law is most strongly correlated with investment attractiveness.

To sum up, governance quality is a key factor influencing investment decisions, as confirmed by analyses based on Governance Quality Indicators (WGI). Higher governance quality translates into greater attractiveness for foreign investors, which can increase the inflow of foreign direct investments. As GQ plays a crucial role in shaping a country's investment landscape, policymakers should prioritise governance reforms to enhance their competitiveness in the global market and maximise the potential benefits of FDI inflows. Moreover, it can also be assumed that European integration promotes convergence in institutional quality. This is facilitated by multiple channels: policy harmonisation, financial support, knowledge sharing, and economic interdependence (it compels governments to adopt compatible governance structures to facilitate trade, investment, and economic cooperation). Testing this thesis requires further in-depth research.

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5. EU support for the recovery process and developing the economic and business environment in Ukraine after the large-scale conflict with Russia in 2022

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Abstract: Ukraine's wartime recovery is analysed through the unprecedented scale and variety of EU support after Russia's 2022 large-scale invasion. The chapter reviews EU budgetary and policy documents, financial commitment data, reports and secondary literature, and also applies a simplified PESTLE perspective to the business environment. The assistance combines emergency stabilisation with long-term reconstruction and accession-oriented reform. Key instruments include macrofinancial assistance, the Ukraine Facility, humanitarian packages, military support, Solidarity Lanes, SME and innovation measures, and temporary protection for displaced Ukrainians. The EU mobilised more than EUR 84 billion for Ukraine's economy, emergency needs and early recovery, alongside substantial refugee support within Member States. The chapter presents the Union as both crisis manager and transformative partner, helping preserve sovereignty while preparing deeper European integration.

Keywords: Ukraine, financial instruments, Ukraine Facility, European integration, war economics.

Introduction

Following the onset of large-scale conflict with Russia in 2022, the relationship between the European Union (EU) and Ukraine deepened, resulting in robust political, economic, and institutional ties. These ties have played a crucial role

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in Ukraine's efforts toward recovery, financial resilience, and long-term modernisation. The EU is Ukraine's most significant trading partner, accounting for approximately 56% of its total trade in goods in 2023. This partnership underpins Ukraine's orientation towards European integration and its commitment to market reforms, the rule of law, and harmonisation with EU standards (European Commission, 2024). Since the implementation of the Deep and Comprehensive Free Trade Area (DCFTA) in 2016, trade between Ukraine and the EU has expanded rapidly. By 2023, the total trade in goods between the EU and Ukraine had surpassed €61.9 billion, more than doubling since the DCFTA entered into force. Moreover, the EU supports Ukraine's access to its Single Market by granting full trade liberalisation, having temporarily suspended import duties, quotas, and trade defence mechanisms for Ukrainian goods since June 2022. These measures were renewed through June 2025, substantially assisting Ukrainian producers and exporters during a period of economic duress (European Commission, 2025a).

Beyond goods, the EU also invests in Ukraine's integration into European value chains. Ukraine's potential accession to the EU, along with ongoing accession negotiations involving Moldova, highlights the strategic importance of these trade relations. The EU is currently mapping priorities and actions to further adapt its structures for the inclusion of new Member States, which will facilitate smoother integration and deeper economic linkages (European Commission, 2024). To facilitate this integration, the EU has mobilised a range of instruments to support Ukraine's economic stability, recovery, and modernisation. These include both immediate crisis-response tools and long-term development funding.

The chapter sheds light on the European Union's supportive instruments directed to Ukraine and aims to: (1) identify and quantify the principal channels of EU assistance to Ukraine between 2022–2025; (2) analyse the policy mechanisms underpinning this support; and (3) assess the balance between immediate crisis intervention and longer-term resilience building. The structure encompasses the instruments' characteristics, the evolution of EU assistance to Ukraine in numerical terms, the Member States' contributions, and an analysis of the bilateral relations between the EU and Ukraine. This is followed by the impact of this evolutionary cooperation on business development and concluding remarks.

5.1. Overview of the EU instruments supporting Ukraine after the war

The EU has deployed multiple instruments to support Ukraine in response to the crisis triggered by Russia's large-scale invasion of Ukraine in 2022. This overview highlights the scope of EU assistance, detailing the various mechanisms

designed to address immediate humanitarian needs, support economic and business stability, and facilitate long-term recovery and resilience in Ukraine.

5.1.1. REACT-EU and CARE initiatives

REACT-EU (Recovery Assistance for Cohesion and the Territories of Europe) and CARE (Cohesion's Action for Refugees in Europe) are specialised EU crisis instruments introduced in response to sudden shocks, such as the COVID-19 pandemic and, subsequently, the war in Ukraine.

Both REACT-EU and CARE provide rapid funding to address emerging economic and social challenges. For Ukraine, these initiatives allocated resources to urgent needs, including supporting businesses disrupted by war, maintaining employment, stabilising local economies, and covering essential social services.

Funds target Ukrainian SMEs, sectors heavily affected by the war, and regions with significant refugee inflow or economic dislocation. Funding under these programmes is distributed flexibly through cohesion policy channels, allowing regional authorities in the EU Member States to swiftly direct aid where most needed, whether it be for job support, business survival, or essential public spending (European Commission [1], n.d.).

5.1.2. The Ukraine Facility

The Ukraine Facility is a comprehensive financial framework established by the EU to underpin Ukraine's recovery, reconstruction, and modernisation in the context of EU accession negotiations. Large-scale grants, loans, or guarantees are offered to finance Ukraine's recovery efforts, infrastructure rebuilding, and economic reforms.

To access funding, the Ukrainian government must develop and implement a national Recovery and Reform Plan. This plan outlines priorities for reconstruction (transport, health, energy, and governance) and commitments to reforms necessary as part of the EU accession process, including strengthening the rule of law, enhancing transparency, combating corruption, and achieving regulatory convergence with the EU. The Facility is not merely a short-term instrument but aims to solidify Ukraine's trajectory towards sustainable development, digital transformation, and readiness for EU membership. It combines new resources with existing EU instruments and initiatives (European Commission [2], n.d.).

5.1.3. Support for SMEs and startups

The EU recognises the vital role that innovative businesses and small and medium-sized enterprises play in Ukraine's economic resilience. Thus, several initiatives were launched.

- **European Innovation Council (EIC) Initiative:** In 2022, the EIC launched a dedicated €20 million programme for Ukrainian tech startups and SMEs. Its goal is to foster entrepreneurship, create new value chains, and embed Ukrainian businesses into pan-European networks of research, innovation, and investment
- **Programmes and networks:** This support is implemented via a consortium of business associations, innovation hubs, and Ukrainian partners, offering direct financing, mentoring, rapid integration into European innovation ecosystems, and access to EU platforms.
- **Broader SME Inclusion:** By helping startups and established SMEs, the EU aims to sustain business activity, protect jobs, and ensure ongoing technological development despite the disruptive effects of war.

5.1.4. Enterprise Europe Network (EEN) and Task Force on Ukraine

The Enterprise Europe Network (EEN) is one of the world's largest support networks for SMEs with international ambitions. It was expanded to facilitate both the recovery processes and the country's prospective EU membership for Ukrainian entities. It has offered several instruments to support the Ukrainian businesses affected by the war under its operations in the Single Market Programme (EISMEA, 2023):

- **Crisis Response:** Since the outbreak of the war, EEN has launched special actions to assist Ukrainian businesses facing supply chain disruptions, market loss, or logistical barriers.
- **Ukraine Task Force:** This dedicated task force coordinates support from across the EU for both Ukrainian firms and partner agencies, facilitating collaboration, matchmaking with EU companies, and providing business advisory services tailor-made for war-affected conditions.
- **Integrated Platforms:** Initiatives such as the **European Cluster Collaboration Platform (ECCP)** and **Erasmus for Young Entrepreneurs (EYE)** further enable Ukrainian companies and entrepreneurs to connect with their European peers, learn from best practices, and explore new market opportunities.

5.1.5. EU funding for Ukrainians abroad

Recognising the wave of Ukrainian entrepreneurs and professionals relocating to the EU due to the conflict, the following instruments were proposed, including those directed to the Ukrainian innovators, tech startups, SMEs, etc. (European Innovation Council, 2023):

- **New Business Creation:** The EU has opened funding channels and support programmes for businesses founded and operated by Ukrainians in EU countries. These initiatives encourage the development of new business ventures, facilitate the integration of Ukrainian talent into EU economies, and enable the creation of cross-border value chains.
- **Networking and Integration:** Ukrainian-run companies abroad can tap into EU networks, accelerators, and business incubators, helping both the individual entrepreneurs and the broader EU economy benefit from Ukrainian innovation and agility.

5.1.6. Connecting Europe Facility for Solidarity Lanes

Following the signing of new road transport agreements between the EU, Ukraine, and the Republic of Moldova, and the extension of the Trans-European Networks (TEN-T) to Ukraine in 2022, the EU has decided to establish alternative logistics routes via rail, road, and inland waterways, known as Solidarity Lanes. The Connecting Europe Facility instrument supported their operation. This was a response to the blockade imposed by Russia on transport due to military operations. These Lanes aim to protect (European Commission, 2025c):

- global food security,
- the export of Ukrainian goods,
- the import of fuel and humanitarian aid into Ukraine.

These instruments demonstrate the EU's multifaceted approach: responding to immediate crises, supporting lasting economic resilience, and laying the foundations for Ukraine's accession to the EU by driving institutional reforms and integration into the Single Market.

5.2. EU financial support for Ukraine through mechanisms and numbers

In response to Russia's full-scale invasion of Ukraine in February 2022, the EU has implemented a wide range of policy responses to assist the country in overcoming the dreadful consequences of the war. Alongside the imposition of 18 packages of sanctions and other restrictive measures against the aggressor so far, the EU has intensified its support on an unprecedented scale to strengthen Ukraine's overall capacity and resilience to military and non-military challenges. The wide-ranging social and financial assistance includes measures such as emergency macro-financial assistance and budget support, humanitarian aid and civil protection, reception of refugees through the EU temporary protection mechanism, military support, trade liberalisation measures, and support in the investigation and prosecution of war crimes. The EU, together with its Member States (MS) and financial institutions for development (FID), have so far mobilised over EUR 164.8 billion for Ukraine and its people. This multi-agency platform of coordination, referred to as the *Team Europe* approach, was launched in order to improve the intra-EU-MS-FID effectiveness and deliver a far greater impact than fragmented individual action. In fact, the mobilisation of financing and coordinating sources of assistance at the multilateral level has led to the four main financial action packages, as shown in Figure 5.1. This extraordinary financial support constitutes both Team Europe's commitments to assist Ukraine in mitigating the consequences of Russia's aggression and the resources earmarked for Member States welcoming Ukrainian citizens fleeing the war.

What stands out in Figure 5.1 is how support is predominantly directed towards Ukraine's economy, emergency response, and early recovery, representing more than half of the total financial assistance. Within the framework of this action, the EU provided or guaranteed a support package (available in both grants and loans) amounting to EUR 7.2 billion in macro-financial assistance (MFA), which was disbursed in 2022. Moreover, the EU set out a second financial package of up to EUR 18 billion for 2023 that covers support in the form of highly concessional loans, and subsequently additional packages totalling EUR 33.2 billion. These financial resources are primarily allocated towards the following support areas (Regulation, 2022):

- a) financing Ukraine's immediate needs, to ensure the macroeconomic stability of the country;
- b) rehabilitating critical infrastructure, such as water systems, energy infrastructure, transport networks, or in strategic economic and social sectors, such as hospitals, schools, and housing for relocated persons;

- c) supporting institutional reforms, including the judiciary and the fight against corruption, good governance, respect for the rule of law, and modernisation of the institutions;
- d) preparing for the sustainable post-war reconstruction;
- e) supporting Ukraine's path towards European integration, including its integration into the structures of the internal market, as well as reinforcing economic development and boosting competitiveness;
- f) strengthening Ukraine's administrative and institutional capacity, including technical assistance.

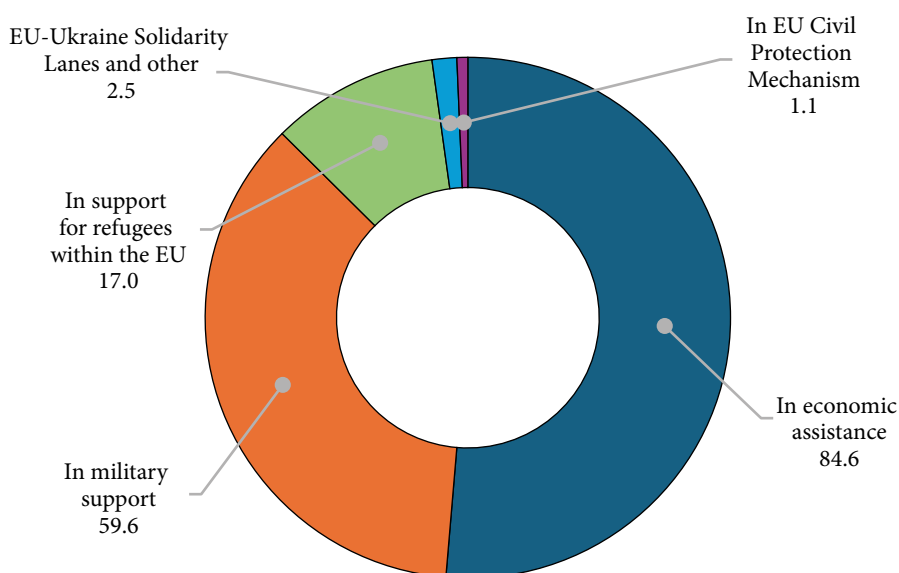


Figure 5.1. EU financial action to support Ukraine in EUR bln

Source: (European Commission, 2025b).

As a result of this assistance, Ukraine have been able to maintain its essential public services, keep paying wages and pensions, sustain its public administration and provide emergency relief to those in immediate need. These resources also serve to reinforce the public health system by improving access to health services (e.g., supporting the domestic production of essential medicines) and strengthening its resilience to respond to and recover from the deadly consequences of war. With this support, it is possible not only to repair and reconstruct damaged critical municipal infrastructure but also to bolster Ukrainian efforts to safeguard their national institutions while advancing critical reforms and the integration with the EU.

Closer inspection of the data on economic and financial assistance presented in Figure 5.2 confirms that the support resources were provided by various donors and are made available in multiple forms. MFA funds made available to Ukraine were provided via long-term loans on highly favourable terms and were paid out in a small number of instalments. The Commission borrowed the financial resources necessary to cover this initiative from international capital markets. At the same time, the administrative fee payments and interest costs related to the loan were borne for the first time by the EU budget. It is worth noting that the loans were backed by Member State guarantees to complement the provisioning available from the EU budget. In fact, the loans are fully secured up to 70% of their value by national guarantees and funds set aside from the EU budget. The maximum average maturity of the loans is 15 years. The financial assistance for 2023 and next year (referred to as MFA+) has been provided on similar terms. The support in the form of highly concessional loans was disbursed to Ukraine in monthly instalments of an average amount of EUR 1.5 billion throughout 2023. The difference is that the Commission was empowered to borrow the necessary amounts from the capital markets under the multiannual financial framework for 2021–2027 (MFF). The funds have been mobilised through the mechanism over and above the ceilings established by the MFF up to the limits of the own resources ceiling – “headroom” (Council Regulation, 2022). The disbursement of the support is dependent on progress in the implementation of reform, in areas such as anti-corruption measures, the rule of law, and judicial independence. The resources under “headroom” can apply only to the financial assistance intended for covering Ukraine’s needs for 2023 and, if necessary, 2024 (Pari, 2022). The interest costs of the loans will be covered by external assigned revenue to the EU budget contributed by the Member States. The repayment of the principal component will not start before 2033 and has a maximum duration of 35 years.

From Figure 5.1, it can be seen that the second biggest item of the financial support to Ukraine is the military assistance, accounting for over 36.2% of the total support provided through the European Peace Facility (EPF). This special instrument outside the EU budget was established in 2021 to strengthen the EU’s ability to act as a global security provider. An off-budget fund is financed directly by yearly contributions from Member States proportionate to the ratio of their GNI. With its initial financial ceiling of €5.692 billion and after the adoption of several Council decisions, the last of which was adopted in June 2023, the financial ceiling of EPF amounts to more than €12 billion in 2027. Up to mid-2023, the EU mobilised EUR 5.6 billion under the EPF to support the delivery of military equipment to the Armed Forces of Ukraine, including lethal equipment and non-lethal supplies. Moreover, in May 2023, the Council adopted an assistance measure worth EUR 1 billion under the EPF to speed up the provision of one million rounds of

ammunition within a year to the Ukrainian Armed Forces. The measure allows the joint procurement of 155-mm calibre artillery rounds and missiles from economic operators established in the EU or Norway (Council, 2023). Together with the previous decision to rapidly deliver ammunition from existing stocks, to date the EU has committed EUR 2 billion to this kind of military equipment. In addition to that, through the bilateral commitments, Member States have earmarked EUR 15.56 billion for Ukrainian defence needs, bringing the total EU military support to Ukraine to approximately EUR 21 billion. This assistance includes not only the delivery of personal protective equipment, first aid kits, fuel, and military lethal equipment for defensive purposes, but also support through multi-purpose measures. This includes support for nuclear safety and mine clearance in Ukraine, restrictive measures imposed against Russia, and aid to ensure full accountability for war crimes and aggression, etc. The EU also has established a Military Assistance Mission (MAM) aimed at enhancing the capability of the Armed Forces of Ukraine to plan and execute military operations effectively. Based on this assistance, MAM has so far trained over 78,100 Ukrainian soldiers.

Member States	15 billion from Member States in the form of grants, loans and guarantees		15 billion
European Union	33.2 billion in disbursed macro-financial assistance to help Ukraine address urgent needs	2.8 billion in loans and guarantees by the EIB, EBRD and other international financial institutions guaranteed by the EU	
		1.2 billion in bilateral cooperation to increase Ukraine's resilience and support reforms	114 million for rehabilitating schools
		1.1 billion in humanitarian	237 million for crisis response measures
	28.3 billion of direct and indirect assistance (through IFIs) under the Ukraine Facility	330 million emergency package to support needs of internally displaced population, municipalities, health support, etc.	31 million for civil society
			535 million under Connecting Europe Facility for Solidarity Lanes
	1.1 billion MFA+ interest rate subsidy	315 million for ongoing projects adjusted to meet urgent needs	48 million for nuclear safety cooperation
	In total		84.6 billion

Figure 5.2. Financial support for Ukraine's economy, emergency and early recovery

Source: own elaboration.

As shown in Figure 5.1, the third-largest package of the EU financial assistance (accounting for 10.3% of the total) is dedicated to support for Ukrainian refugees within the EU, estimated at close to EUR 17 billion. This support was mobilised following the activation of the Temporary Protection Directive (Council Directive, 2001), which enabled swift and practical assistance to people fleeing the war in Ukraine. In the face of Russian aggression, the EU had to confront the unexpected event of the mass influx of displaced people from Ukraine seeking refuge and safety, introducing temporary protections aimed at easing pressure on national asylum systems and making it possible for displaced people to enjoy harmonised rights across the EU. The harmonised rights under this mechanism include (Luyten, 2022):

- residence permit,
- access to suitable accommodation,
- the possibility to engage in employment or self-employment,
- medical, welfare or other assistance,
- means of subsistence,
- access to education for children (under 18 years),
- temporary protection by legal guardianship for unaccompanied minors,
- unaccompanied minors should also enjoy legal guardianship.

As the Commission reported, at the end of May 2023, more than 4 million non-EU citizens who had fled Ukraine in the wake of Russia's invasion were benefiting from temporary protection in the EU. Furthermore, almost 775,000 school pupils were enrolled in the educational systems of 26 EU countries. In order to address these needs and to make available the necessary financial resources, the Commission took measures by extending the possibilities to utilise the funds under the multiannual financial framework (MFF) and the Next Generation EU (NGEU). Firstly, the Commission unlocked up the money available to Member States under the 2014–2020 Home Affairs funding and prolonged by one year its implementation period. As a result, it released around EUR 420 million of remaining funds from the 2014–2020 MFF to be allocated for additional support. Secondly, the Council adopted the regulation on Cohesion's Action for Refugees in Europe (CARE), amending the 2014–2020 legal framework of ESIF (European Parliament and Council, 2022). The changes introduced exceptional flexibility in the use of EU cohesion policy funds, in particular by affording Member States and regions the possibility to transfer resources between programmes financed by the European Regional Development Fund (ERDF) and European Social Fund (ESF), to increase the financing rate up to 100% and enable additional pre-financing of projects. Thirdly, Member states could also utilise resources made available under Recovery Assistance for Cohesion and the Territories

of Europe (REACT-EU) to address the inflow of refugees. By doing so, the EU mobilised around EUR 7 billion of unspent funds from 2014-2020 for cohesion policy and around EUR 10 billion of funds committed to post-pandemic recovery within the framework of REACT-EU, which is estimated to release nearly EUR 17 billion. Consequently, these measures alleviated pressure on national systems to provide emergency support, healthcare and education to people escaping Russia's war against Ukraine.

The following package, accounting for 1.5% of the total assistance, was involved in creating a platform of cooperation under the EU-Ukraine Solidarity Lanes. The goal of this initiative was to bring European and Ukrainian companies from the agricultural, food, recycling and logistics sectors together quickly in order for them to find pragmatic solutions for exporting various products from Ukraine

The smallest support package depicted in Figure 5.1 covers the value of preventive measures worth more than EUR 1.1 billion that were undertaken to ensure in-kind assistance to Ukrainian communities. The assistance was activated through the EU civil protection mechanism, which aims to respond in a swift, timely, effective, and coordinated manner to natural and manmade disasters. In the case of Russia's full-scale invasion of Ukraine, the aid delivery took the form of material assistance and emergency operations such as medical supplies, shelter items, power generators, vehicles, specialised equipment for public health risks. Under this mechanism, the EU delivered around 91,000 tonnes of material assistance, evacuated over 2,300 Ukrainian patients and transferred them to hospitals across Europe, shipped over 3,360 power generators and 2,000 transformers to Ukraine, and organised a dedicated medical hub in Rzeszów (Poland).

5.3. Assistance for Ukraine – the EU countries' perspective

Many countries have become directly involved in supporting Ukraine by offering various types of assistance. Figure 5.3 presents a comparison of bilateral commitments from European countries to Ukraine, which is divided into four categories: financial aid, military aid, humanitarian aid, and estimated costs of hosting refugees. As observed, Germany stands out as the most significant financial donor in absolute terms, with Denmark and some Baltic states also contributing significant amounts of financial assistance. Military aid is most prominent in Poland, the Netherlands, and several Nordic countries, especially Denmark, Sweden, and Finland, while Germany and France, despite their overall financial strength, contribute proportionally less to the military component. Humanitarian aid, though smaller in scale across all countries, is most notable

in Germany and Poland. The estimates of refugee costs reveal a striking difference between countries: Poland's costs are by far the highest, exceeding EUR 35 billion on the left-hand scale, followed by France at nearly EUR 30 billion. These figures reflect the large number of Ukrainian refugees hosted, particularly in Poland, which became the primary destination after the 2022 Russian invasion.

When the focus shifts from absolute figures to GDP-relative contributions, a different perspective appears. Smaller economies, such as Lithuania, Denmark, and Estonia, stand out as the most dedicated, allocating between 2% and nearly 3% of their GDP to aid for Ukraine. Latvia, Poland, and Slovakia also allocate substantial parts of their economic output. Conversely, Germany and France, although leading in total euro terms, record smaller GDP shares of around 0.5–0.6%, due to the size of their economies reducing the relative impact of their aid.

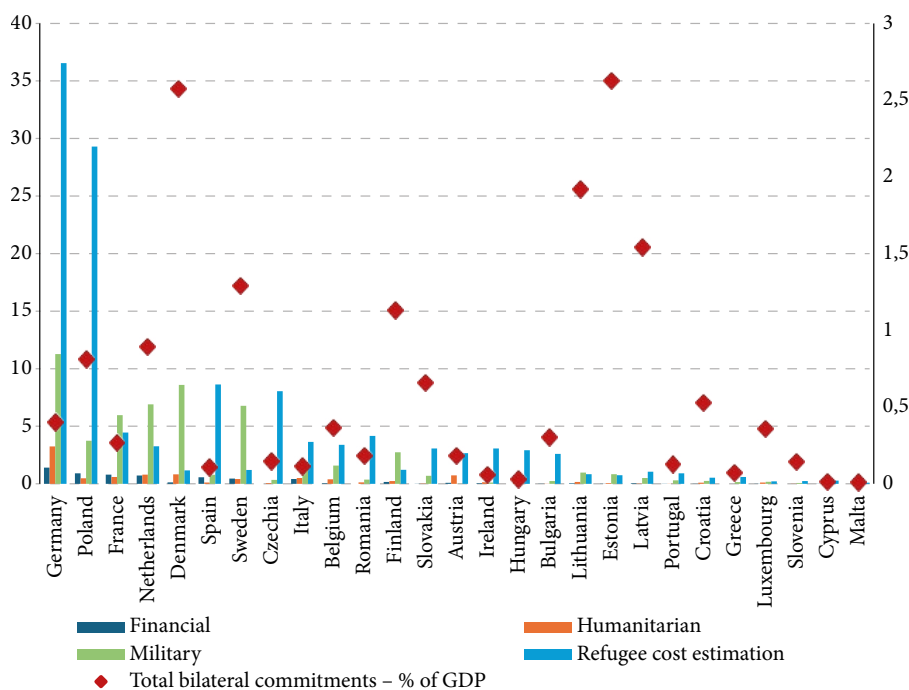


Figure 5.3. Bilateral allocations and refugee costs in EU Member States (billion euro and per cent GDP)

Source: based on (Trebesch et al., 2025).

The results highlight that the nature of support varies significantly across Europe. Some countries, such as Denmark and the Baltic states, concentrate mainly on direct financial and military aid, while others, notably Poland and

France, bear substantial costs through refugee hosting. Large economies dominate in absolute expenditure, but in relative terms, smaller states, particularly in Northern and Eastern Europe, make the most significant sacrifices.

5.4. The characteristics of the bilateral relationship between the EU and Ukraine and the consequences for business development

Following the logic of PESTLE analysis (political, economic, social, technological, legal and environmental analysis), the current features of bilateral relations between the EU and Ukraine can be characterised.

In terms of political alignment with the EU policy, the undeniable fact is that Ukraine's political leadership is firmly oriented toward EU accession, with negotiations formally underway since December 2024. Both sides cooperate closely on institutional reforms, anti-corruption, and governance, with the EU providing direct financial and technical assistance. However, ongoing war-related instability and the need for external security guarantees shape the overall relationship (Cinciripini, 2025).

In terms of the economic aspects of the analysis, the most noteworthy are trade relations, recovery, investment increase and market reforms. The EU is Ukraine's largest trading partner, accounting for 56% of Ukraine's trade in 2023. Bilateral trade reached €61.9 billion, more than doubling since the entry into force of the Deep and Comprehensive Free Trade Area (DCFTA). Temporary measures granting Ukraine duty- and quota-free access to the EU market were extended until June 2025 following recent negotiations to modernise and sustain the trade partnership (European Commission, 2025a).

Economic growth in Ukraine has resumed as supply chains recover and international investments increase, primarily driven by support from EU instruments, including the Ukraine Facility and targeted investment frameworks (e.g., the European Flagship Fund for Reconstruction). Nevertheless, the war's disruptions, persistent security risks, and the phasing out of some exceptional trade preferences pose ongoing challenges (GlobalData, 2024).

Furthermore, Ukraine is addressing state-owned enterprise (SOE) reforms, SOE management, and labour shortages while working to align its fiscal policy and banking with EU standards. However, the country remains at an early stage of readiness to compete fully within the EU's Single Market (SWD, 2024).

Regarding societal aspects, labour and human capital regeneration are crucial for addressing the Ukraine's dramatic population loss. Labour shortages are

growing acutely due to population displacement and the mobilisation of the workforce for defence. The government is implementing strategies to stabilise demographics, reduce informality in the labour market, and integrate refugee professionals via EU mobility and funding programmes (SWD, 2024). EU support remains crucial for maintaining confidence among businesses and the broader population, but delays in aid or policy changes could risk social stability and economic recovery.

Another area of transformation aligned with EU and global trends is digital integration. Ukraine prioritises digital transformation as part of its EU harmonisation efforts. Through active collaboration on digital identity, electronic signatures, and creating tech bridges with the UK and EU, the country is expanding its digital economy and integration with European networks (Vox Ukraine, 2025; ZPP, 2024). EU initiatives target Ukrainian tech start-ups and SMEs, fostering pan-European innovation networks and supporting business continuity in wartime conditions.

A critical step for any candidate country is the adoption of EU law, although this process is long-term and extremely costly. Having secured candidate country status, Ukraine has initiated the EU law harmonisation (“acquis”) process. It is aligning its legal system with the EU’s, implementing wide-ranging reforms to company law, competition, public procurement, intellectual property, anti-money laundering, and digital legislation. Justice and the rule of law sit at the heart of the Copenhagen criteria. These have become key conditions that EU policies incorporate, given the recent democratic backsliding in many EU Member States. Key progress includes the “Rule of Law Roadmap”, which encompasses anti-corruption monitoring, digitalisation of court systems, and regulatory improvements. However, criticism persists regarding the slow pace of Supreme Court and judicial reforms, which are necessary for attracting investment and EU membership (Cinciripini, 2025; GlobalData, 2024; SWD, 2024).

Another vital strand for operating in the Single Market is business regulations. Notable improvements are evident in bankruptcy procedures, transparency requirements, and the enforcement of intellectual property rights, although complete alignment is still ongoing. The business environment may be constrained by legacy issues of corruption, low competition, and incomplete deregulation, but commitment to EU best practices remains strong (Vox Ukraine, 2025).

In terms of implementing environmental standards, several developments have emerged in the Ukrainian arena, including sustainability initiatives. Ukraine participates in joint green energy projects with the EU (e.g., Renewables for a Resilient Ukraine project), focusing on rebuilding critical infrastructure with environmental standards. EU policy alignment also accelerates Ukraine’s efforts to decarbonise and adapt to climate change (Cinciripini, 2025; GlobalData, 2024).

When critically assessing the evolution of the business environment, it can be stated that while Ukraine has made strides in transparency, SOE reform, and digitalisation, businesses still face significant hurdles due to administrative capacity gaps, corruption, and limited access to finance. Initiatives via the Ukraine Facility, Enterprise Europe Network, and various business clusters help SMEs, start-ups, and displaced entrepreneurs access funding, build value chains, and integrate more deeply into the EU economy. Nevertheless, while Ukraine is making progress, it remains in the early stages of developing its ability to withstand competitive market forces within the EU. This vulnerability highlights the need for continued reforms in banking, competition policy, and company law.

Conclusions

This analysis focuses on the main features in economics, law, and business, adapted for the current context of Ukraine's EU integration trajectory in the light of the war-economy. There is a notable dichotomy in the processes of the country rebuilding itself and preparing for EU membership. Ukraine is striving to prepare for full integration with the EU by fulfilling the accession criteria and developing negotiations in each of the accession agreement chapters. The chapter sheds some light on the multiple instruments the EU has established or extended in order to help in the recovery and integration processes.

The scale and diversity of the European Union's support for Ukraine after the full-scale Russian aggression in 2022 demonstrate the Union's multifaceted approach to crisis response, recovery, and long-term resilience building. The EU mobilised a broad package of financial instruments, combining macro-financial assistance, humanitarian aid, development cooperation, infrastructure investment, and support to refugees, with total commitments surpassing EUR 84 billion. These measures not only addressed Ukraine's urgent financial and humanitarian needs amid war, but also laid the foundation for the country's economic and institutional recovery. Initiatives such as the Ukraine Facility, bilateral cooperation programmes, and sector-specific interventions (including energy, civil society, and transport connectivity) highlight the strategic, long-term vision of EU assistance.

Equally important has been the unprecedented support for displaced Ukrainians within EU borders, amounting to nearly EUR 17 billion, facilitated by the activation of the Temporary Protection Directive. This mechanism enabled swift, harmonised access to rights and services, easing the humanitarian burden and allowing refugees to integrate more effectively in host countries.

Overall, the EU's response illustrates its evolving role as both a crisis manager and a transformative partner in reconstruction. By integrating emergency support with forward-looking reforms, the EU is not only safeguarding Ukraine's sovereignty and stability but also fostering conditions for its closer integration after the conflict. The resilience of Ukraine's recovery will depend on sustained international commitment, with the EU remaining a central pillar in this collective effort. These will further lead to the creation of opportunities for the Member States and businesses to deepen their economic and business ties.

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II

TRADE, COOPERATION AND GLOBAL POSITIONING

6. The potential for trade cooperation between the European Union and selected countries of the Southern African Development Community in light of the provisions of the Economic Partnership Agreement

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Abstract: Trade cooperation between the EU and selected Southern African Development Community economies is explored through the Economic Partnership Agreement. The chapter studies Angola, Botswana, Eswatini, Lesotho, Mozambique, Namibia and South Africa by reviewing source documents and examining trade statistics, especially for 2016–2022. Liberalisation under the EPA is shown to have generated trade creation, though the gains differ markedly across countries. South Africa dominates the relationship, Angola remains significant, yet the region's overall share in EU external trade is still modest. The commodity pattern is asymmetrical: EU imports are led by raw materials, fuels and other resource-based goods, whereas EU exports mainly consist of machinery, equipment and transport goods. The chapter indicates that preferential access can stimulate exchange, but developmental value depends on each economy's structure and capacity to use the agreement.

Keywords: trade cooperation, Economic Partnership Agreement, Southern African Development Community.

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Introduction

The Economic Partnership Agreement (EPA) between the European Union (EU) and the member states of the Southern African Development Community (SADC) is the key element of their trade co-operation, whose aim is to strengthen economic relations and support regional integration among the countries of the African, Caribbean and Pacific states (ACP). The Agreement, which originally comprised Botswana, Lesotho, Mozambique, Namibia, the Republic of South Africa and Eswatini (former Swaziland), guarantees an asymmetrical access to the market for the partners within the SADC EPA group. The agreement, which was temporarily introduced on 10 October 2016, opened new possibilities of trade exchange, whilst the Angola's access to the negotiations in 2022 bolstered the significance of the partnership.

The aim of the chapter is to present the results of an analysis of the EPA's significance for EU trade relations with selected SADC member states (Angola, Botswana, Eswatini, Lesotho, Mozambique, Namibia, the Republic of South Africa).¹ This study posits that the trade liberalisation provided for in the EPA has influenced the mutual trading products flow between the EU and selected SADC economies. The research methods used here include a review of source documents and statistical reports, in addition to a statistical analysis of trade data. Ultimately, the research results enabled an evaluation of the significance of the EPAS for the mutual trade flows in 2016–2022.

6.1. The main provisions of the SADC EPAs

The SADC countries, as the member states of the ACP, use the preferential trading conditions established as early as in 1975. The Cotonou Agreement, signed in 2000, forms the foundation for this relationship, specifying the collaboration in three areas: development, economy and politics. According to this agreement, negotiations on some regional EPA agreements commenced in 2002–2007, with the objective being to introduce mutual trade preferences in compliance with WTO principles. Eventually, the negotiations for Economic Partnership Agreement (EPA) between the EU and SADC EPA group were completed on 15 July 2014, after more than a decade of negotiations. The Economic Partnership Agreement between the EU and SADC comprising Botswana, Lesotho, Mozambique, Namibia, the Republic of South Africa (RSA) and Swaziland (today Eswatini)

¹ The group comprises 16 states, yet only seven of them are bound with the EPA agreement within this regional group, this these countries were selected for the study.

was signed on 10 June 2016 (Economic Partnership Agreement between the European Union and its Member States, of the one part, and the SADC EPA States, of the other part, OJ L 250, 16.9.2016). It entered into force from 10 October 2016, (in Mozambique on 4 February 2018). On 26 July 2022, the Joint Council of the EU and SADC EPA countries adopted a decision enabling Angola to commence negotiations for admission to UE–SADC EPA (European Commission 2018). Moreover, the European Union finalised the negotiations with Angola for the Sustainable Investment Facilitation Agreement on 18 November 2022 and formally signed it on 17 November 2023.

Table 6.1. The scope of tariff elimination and reductions provided for in SADC EPA

EU offer to BLMNS	
Full liberalisation	100% (except arms and ammunition, 93 HS section)
EU offer to South Africa (RSA)	
Full liberalisation	94.9%
Partial liberalisation	3.2%
Excluded	1.9%
SACU offer to EU	
Full liberalisation	84.9%
Partial liberalisation	12.9%
Excluded	2.2%
Mozambique offer to EU	
Full liberalisation	81%
Excluded	19%

Source: Source: (European Commission, 2016, pp. 15–16; Fact sheet, 2011).

The EU-SADC Economic Partnership Agreement provides for reciprocal but asymmetrical tariff preferences. Under the agreement, the EU grants duty-free and quota-free access to goods originating in Botswana, Eswatini, Lesotho, Mozambique and Namibia. This means that products from these countries (with the exception for arms and ammunition) will enter the EU market duty-free. In South Africa, the preferences are less generous. Zero tariffs cover 95% of all tariff lines, with approximately 2% of them excluded from liberalisation (Table 6.1). On the other hand, Botswana, Eswatini, Lesotho, Namibia and South Africa have liberalised approximately 85% of all tariff lines and partially liberalised 13% of them, whilst 2% of tariffs are excluded from liberalisation. Mozambique has ensured the elimination of tariffs on 81% of its tariff lines for imports from the EU.

While the EPA aims to continue and secure duty-free access to the EU market enjoyed for several decades by Botswana, Lesotho, Mozambique, Namibia and today's Eswatini (BLMNS), in the case of South Africa (RSA), the objective of the agreement is to improve the market access conditions, as set out in the 2018 Trade Development and Cooperation Agreement (TDCA) with the EU. This agreement provided South Africa with significantly liberalised access to the EU market, whilst the EPA introduced additional selective and partial liberalisation in this respect. It is selective because it concerns only selected agricultural goods, and partial because it means the establishment of tariff rate quotas (TRQ).² These apply to key South African exports, including sugar, wine, fruit and fruit juices (European Commission 2016, p. 16) (Table 6.1).

In addition to its trade liberalisation aspects and the consequent increase in mutual trade, the SADC EPAs are of particular importance for regional supply chains due to the rules of origin. Whether a product qualifies for export to the EU at a reduced or zero tariff rate always depends on its origin. In order to benefit from the preferences of the EPA agreement, economic operators must comply with specific rules of origin.

The SADC EPA specifies the rules of origin designed to support the development of the new value chains within the region. This includes 'the cumulation of origin', thanks to which the countries that apply the same rules of origin to jointly account for the production of goods that qualify for preferential treatment.³ This mechanism exempts materials originating from countries in the cumulation zone from the obligation to meet the criterion of sufficient processing to confer origin; this involves treating them as if they were materials originating from the country of processing. Therefore, cumulation of origin constitutes an exception to the rule that preferential rules of origin apply to products from only one country benefiting from preferences in the recipient country.

The EPA rules of origin enable an extended cumulation which may facilitate the intraregional trade. The agreement provides for three types of cumulation:

- bilateral, between SADC EPA and EU Member States (Title II, article 3 of the EPA agreement);
- diagonal, comprising the SADC EPA states, the remaining ACP EPA states, overseas countries and territories of the EU (OCTs) and the EU (Title II, article 4 of the EPA agreement);

² A tariff rate quota is a specific quantity of goods for which lower duties are set during the quota period.

³ More about the rules of origin can be found in (Czermińska, 2023; Gwardzińska & Chowaniec, 2021).

- extended cumulation in reference to the materials subject to zero-tariff treatment in the EU, pursuant to the MFN treatment in the EU and in reference to the materials originating from the remaining countries to which preferential quota-free access to the EU applies (LDC countries) (Title II, articles 5 and 6 of the EPA agreement).

Within the bilateral cumulation, the materials originating from the EU and undergoing further processing or treatment in a country benefiting from the SADC EPA preferential conditions are regarded as originating from the beneficiary country, whereby the processing or treatment there must be sufficient to confer origin. Bilateral cumulation is mutual, and thus applies to the materials originating from the EU that undergo treatment or processing beyond the minimum operations in the SADC EPA country and then exported to the EU.

A diagonal cumulation takes place between the SADC EPA countries, the EU and the ACP EPA states, as well as the twenty-five overseas countries territories. As opposed to the TDCA, this cumulation applies solely to the ACP countries which entered into an economic partnership agreement with the EU. Consequently, materials originating from the EU, a SADC EPA country, or other ACP EPA or OCT states may be used for a product created in another SADC EPA country, provided that the processing or treatment there exceeds the minimum operations which are insufficient for conferring origin; if this condition is met, the final product will be regarded as originating from SADC EPA. Conversely, the materials originating from the SADC EPA country, other ACP EPA or OCT states may be used in a product created in the EU. Under the same condition (the processing or treatment there exceeds the minimum non-origin-conferring operations) – the final product will be regarded as originating from the EU.

This cumulation is not applicable to: (1) materials numbered HS 1604–1605 originating from the Pacific (processed or preserved fish; caviar, crustaceans, molluscs and other aquatic invertebrates, processed or preserved); (2) materials originating from the Republic of South Africa, which cannot be brought to the tariff-free and quota-free. From 1 October 2018, the exporters from the EU may apply this diagonal cumulation with ACP EPA states and with the OCTs (Journal of Laws No.: C 407 of 12.11.2018, p. 8).⁴

Whilst diagonal cumulation applies only to the materials originating from the ACT countries covered by the Economic Partnership Agreement, an extended cumulation with the GSP beneficiaries basically refers to the majority of ACP countries, which did not enter into the Economic Partnership Agreement. Therefore, SADC EPA states may obtain such materials from the GSP EBA beneficiaries (who otherwise would use the tariff-free and quota-free access in

⁴ Guide to the Protocol (2022).

the case of direct export to the EU) and treat them as their own materials to be used in their final products. Such materials must be sufficiently processed or treated to confer origin.

Similarly, materials sourced anywhere in the world can be integrated into local production, provided that such goods or materials are subject to MFN zero-tariff access to the EU (extended cumulation). Thus, the final product (resulting from processing sufficient to confer origin) will retain preferential status under the SADC EPA.

A new partnership agreement, known as the “Samoa Agreement” and in force since January 2024, was concluded on 15 November 2023 by the EU and its Member States with the member states of the Organisation of African, Caribbean and Pacific States (OACPS). This agreement is provisional in character, as before it can come into full effect, further legal procedures must be implemented, in particular, ratification by at least two thirds (53) of the OACPS members. The Samoa Agreement contains mutual principles and is based on six key priorities: human rights, democracy and governance; peace and security; human and social development; sustainable economic growth and development; environmental sustainability and climate change; and migration and mobility (Partnership Agreement, 2023).

6.2. Economic significance of selected SADC countries

This section will focus on identifying the potential of the economies studied in the region. The significance of the SADC countries is analysed by the share in the Gross Domestic Product (GDP) and the population (Table 6.2). The studied economies make up 46% of the region's population and generate over 72% of the GDP of SADC. The total share of the selected countries in the SADC GDP decreased by 10 percentage points over the period 2012–2022, primarily as a result of the decline in Angola's share in the SADC GDP from 16.9% in 2012 to 9.1% in 2022. Nevertheless, most of the countries have noted an increase share of SADC GDP, with the largest proportion being that of the RSA which, in 2012 accounted for 57.2% of the total SADC GDP, dropping to 53.6% in 2022. RSA has also the largest population, making up 20.2% of the SADC total population. The data illustrates the stark diversity in the SADC region, which can additionally be analysed using the GDP per capita. The disparity between the highest level (8,304 USD for Botswana) and the lowest (582 USD for Mozambique) is 14-fold (Table 6.3). The GDP per capita in Botswana is one of the region's highest, indicating a relatively efficient economy paired with a small population. It is worth emphasising, however, that in the study period, both economies could be characterised by the highest rates of GDP per capita growth.

Table 6.2. The share in GDP and the population rate in selected SADC countries (%)

SADC		Selected													
		Zimbabwe													
		Zambia													
		United Republic of Tanzania													
GDP	2012	16.9	1.8	0.1	4.0	0.6	0.3	1.5	1.1	1.5	2.2	1.7	0.1	57.2	5.2
	2016	16.0	2.4	0.2	6.1	0.6	0.3	1.9	1.2	2.0	1.9	1.7	0.2	51.1	7.9
	2022	9.1	2.3	0.2	8.8	0.6	0.3	1.9	1.6	1.5	2.0	1.6	0.2	53.6	9.0
Population	2022	12.0	0.9	0.3	2.0	0.4	0.8	10.0	6.9	0.4	11.1	0.9	0.04	20.2	22.0

Source: based on (SADC Statistics, 2022; World Bank, n.d.).

Table 6.3. GDP per capita (USD, PPS)

Countries	2012	2016	2017	2018	2019	2020	2021	2022	2016/2012 (%)	2022/2016 (%)
Angola	5 275	3 677	4 306	3 466	2 757	1 761	2 203	3 478	69,7	94,6
Botswana	6 742	6 795	7 145	7 441	7 195	6 298	7 730	8 304	100,8	122,2
Eswatini	4 530	3 369	4 032	3 882	3 965	3 470	4 180	4 076	74,4	121,0
Lesotho	1 327	1 089	1 182	1 120	1 129	999	1 079	1 063	82,1	97,6
Mozambique	711	460	476	526	529	473	524	582	64,7	126,5
Namibia	6 040	4 360	5 443	5 668	5 100	4 227	4 881	4 856	72,2	111,4
South Africa	8 212	5 762	6 689	6 997	6 626	5 680	6 977	6 680	70,2	115,9
SADC	2 563	1 920	2 152	2 154	2 003	1 726	2 062	2 160	74,9	112,5

Source: based on (SADC Statistics, 2022).

6.3. Trade patterns between the EU and selected SADC economies

From 2012 to 2022, the value of the trade exchange between the EU and the SADC countries fluctuated, both with respect to the export and import (Figure 6.1). However, when focusing on the period after 2016, it is worth paying attention to a substantial trade creation effect, where the turnover increased by 170.7% in 2022 in comparison to 2016 (exports by 131%, and imports by 214.2%). At that time, the majority of SADC states recorded accelerated trade dynamics with the EU, with the largest growth reported in Angola (352.4%), and the largest import increase in Mozambique (193.7%). An analysis of the trade balance of selected SADC countries in relation to the EU reveals that the EU maintains a deficit with these countries, meaning that the value of imports exceeds that exports from the EU to the selected SADC countries.

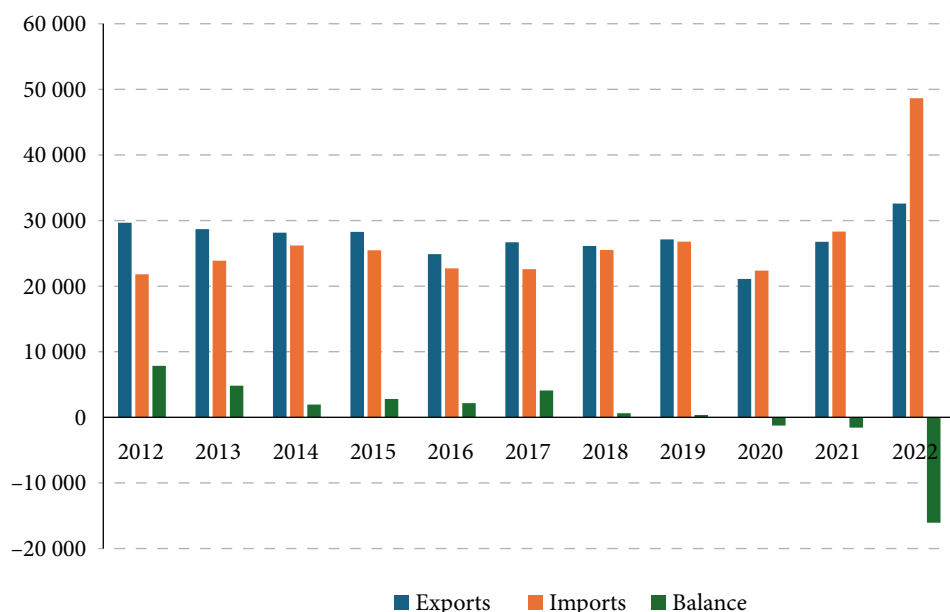


Figure 6.1. EU's commodity trade with the selected SADC countries, 2012–2022 (million EUR)

Source: based on (European Commission, n.d.).

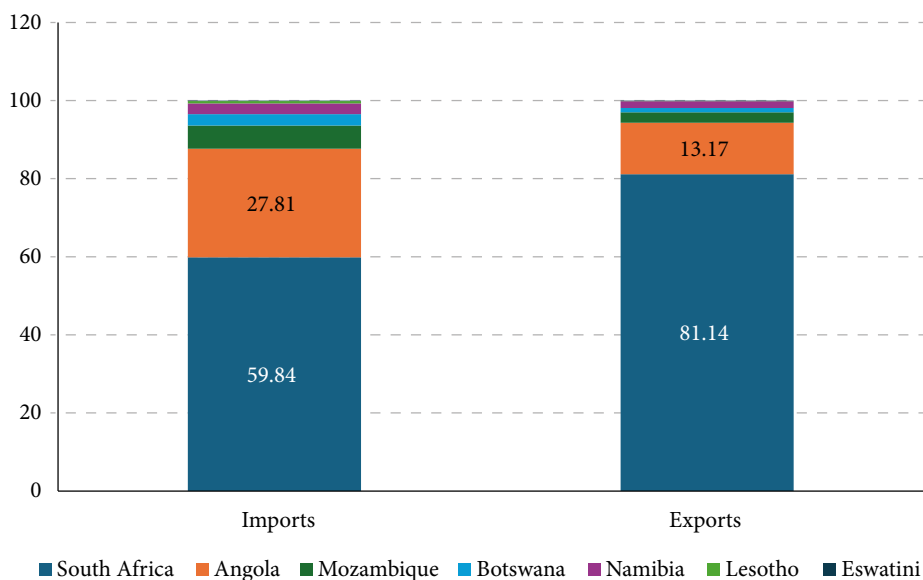
When analysing the share of selected SADC economies in EU trade, their low share of its external turnover must be emphasised i.e. 1.27% in exports and 1.62% in imports in 2022 (Table 6.4).

Table 6.4. The share of the selected SADC in the EU trade exchange (%)

Years	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Exports	1.68	1.61	1.57	1.51	1.33	1.34	1.27	1.27	1.09	1.23	1.27
Imports	1.28	1.46	1.61	1.55	1.42	1.28	1.33	1.38	1.30	1.33	1.62

Source: based on (European Commission, n.d.).

South Africa and Angola clearly dominate EU trade with the SADC economies under review (accounting for 59.8% and 27.8% of EU imports from the region and 81.1% and 13.2% of EU exports, respectively), whilst the share of Botswana, Eswatini, Lesotho, Mozambique and Namibia is substantially smaller (Figure 6.2). However, for most SADC countries, the EU remains an important trading partner, which is evidenced by the EU's high share in these countries' trade.⁵

**Figure 6.2. The share of the economies under review in the mutual trade with EU in 2022 (%)**

Source: based on (European Commission, n.d.).

⁵ In 2022, South Africa's share in the EU trade was 1% for both exports (22nd place) and imports (20th place). The EU's share in South African trade, on the other hand, was 21.9% for exports and 22.1% for imports, making the EU South Africa's number one trading partner. Angola's share in the EU's trade is 0.2% for exports (54th place) and 0.5% for imports (37th place). Conversely, the EU's share in Angola's trade is 24.2% for exports (2nd place) and 31.3% for imports (1st place). Botswana's share in the EU trade is negligible, both for exports (128th) and imports (76th), whereas the EU share in Botswana's trade in 2022 is 7.2% for exports (2nd) and 7.5% for imports (2nd). Similarly, the share of the other

Figure 6.3 illustrates the trade between EU with selected SADC economies in 2022, according to the Standard International Trade Classification (SITC). The most important item in EU imports from the SADC region is mineral fuels, lubricants and related materials (35%). On the other hand, the dominant item in EU exports to SADC is machinery, equipment and transport equipment (41.5%).

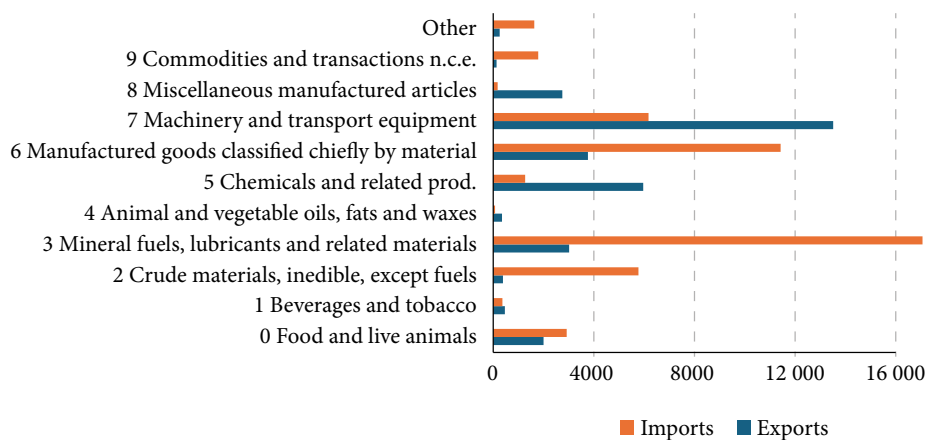


Figure 6.3. The structure of EU trade with the SADC economies under review in 2022 (million EUR)

Source: based on (European Commission, n.d.).

However, the differences in the structure of trade with individual countries, reflecting their economic specificities and natural resources, are obvious. For example, mineral fuels dominate in imports from Angola to the EU (94.1%), whilst industrial goods dominate in imports from Lesotho to the EU (96.6%).

Conclusions

Trade liberalisation under the EPA contributed to an increase in bilateral trade between the EU and selected SADC countries between 2016 and 2022. The average trade creation balance in goods between the EU and the economies under review was positive within this period, confirming the research hypothesis.

economies under review in EU trade is very low, while the EU's share in trade is as follows: Eswatini 3.7% for exports (3rd position) and 4.1% for imports (4th position); Lesotho 33.3% for exports (1st position) and 0.9% for imports (8th position); Mozambique in 2022: 26.2% for exports (1st place) and 8.4% for imports (3rd place); Namibia in 2022: 19.2% for exports (2nd place) and 9.6% for imports (3rd place).

However, the extent of change varies from one country to another. While the share of selected SADC countries in the EU external trade remains small (approx. 1%), the share of EU imports increased from 1.4% to 1.6%, along with a slight decrease in the share of EU exports from 1.33% (2016) to 1.27% (2022). Due to its significant share in EU-South African trade, South Africa has consistently had the greatest impact on the trade balance in the SADC region.

The surveyed SADC countries are oriented towards trade with the EU to varying degrees, which is also directly related to the commodity structure of their trade. South Africa has the highest share of trade with the EU, accounting for 60% of imports and just over 80% of exports (2022). Angola ranks second with a share of 28% of imports and 13% of exports. Mozambique is in third place with a share of 6% of imports and just under 3% of exports. Eswatini has the smallest share in trade with the EU (less than 1%). In the structure of EU imports from the studied economies, mineral fuels, lubricants and related materials continued to dominate, accounting for 35% of the value of imports in 2022. By contrast, EU exports were dominated by machinery, equipment and transport equipment, with a share of 41.5%.

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7. Resilience of the Polish and German economies to external shocks in the context of Polish accession to the EU

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Abstract: Poland's 2004 accession is treated as a structural shock that may have strengthened resilience to later crises. The chapter compares Poland, a new Member State, with Germany, an established EU economy, using quarterly Eurostat data, Vector Autoregression models and Impulse Response Functions. GDP reactions to export shocks are assessed during accession, the global financial crisis, the sovereign-debt crisis and COVID-19. Poland displays stronger and more persistent responses relative to its economic size, while Germany shows earlier but smaller relative movements and greater exposure to large adverse shocks in its export mix. Market access, capital inflows, institutional convergence, EU funds and trade diversification appear to have improved Poland's adaptive capacity. The chapter portrays enlargement as a resilience-building mechanism rather than as a one-off integration event.

Keywords: EU accession, resilience, external shocks, Vector Autoregression (VAR) model, Impulse Response Functions (IRFs), GDP.

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Introduction

The enlargement of the European Union in 2004 marked a watershed for both new and old Member States. The accession of Poland, alongside nine other Central and Eastern European countries, expanded the Union's economic footprint, deepened regional integration, and reshaped trade, investment, and policy dynamics across the region. As highlighted in the accompanying analysis, the enlargement brought substantial macroeconomic gains for the EU as a whole, including higher trade volumes, job creation, and improved resilience to external shocks. Yet the magnitude and channels of these benefits were uneven across Member States, with the accession economies facing both heightened exposure to global fluctuations and enhanced opportunities for growth through integration. As the frequency and the severity of exogenous shocks and subsequent crises increased, the concept of economic resilience has gained significant attention in recent years (Keller, 2021; Majewska & Truskolaski 2024).

This chapter investigates the resilience of the economies that entered the EU in 2004, focusing in particular on Poland as a representative “new” member state and Germany as a benchmark “old” member state in the face of the overlapping crisis phenomena in the global economy. The central question is how EU accession affected their ability to withstand and recover from external shocks of overlapping crises – such as the global financial crisis, the sovereign debt crisis, and the COVID-19 downturn – based on the GDP response to external shocks in exports. By employing Vector Autoregression (VAR) models and Impulse Response Functions (IRFs), the study quantifies the extent to which EU accession altered the resilience properties of Poland and Germany in the face of external shocks, distinguishing responses of GDP to different crisis episodes within the whole analysed period.

The chapter is structured as follows. The literature review section (subsection Economic resilience and its determinants) surveys conceptualisations of economic resilience and its determinants, outlining static and dynamic perspectives and detailing how VAR-based tools capture short-run interdependencies and longer-run adjustment. The following subsection, devoted to the theoretical context, develops the concept of the EU accession shock as a multi-channel resilience mechanism, highlighting how openness, investment, and institutional convergence interact to raise export performance, attract capital, and improve productivity. The final subsection of the literature review examines how external shocks affect national economies and shape their resilience, using the global financial crisis, the euro area sovereign debt crisis, and the COVID-19 pandemic as key examples. The data and methodology section specifies the VAR framework and impulse response analysis, and the data sources used to compare Poland and Germany across the identified crisis episodes. The empirical findings section

presents the key results, emphasising the differential impact of shocks to exports on GDP and the durability of these effects. Finally, the conclusions synthesise the main insights and outline avenues for further research.

7.1. Literature review

7.1.1. Economic resilience and its determinants

Economic resilience, defined as an economy's ability to withstand or recover from shocks, is a cornerstone in economic literature. Briguglio et al. (2009) provide a comprehensive framework for understanding economic resilience, arguing that it is not merely a function of economic structure but also of policies and institutions that enable adaptation and recovery. They further posit that the resilience of small economies, in particular, is influenced by their openness, concentration, and the extent of their shock-absorbing potential.

Several factors can contribute to an economy's resilience. These include the diversity and complexity of the economy, the flexibility of its institutions and markets, the strength of its social networks and communities, and the effectiveness of its policy responses. Economies that are more diverse and complex tend to be more resilient because they are less dependent on any single sector or industry. If one sector is hit by a shock, other sectors can continue to function and support the overall economy. Flexible institutions and markets can help an economy to adapt to shocks. For example, flexible labour markets can help to mitigate unemployment during economic downturns by facilitating the movement of workers from declining sectors to growing ones. Strong social networks and communities can provide a form of social insurance that helps to buffer individuals and households against economic shocks. For example, during times of economic hardship, families and communities often provide support to their members in the form of shared resources, mutual aid, and emotional support. Effective policy responses can also play a crucial role in enhancing economic resilience. Martin et al. (2018) argue that this includes both proactive policies that aim to mitigate the risk and impact of shocks, and reactive policies that aim to facilitate recovery after shocks have occurred. They further suggest that resilience-building policies should be context-specific, taking into account the unique characteristics and vulnerabilities of each economy.

Resilience can be viewed from two main perspectives: static and dynamic. Static resilience refers to the ability of an economy to withstand a shock without changing its structure or behaviour, while dynamic resilience refers to the ability of an economy to adapt and evolve in response to shocks, potentially

leading to a new equilibrium state that may be more efficient or desirable than the original state.

Static resilience can be associated with the Vector Autoregression (VAR) model. By capturing the interdependencies among multiple time series, the VAR model can help understand how a shock to one variable (e.g., an external shock to the economy) affects other variables in the system (like GDP or unemployment rate) at the same point in time. This can provide insights into the immediate or static response of an economy to shocks.

On the other hand, dynamic resilience, which refers to the ability of an economy to adapt and evolve in response to shocks, can be associated with Impulse Response Functions (IRFs). IRFs, derived from the VAR model, trace the response of variables in the system to shocks over time. This can provide insights into the dynamic response of an economy to shocks, including how quickly and effectively it recovers from them.

Therefore, the VAR model and IRFs can be valuable tools for analysing both the static and dynamic resilience of economies. They allow for a nuanced understanding of how economies respond to shocks both immediately and over time, which is crucial for designing effective policies to enhance economic resilience.

7.1.2. Theoretical context of EU accession as a structural shock – resilience function of integration

EU accession can be interpreted as a positive, multi-channel integration shock that lifts efficiency, long-run growth, and macroeconomic resilience. Standard and new trade models predict that removing tariff and non-tariff barriers within a large customs union reallocates resources toward activities with comparative and competitive advantage, deepens specialisation, and expands exports at both the extensive and intensive margins (Michałek & Hagemeyer, 2024). At the aggregate level, tighter external-demand linkages make output more responsive to global trade cycles, yet impulse-response evidence shows that export-driven shocks boost GDP in a positive and persistent way, consistent with an export-led resilience mechanism (e.g., SVAR/GVAR results in Sznajderska, 2021).

Integration also unlocks capital mobility. Accession strengthens policy credibility and compresses risk premia, crowding in foreign direct investment alongside EU funds that finance capacity expansion, technology transfer, and organisational upgrading. In theory, these inflows act on both the supply side (capital deepening, productivity) and the demand side (employment, income). Empirically, they often coincide with a post-accession structural break – a shift to a higher growth regime supported by sustained external financing and institutional adaptation (Ladonko

et al., 2022). In dynamic terms, investment and export effects arrive quickly, with output stabilising at a higher equilibrium as the new capital stock is absorbed.

A third mechanism is institutional convergence. Harmonisation of competition policy, state-aid rules, environmental and product standards, and governance practices reduces transaction costs, strengthens the credibility of economic policy, and lengthens private planning horizons (Ambroziak, 2021, 2022, 2023; Białek & Oleksiuk, 2024). In the language of endogenous-growth theory, these reforms operate as a sustained Total Factor Productivity (TFP) shock: they lock in efficiency gains, magnify the returns to openness, and reinforce the durability of export-led growth. The feedback loop between trade openness and institutional quality – “integration-induced productivity convergence” outlined in Michałek and Hagemeyer (2024) – explains why the accession shock is not merely transitory but yields permanent-type improvements in performance.

Taken together, accession functions as a resilience mechanism. A rule-based Single Market with free movement of goods, services, capital and – imperfectly but materially – labour reshapes expectations, coordinates investment and innovation, and strengthens shock absorption. In compact form, the integration shock raises exports, FDI, and productivity through mutually reinforcing channels of trade, finance, and institutions, placing the economy on a higher and more stable growth path that is better able to transmit, withstand, and recover from external disturbances.

Studies report that integration with the European Union is associated with economic integration with trade-offs. Aizenman and Saadaoui (2024), Buti and Szekely (2019), and Jacoby (2014) note that accession encourages growth, increased foreign direct investment, and trade integration. At the same time, these studies document how such economic openness can heighten exposure to external shocks and market volatility, particularly in non-eurozone contexts.

For Poland, integration into the EU increased its exposure to global demand fluctuations but simultaneously changed the sign and persistence of responses: shocks transmitted through exports now had a stronger positive multiplier, while negative shocks (e.g., crisis-related declines in global demand) were increasingly buffered by structural funds, fiscal coordination, and flexible exchange rates.

EU integration enhanced Poland's resilience to external crises. Both empirical reports (Ambroziak 2023; Białek & Oleksiuk 2024) and analytical models (Sznajderska 2021) demonstrate that post-accession Poland displayed a higher ability to absorb negative foreign shocks such as the 2008 global financial crisis, the Eurozone debt crisis, and the COVID-19 recession without long-term output loss. This resilience stems from several reinforcing mechanisms:

1. **Policy Anchoring and Credibility:** The institutional commitments of EU membership constrained fiscal and monetary populism, creating a credible policy environment that reduced risk premiums and currency volatility.

2. Diversified Trade and Financial Linkages: Integration broadened export markets and investment partners, decreasing exposure to single-country shocks.
3. Countercyclical Fiscal Transfers: Access to EU structural and cohesion funds acted as automatic stabilisers during downturns.
4. Adaptive Labour Markets: Migration flows to and from the EU provided a demographic shock absorber, aligning domestic labour supply with cyclical fluctuations.

Białek & Oleksiuk (2024) emphasise that Poland's macroeconomic volatility decreased markedly after 2004, with output gaps closing faster and recessions shallower compared to pre-accession years. Their analysis conceptualises EU membership as a "resilience dividend" – a permanent improvement in the country's ability to withstand shocks. In the language of impulse response analysis, this corresponds to a smaller negative deviation of GDP following crises and a faster return to equilibrium.

Balcerowicz's 2007 study noted that while EU accession initially implied rapid exposure to external markets and competition, it also strengthened the macroeconomic policy framework. Later research (Białek & Oleksiuk, 2024; Michałek & Hagemeyer, 2024) documented that the same institutional and financial mechanisms that amplified Poland's upward growth trajectory in the 2000s helped stabilise output during the successive global and European crises.

This resilience stems from three interacting theoretical channels:

1. The Automatic Fiscal Channel. The Stability and Growth Pact and access to EU structural and cohesion funds introduced countercyclical elements into Poland's fiscal policy. In downturns (2008–2009, 2020–2021), EU transfers rose relative to GDP, functioning as external automatic stabilisers. These transfers finance public investment and social programmes insulated from domestic budget tightening, thus mitigating the negative phase of the cycle.
2. The Financial Credibility Channel. Integration into the EU's financial and regulatory architecture reduced perceived sovereign risk. Poland's flexible exchange-rate regime, together with IMF's Flexible Credit Line, acted as a shock absorber during global financial turbulence. The institutional credibility effect meant that capital inflows resumed quickly after each crisis, avoiding the sudden-stop phenomena typical for non-integrated emerging markets.
3. The Trade Diversification Channel. Membership of the Single Market increased both the number of export destinations and the sophistication of exported goods. Thus, even when global demand declined, Poland's export portfolio shifted dynamically across EU submarkets. This diversification explains why, in the VAR model, the GDP response to export shocks remains consistently positive across the entire sample period, even when major crises are incorporated as exogenous dummies.

The theoretical literature therefore interprets Poland's accession as a structural upgrade in the transmission mechanisms of global shocks.

7.1.3. External shocks and national economic responses

External shocks, whether financial, fiscal, epidemiological or geopolitical, translate into macroeconomic reactions through four intertwined channels: trade, finance, expectations and policy. Trade shocks alter demand, import prices and inventories; financial shocks shift risk premia, collateral values and credit supply; expectations affect precautionary saving and the option value of waiting; policy transmits automatic stabilisers, discretionary fiscal measures, monetary reactions and regulatory forbearance. The balance between amplifiers (financial accelerator input-output propagation, inventory cycles) and buffers (bank capital, cash cushions, social insurance, international risk-sharing) determines the depth of the trough and the speed of recovery. Static resilience is the contemporaneous impact given existing buffers; dynamic resilience is the full adjustment path back to trend, measured by impulse-response functions that summarise peak effects, half-life and long-run convergence.

The following subsections examine three emblematic episodes (the 2007–2009 global financial crisis, the 2009–2012 euro area sovereign debt crisis, and the 2020 COVID-19 shock) to illustrate how variations in shock type, initial conditions, and policy mix map into distinct transmission patterns and resilience profiles.

Global financial crisis

The financial crisis of 2007–2008 had a significant impact on Europe's economies, with the effects of the crisis unfolding over several quarters. While the crisis originated in the United States due to the subprime mortgage market's collapse, its consequences quickly spread to Europe and other parts of the world. In Europe, the sequence ran from stress at some banks in mid-2007, through the post-Lehman funding freeze in Q3 2008, to recessions in 2009. Transmission operated via a sudden stop in wholesale funding, jumps in risk premia, bank deleveraging, and a collapse of trade finance and investment. Policy responses combined liquidity backstops and guarantees with fiscal stimulus; recovery relied on bank repair and regulatory overhaul that gradually restored credit and confidence.

Sovereign debt crisis

The sovereign debt crisis, also often referred to as the European debt crisis, was a financial calamity that struck several European nations in the aftermath of the 2008 global financial crisis, and it spanned roughly from 2009 to 2012. The

core mechanism was a sovereign–bank feedback loop: rising sovereign yields weakened banks holding domestic bonds, which amplified funding stress. Policy combined fiscal adjustment and competitiveness-oriented realignment with European-level firewalls (EFSF/ESM) and the ECB's backstop via Outright Monetary Transactions, re-anchoring expectations.

COVID-19 crisis

The outbreak of the SARS-CoV-2 pandemic in China at the end of 2019 and its rapid spread across the globalised world in early 2020 had a severe global economic impact. As a macro shock, COVID-19 combined simultaneous supply restrictions (mobility and workplace constraints) with a demand contraction driven by uncertainty and precautionary behaviour. Effective responses layered three pillars: large temporary fiscal transfers and state guarantees; highly accommodative monetary policy and regulatory forbearance; and labour-market schemes to preserve matches. The literature stresses that resilience policies must be context-specific, blending proactive risk reduction with reactive support (e.g., Martin et al., 2018).

These crises have produced heterogeneous economic effects, affecting economic growth, policies, and institutional governance, fiscal variables, banking sectors, and government debt, with some countries experiencing more dramatic consequences than others. The variations are driven by country-specific factors like economic structure and local fiscal policies, making a uniform EU-wide response challenging.

7.2. Methods and data sources

7.2.1. Data sources and description

The empirical analysis in this study relies on a rich dataset retrieved from the Eurostat Dissemination Database, an official data portal of the European Union. This dataset offers a comprehensive range of social and economic statistical data that covers all EU Member States. We focus on a pair of countries: Poland as the “new” EU member and Germany as the “old” one. We used quarterly data for the period 2000–2023 from Eurostat databases.

We incorporate the following variables into our analysis:

1. Gross Domestic Product (GDP) – in EUR mln as a comprehensive measure of overall economic activity within countries.
2. Exports of goods and services – in EUR mln as a measure of economic activity and its vulnerability to external shocks.
3. Crises Dummy – a dummy variable incorporated to account for any major economic or financial crises during the observed period.

Figure 7.1 and Figure 7.2 below present the comparison of changes over quarters within the years 2000–2023 in GDP and exports (in millions of euros, current prices) in Poland and Germany, respectively.

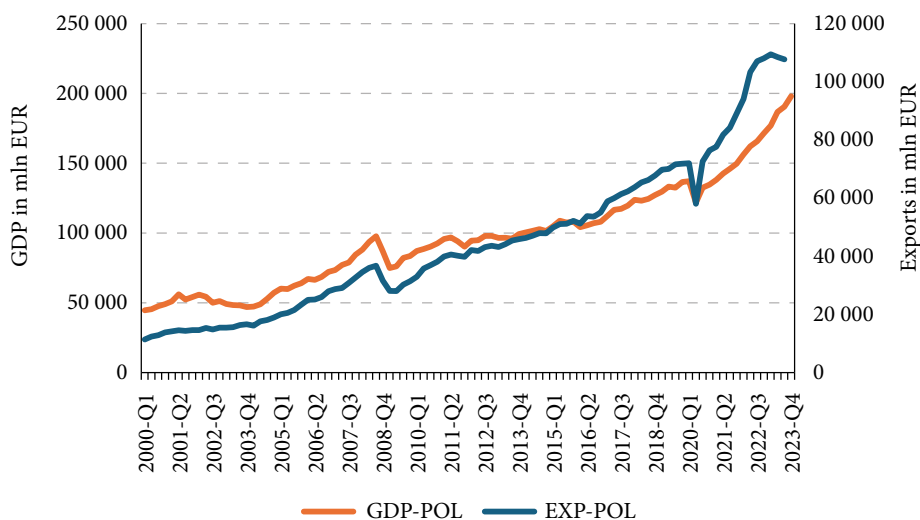


Figure 7.1. GDP and exports values in EUR mln over time for Poland

Source: based on Eurostat Database.

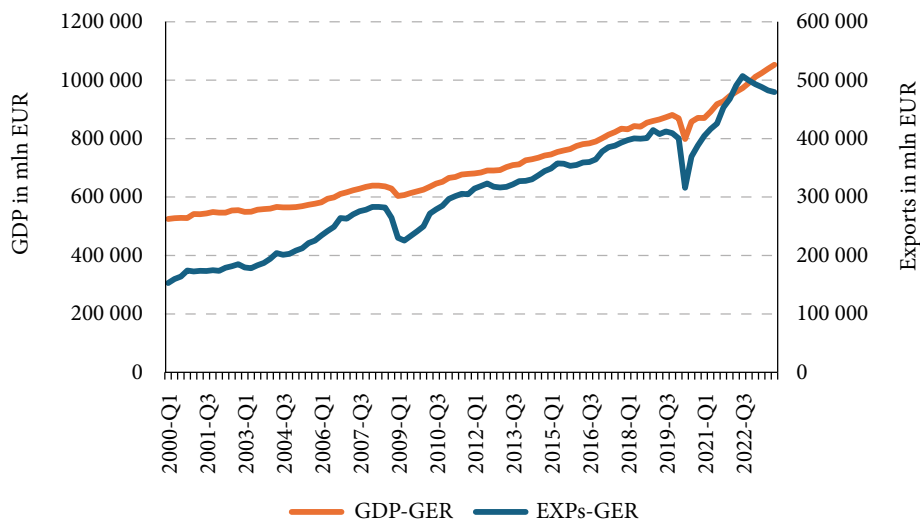


Figure 7.2. GDP and exports values in EUR mln over time for Germany

Source: based on Eurostat Database.

7.2.2. Method and model specification

We employ the Vector Autoregression (VAR) method to compute the Impulse Response Functions (IRFs) for explaining the effects of positive (EU accession) and negative (crises) shocks on the endogenous variables – GDP, and exports of goods and services. The VAR model is a multivariate time series econometric model that captures the linear interdependencies among multiple time series variables (Lütkepohl, 2005).

We compute the IRFs to analyse the dynamic responses of GDP to one standard deviation shocks in exports in the presence of the external dummy variables representing EU accession in 2004, the 2008 financial crisis, sovereign debt crisis, and Covid-19 pandemic for the period 2000–2023. The IRFs provide insights into the magnitude, direction, and persistence of the impact of these shocks on the GDP changes in Poland and Germany as examples of “new” and “old” EU Member States.

VAR models are widely used in macroeconomics to analyse the dynamic interactions between economic variables, policy analysis, and forecasting (Sims, 1980; Stock & Watson, 2001). The VAR model is appropriate for this study due to its ability to capture the complex relationships among GDP, exports of goods and services, and external shocks (Enders, 2015).

The VAR model can be represented by the following equation:

$$\Delta Y_t = A_1 \Delta Y_{t-1} + A_2 \Delta Y_{t-2} + \dots + A_p \Delta Y_{t-p} + B_1 X_{1t} + B_2 X_{2t} + B_3 X_{3t} + \varepsilon_t$$

where

ΔY_t is a vector of endogenous variables (seasonally differenced real GDP, and exports of goods and services),

A_i ($i = 1, 2, \dots, p$) are matrices of coefficients to be estimated,

X_{1t} , X_{2t} , and X_{3t} are the dummy variables representing the accession to the EU, 2007–2008 financial crisis, 2009–2012 sovereign debt crisis, and the 2020 COVID-19 pandemic, respectively,

B_i ($i = 1, 2, 3$) are coefficient vectors associated with the external shocks, and ε_t is a vector of error terms.

The VAR model is estimated using the ordinary least squares (OLS) method. The optimal lag length for the VAR model is determined using information criteria such as Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) (Lütkepohl, 2005). Diagnostic tests, including serial correlation tests (Breusch–Godfrey test), heteroskedasticity tests (White test), and tests for

normality of residuals (Jarque–Bera test), are conducted to ensure the model's validity and robustness (Enders, 2015). After estimating the VAR model, we compute the Impulse Response Functions (IRFs) to analyse the dynamic responses of the endogenous variables (seasonally differenced real GDP, and exports of goods and services to one standard deviation shocks in the external dummy variables representing the accession to the EU, 2007–2008 financial crisis, sovereign debt crisis, and COVID-19 pandemic.

7.3. Results

7.3.1. Poland

We built a VAR model taking GDP (EUR mln) as an endogenous variable and calculated IRF showing the response of GDP to an export shock, as a measure of the economy's resilience to shocks. The response is measured in terms of standard deviations, with the shock to exports and the corresponding response of GDP during each crisis. The data reveals considerable variation across different crises and countries, illustrating the interplay between external shocks and national economic responses.

Table 7.1 reports the size of export shocks and the associated GDP responses for Poland, both in standard-deviation units, across four episodes.

Table 7.1. Impact of accession and various crises on exports and GDP response, Poland

Country	Accession, crises	Shock to exports (in standard deviations)	Response of GDP (in standard deviations)
Poland	accession to the EU	0.013	0.029
	financial crisis	−0.065	−0.135
	sovereign debt crisis	none	none
	COVID-19	−0.175	−0.193

Source: based on Eurostat Database.

Based on the data collected, the GDP response to shocks in exports varies during different crises. The accession to the EU registers a small positive export impulse ($+0.013\sigma$) with a positive GDP reaction ($+0.029\sigma$). The implied output-to-export transmission is approximately 2.23 ($0.029/0.013$), consistent with a benign demand expansion and productivity gains. The global financial

crisis shows a negative export shock (-0.065σ) and a larger negative GDP response (-0.135σ), giving a transmission of 2.08; output fell roughly twice as much (in σ terms) as exports, in line with financial-accelerator effects. For the sovereign debt crisis, the table records no distinct shock for Poland, suggesting that this episode did not generate a statistically separable export disturbance in the Polish data. The COVID-19 shock is the largest in magnitude on exports (-0.175σ) and translates into -0.193σ on GDP; the transmission ratio drops to about 1.10, indicating that supply restrictions, precautionary behaviour and policy buffers damped the pass-through from trade to output compared with the financial crisis.

Figure 7.3 below presents IRF of GDP to a shock in exports for Poland.

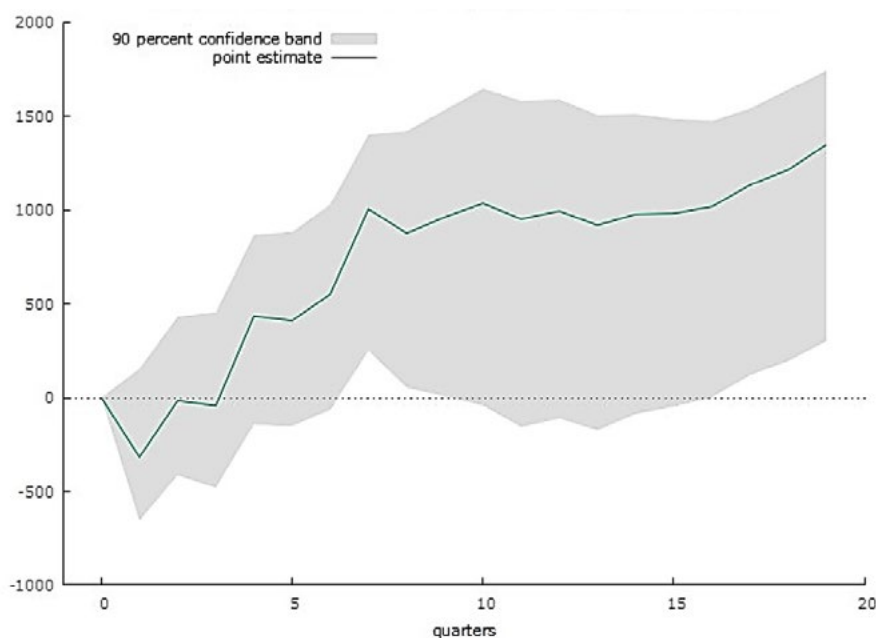


Figure 7.3. Response of GDP in EUR mln to shocks in exports for Poland

Source: based on Eurostat Database.

The Polish GDP response to an export shock begins slightly below zero, turns positive within the first few quarters, rises steeply to a peak of about EUR 1,000 million around quarters 3–7, and then settles near EUR 1,250 mln by quarter 20. The 90% confidence band is wide and overlaps zero at several horizons, so claims of positivity refer to the point estimate rather than to uniformly significant effects across the whole path. Taken as a whole, the profile suggests a gradual and

persistent pass-through from exports to output, with considerable uncertainty about the precise magnitude at different horizons.

7.3.2. Germany

Table 7.2 summarises Germany's export shocks and associated GDP responses (both in standard-deviation units) across major episodes.

Table 7.2. Impact of accession and various crises on exports and GDP response, Germany

Country	Accession, crises	Shock to exports (in standard deviations)	Response of GDP (in standard deviations)
Germany	accession to the EU	0.073	0.061
	financial crisis	-0.433	-0.314
	sovereign debt crisis	none	none
	COVID-19	-1.06	-0.889

Source: based on Eurostat Database.

EU accession appears as a small positive disturbance to exports ($+0.073\sigma$) with a positive GDP reaction ($+0.061\sigma$). The implied output-to-export transmission is 0.84 ($0.061/0.073$), indicating a modest aggregate pass-through. The global financial crisis records a negative export shock (-0.433σ) and a GDP response of -0.314σ , for a transmission of 0.73; output moved less than one-for-one with exports in standard-deviation terms, consistent with partial absorption through domestic buffers. The sovereign debt crisis shows no distinct shock in this specification, suggesting the episode does not yield a statistically separable export disturbance for Germany in the underlying identification. The COVID-19 shock is the largest in magnitude (-1.06σ on exports) and maps to -0.889σ on GDP, a transmission of 0.84.

Figure 7.4 below presents IRF of GDP to a shock in exports for Germany.

The point estimate turns positive in the first quarters, reaches a local maximum of roughly EUR 2,000 million within about 2–3 quarters, then retraces toward EUR 700–1,000 million around quarters 5–7, and gradually rises to a plateau near EUR 1,500 mln by quarter 20. The 90% confidence band is wide and overlaps zero at several horizons, so this profile should be interpreted as a positive point estimate rather than a uniformly significant effect across the whole path.

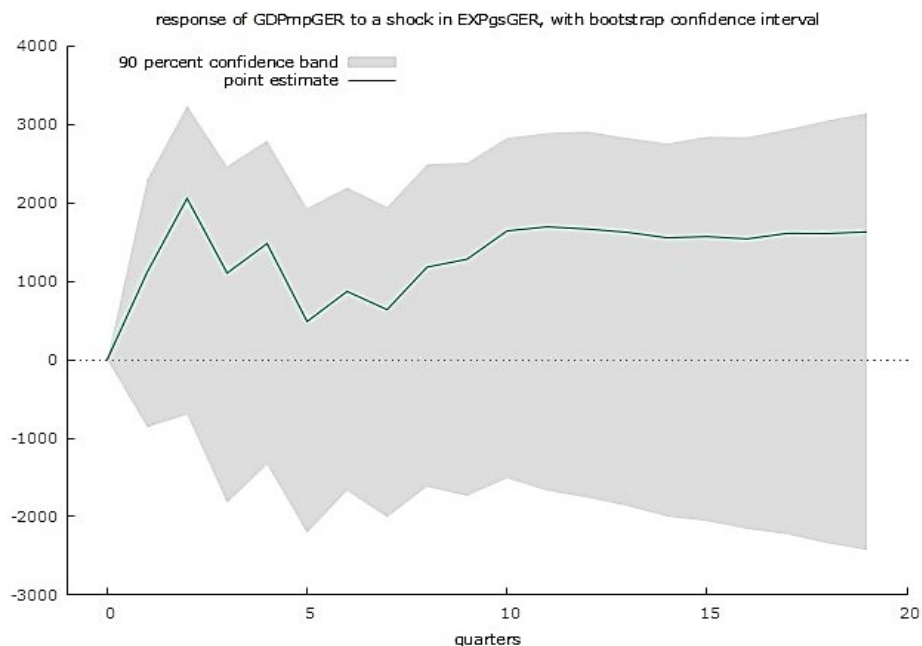


Figure 7.4. Response of GDP in EUR mln to shocks in exports for Germany

Source: based on Eurostat Database.

Economic resilience and interpretation of magnitudes

Expressing the impulse responses as a share of GDP yields a consistent ordering: Poland's GDP responds more strongly to an export shock than Germany's across all five normalisations. Poland's peak effect lies between 3.26% of GDP (2004Q2 baseline) and 0.71% (2025Q2); the corresponding range for Germany is 0.45% to 0.23%. The implied Poland-minus-Germany peak gap is therefore about 0.52 to 2.90 percentage points. Persistence is also greater for Poland in relative terms. The cumulative response over 0–20 quarters, measured in percent-quarters of GDP, exceeds Germany's by roughly 4.6 to 29.4, depending on the baseline. The temporal profiles differ: Germany's point estimate spikes early and then flattens, whereas Poland's rises gradually and peaks late within the 20-quarter window. In absolute euro amounts, Germany remains larger, but after scaling by GDP Poland exhibits the larger relative pass-through from external demand and a more persistent profile. Confidence bands in the original figures overlap zero at several horizons for Germany and are wide for Poland, hence assertions of positivity refer to point estimates rather than uniformly significant effects.

Conclusions and discussion

Three results emerge. Firstly, when impulse responses are scaled by GDP, Poland's GDP reacts more strongly to an export shock than Germany's across all five normalisations. Poland's peak response ranges from 3.26% to 0.71% of GDP, while Germany's ranges from 0.45% to 0.23%. The Poland-minus-Germany gap at the peak lies between 0.52 and 2.90 percentage points. The cumulative effect over 0–20 quarters is also larger in Poland by about 4.6 to 29.4 percent-quarters, which points to greater persistence in relative terms. Germany's point estimate peaks early and flattens, whereas Poland's rises more gradually and peaks late. In levels, Germany remains larger, but once scaled by GDP, Poland exhibits the stronger relative pass-through.

Secondly, table evidence on episode-specific shocks aligns with this ranking and clarifies why the long-run comparison favours Poland. For Poland, the accession impulse is positive on exports ($+0.013\sigma$) and GDP ($+0.029\sigma$). Crisis shocks are negative but of moderate size: financial crisis -0.065σ on exports and -0.135σ on GDP, COVID-19 -0.175σ and -0.193σ . For Germany, accession is also positive ($+0.073\sigma$ on exports, $+0.061\sigma$ on GDP), yet crisis shocks are much larger in absolute σ terms: financial crisis -0.433σ with -0.314σ on GDP, COVID-19 -1.06σ with -0.889σ on GDP. Hence the accession benefit is present in both economies, but Germany's stronger exposure to adverse global shocks offsets it more forcefully over longer horizons.

Thirdly, the pattern is consistent with an integration-driven resilience mechanism operating more powerfully in Poland after 2004. Accession coincided with deeper market access, capital inflows and institutional convergence that raised export capacity and lowered risk premia. The result is a larger relative elasticity of GDP to external demand and a more persistent adjustment profile. Germany's aggregate, while benefiting from accession, appears more insulated in percent-of-GDP terms due to size and diversification, and at the same time more exposed to large negative external disturbances that hit its export mix during crisis episodes.

Taken together, the figures and tables support the following conclusion. In the post-accession era, Poland displays stronger and more persistent responses to export impulses relative to its size, while Germany registers earlier but smaller relative movements and a heavier imprint of crisis shocks. This combination explains why Poland's medium-to-long-run profile in the IRFs is positive and upward in relative terms, and why Germany's positive accession effect is more fully offset by the magnitude of subsequent global crises.

Further research could expand cross-country comparisons by extending the analysis beyond Poland and Germany to include a broader set of EU newcomers and EU-15 members to assess the generality of the accession-led resilience mechanism across different institutional contexts and development levels, taking into account membership or non-membership of the euro area. Moreover, empirical findings would be situated within a broader theoretical framework of integration-induced resilience, linking micro-level policy actions (e.g., policy credibility, diversification of trade, structural funds) to macro-level outcomes in GDP stability and recovery dynamics.

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8. Cross-border cooperation in the EU in light of economic fluctuations: The case of the Polish-German borderland

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Abstract: The Polish-German borderland provides a test of whether territorial cooperation follows actual economic linkages or merely geographical proximity. The chapter combines literature and legal-document reviews with Eurostat GDP data for NUTS3 border regions from 2000 to 2020. Cyclical fluctuations are extracted with the Hodrick–Prescott filter and compared through Pearson correlations. Although local governments frequently cooperate with directly adjacent partners, business-cycle convergence between neighbouring Polish and German border regions is rare and usually weak. Some correlations appear between territories that do not share a border, while several commonly cited cross-border links show little economic synchronisation. The chapter challenges border-centred thinking in cooperation policy. More effective projects require evidence on real socio-economic interdependencies, not only administrative adjacency or historical partnership patterns.

Keywords: border regions, Polish-German borderland, business cycles, European Union, European Territorial Cooperation, Interreg.

Introduction

Cross-border cooperation is a relatively new research subject; though widely addressed in political science, sociology, law, and geography, it has been less frequently explored in the field of economics (Perkmann, 2003; Wróblewski, 2020, 2021, 2022, 2024). The growing interest in cross-border cooperation is undoubtedly linked to the intensification of integration processes occurring in Europe at regional and local levels. The latter has included the establishment of the first Euroregional structures along the borders of Western European states in the late 1950s and early 1960s, followed by their expansion to the eastern part of the continent in subsequent decades. Equally significant was the adoption of key legal instruments by the Council of Europe in the 1980s, including

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the Framework Convention on Cross-Border Cooperation. However, the most critical factor in the development of cross-border cooperation in Europe has been the financial support from the European Union, particularly within the framework of European Territorial Cooperation.

The primary objective of cross-border cooperation is to address shared challenges faced by border regions. In the EU, local governments predominantly engage in such cooperation with administrative units located directly across the national border. This approach is also reflected in much of the subject literature (Perkmann, 2003; Wróblewski, 2022, 2024).

However, the criterion of border adjacency – that is, mere geographical proximity – as a basis for territorial cooperation has been somewhat overemphasised. Such a narrow focus may fail to account for the needs of the real economy. For instance, businesses operating in border regions primarily respond to market-driven goals and mechanisms rather than their own location on the border. This aspect is often overlooked in cross-border cooperation projects, as geographical distance is becoming less relevant.

As a result, policymakers who fail to comprehend the actual economic linkages within a given region may propose solutions or make decisions that are unjustified and fail to address the needs of local businesses or workers. It is therefore essential to approach the issue of cross-border cooperation and linkages from the perspective of said economic needs. Doing so may enable local governments to develop appropriate regional development pathways and strategies while also designing adequate cross-border cooperation projects.

This study seeks to examine cross-border cooperation among border regions in the context of business cycle convergence, using the Polish-German borderland as a case study. To this end, an assessment was conducted of the degree of synchronisation of business cycle fluctuations in NUTS3 border regions along the Polish-German border. The study draws on GDP data from the years 2000–2020, sourced from the Eurostat database, and employs the following research methods: literature and legal document analysis, the Hodrick–Prescott filter, and Pearson’s linear correlation.

8.1. Cross-border cooperation support in the EU

Cross-border cooperation denotes some form of cooperation undertaken by at least two entities located across a state border to achieve a common goal. While numerous forms of cross-border cooperation exist (Wróblewski, 2022), local governments can only undertake cooperation within the limits established by domestic law. Consequently, individual entities in different EU countries may

different or legally insufficient jurisdictions in this regard (Wróblewski, 2020, 2021, 2022, 2024).

The term 'cross-border cooperation' does not appear in EU legislation. Instead, the term 'territorial cooperation' is used. This designation was introduced by the European Commission, the Council, and the European Parliament in response to a recommendation from the Committee of the Regions, which called for a clear definition encompassing cross-border, interregional, and transnational cooperation.

The EU supports cross-border cooperation along its internal and external borders. It occurs in legal, organisational and financial dimensions (Perkmann, 2003; Virkkunen, 2002). The legal dimension includes the EU cohesion policy law, while the financial dimension is manifested in the establishment of financial instruments (Perkmann, 2003). The organisational dimension, on the other hand, refers to the management of cross-border cooperation programmes, including by designated managing authorities.

One of the first initiatives supporting such cooperation was the Phare Programme, established in 1989. Its primary objective was to assist the economic and political transformation of Central and Eastern Europe. It comprised three components: Phare CBC, Credo, and Tacis. For example, Phare CBC focused on supporting cooperation along the external borders of the EU. For instance, Poland's borderlands saw the implementation of several programmes (Poland–Germany, Poland–Czech Republic, Poland–Slovakia, and Poland–Baltics).

In the following years, support for cross-border cooperation on the borders of EU Member States was mainly carried out through the Interreg initiative. Its establishment emphasised the importance of territorial cooperation for territorial, social and economic cohesion, with five editions implemented to date (1991–1993, 1994–1999; 2000–2006; 2007–2013; 2014–2020).

However, the direct inclusion of territorial cooperation as a distinct objective within the EU's regional policy only occurred with the 2007–2013 programming period. At that time, European Territorial Cooperation (ETC) became a separate goal of cohesion policy. Furthermore, the European Parliament and the Council adopted an implementing regulation for funding territorial cooperation through the European Regional Development Fund (ERDF) only for the 2014–2020 period. Currently, the primary legal basis for territorial cooperation in the European Union is Article 178 of the Treaty on the Functioning of the European Union (TFEU), alongside the aforementioned Regulation 1299/2013.

For the 2021–2027 financial period, ETC consists of four components, rather than three as in previous programming periods (Component A: cross-border cooperation; Component B: transnational cooperation; Component C: interregional cooperation; Component D: cooperation of outermost regions with re-

gions of neighbouring countries). For instance, Component A concerns NUTS3 border regions located along all land borders of the European Union and maritime borders, which are not separated by a distance of more than 150 km. This component supports regions in solving common problems, hoping to contribute to the harmonious development of the entire EU (allocation: 72%). Support is provided for projects concerning such aspects as entrepreneurship, SMEs and cross-border trade, environmental protection, communication infrastructure, human capital, labour market or culture.

The second key instrument supporting cross-border cooperation among border regions in the European Union – this time with a strictly legal dimension – is the European Grouping of Territorial Cooperation (EGTC). Its primary objective is to eliminate legal barriers to territorial cooperation. EGTCs enable national, regional, and local authorities, as well as other public law entities, to establish formal cooperation structures. These structures are granted legal personality in accordance with the laws of the country where their headquarters are located. However, EGTCs do not engage in industrial or commercial activities.

Public entities from third countries may also participate in EGTCs, provided that they share a border with at least one EU member state and that the state in question takes part in EU territorial cooperation programmes. At the same time, EU Member States bordering third countries must recognise their participation in EGTCs as being in line with the scope of their territorial cooperation policies or the state of bilateral relations.

Contrary to expectations, EGTCs are not a widely adopted cooperation structure (Wróblewski, 2020, 2021). For instance, only five groupings are currently headquartered in Poland. However, none of these concern the Polish-German border, despite the establishment of four Euroregions in this area since the early 1990s and the numerous bilateral agreements and cooperation arrangements concluded between Polish and German local government units. The academic literature also provides ample evidence for the intensity of cross-border cooperation along the Polish-German border. The limited use of EGTCs in this context may stem from the fact that their scope of activity – such as transport corridors or R&D – often exceeds the jurisdiction of local governments. As a result, local authorities may perceive them as instruments that do not fully align with their needs. This raises the possibility that EGTCs may not effectively address the issue of institutional distance, or that, in the view of policymakers, it is simply not considered an essential tool for establishing an efficient form of cooperation.

8.2. Cross-border cooperation in the Polish-German borderland and the convergence of economic fluctuations

Cross-border cooperation in the Polish-German border area occurs mainly on the basis of direct agreements between local authorities. It then manifests itself in a range of activities, from study visits or joint sessions of local authorities, through the organisation of cultural or educational events, to flood protection, support for entrepreneurship or the development of local labour markets. The majority of these activities are implemented as part of projects co-financed by the ERDF under ETC.

Nevertheless, policymakers in borderland local governments seem to place excessive faith in the geographic location, specifically proximity to the border. Most cross-border cooperation strategies developed by local governments focus on partnerships with directly adjacent entities across the state border. The subject literature reflects a similar border-centric approach. This issue also results from EU-funded programmes supporting cross-border cooperation, such as Interreg, which define cooperation priorities with a strong emphasis on spatial factors. As a result, local decision-makers lacking knowledge of the actual economic linkages within a given region may propose solutions or make decisions that are misaligned with economic realities, designing cooperation strategies or projects solely based on border proximity.

However, socioeconomic linkages, such as business cooperation and labour migration, often occur between regions located further away from state borders. For example, many enterprises operating in the Polish-German borderland follow market-driven logic and seek business partners or consumers based on market considerations alone rather than on the mere fact that a potential partner happens to be located across the border (Wróblewski, 2021, 2022, 2024). While border proximity creates conditions for cooperation, it is not a decisive factor. The key driver of such activities remains market mechanisms, whereas geographical location is becoming increasingly irrelevant in the modern economy.

Central in this regard is the phenomenon of real business cycle convergence. In a general sense, it means the degree of complementarity between economic processes observed in a region and the condition of the economy of other regions or the national economy as a whole. This phenomenon is completely overlooked in borderland studies literature. In turn, the literature produced in the field of macroeconomics, i.e. one relevant to such phenomena, fails to consider the economic situation from the point of view of lower than NUTS2 units (de Haan & Montoya, 2007; Volpe Martincus & Molinari, 2007). In most cases, the authors limit their reflections to the level of national economies. Identifying trends and

The research procedure was conducted in five distinct stages. In the first stage, data on gross domestic product at current prices, along with annual data for 2000–2020¹ for the regions under study, was converted into natural logarithms. In the second stage, the trend value for the logarithmic data was determined using the Hodrick–Prescott method (Hodrick & Prescott, 1997). Next, the cycle of deviations from the trend line was determined. The correlation of business fluctuations was subsequently determined for the regions under study employing Pearson’s linear correlation. The final step was to classify the obtained correlations into one of five proposed classes (Table 8.1):

Table 8.1. Criteria for classifying the correlation of economic fluctuations

Degree of correlation	Classification criteria
Very high	$r \geq 0.95$
High	$0.95 > r \geq 0.87$
Moderate	$0.87 > r \geq 0.71$
Low	$0.71 > r \geq 0.50$
No correlation	$r < 0.50$

Source: own elaboration.

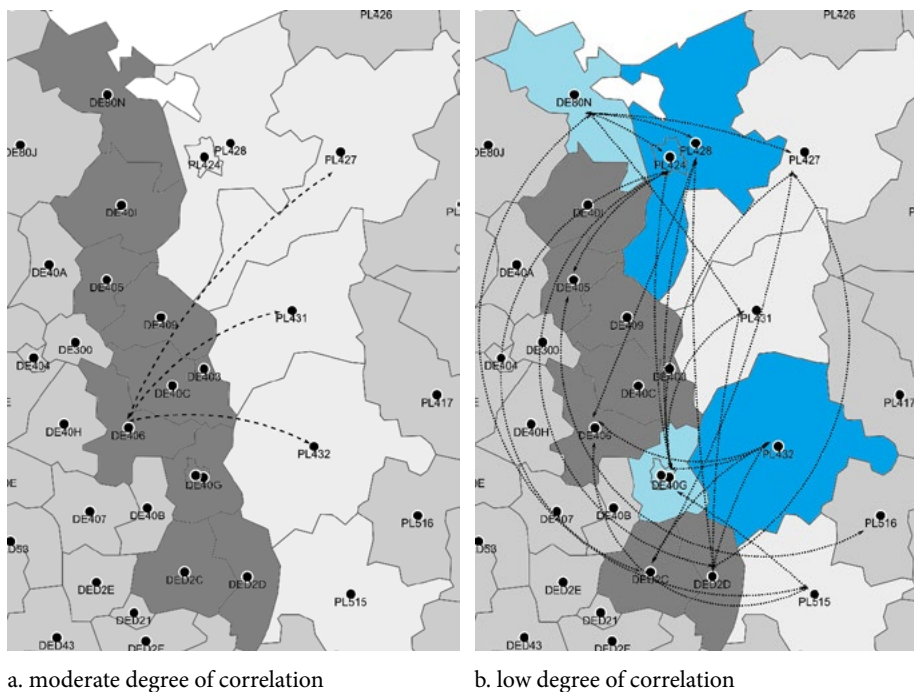
For editorial reasons, the detailed analysis results constitute a separate file, published in Mendeley Data (Wróblewski, 2025). Therefore, the main text refers solely to the selected synchronisation indicators.

The subject literature suggests that linkages between Polish and German border regions are highly common (Dołzbłasz, 2012; Wróblewski, 2021, 2022). However, business cycle convergence between them is rare and, when present, typically weak (Figure 8.2; Wróblewski, 2025). Furthermore, an asymmetry in domestic correlations is evident. Polish regions are closely interconnected, including instances of the highest-degree correlations. In contrast, on the German side of the border, internal interdependencies tend to be weak.

Along the Polish-German borderland, most observed correlations occurred between regions that do not share a direct boundary (Figure 8.2; Wróblewski, 2025). Only four such regional pairs exhibited business cycle convergence, and even then, the correlations between them were merely weak. These cases involved the German region of Vorpommern-Greifswald [DE80N] and both the Szczecin region [PL428] and the city of Szczecin [PL424]. The remaining two were observed between the Zielona Góra region [PL432] and the German regions of Spree-Neiße [DE40G] and Görlitz [DED2D]. This pattern supports

¹ Based on the available data, the widest possible time frame was adopted.

the hypothesis that cross-border economic ties are not necessarily concentrated in regions directly adjacent to national borders but rather tend to occur between more distant areas. This finding somewhat contradicts the prevailing depiction of cross-border cooperation in Polish-German border regions as presented in the literature.



Note: dark grey – German border regions; light grey – Polish border regions; shade of blue – correlated border regions that share a direct boundary.

Figure 8.2. Degrees of correlation of economic fluctuations in the Polish-German borderland

Source: own elaboration.

Nevertheless, the synchronisation of business cycle fluctuations in the Polish-German borderland is generally weak. Among all observed correlations, only three were of moderate strength. These were recorded between the German region of Dahme-Spreewald [DE406] and three Polish regions: Zielona Góra [PL432], Gorzów [PL431], and Szczecinek-Pyrzyce [PL427].

Low-intensity correlations were predominant. The highest correlation value was observed between the city of Szczecin [PL424] and the German region of Dahme-Spreewald [DE406] (0.700). In contrast, the weakest business cycle

convergence in the Polish-German borderland occurred between the Szczecinek-Pyrzyce region [PL427] and the Bautzen region [DED2C].

Among Polish border regions, the city of Szczecin [PL424] exhibited the most frequent correlations with German regions, occurring six times. The Szczecinek-Pyrzyce region [PL427] displayed cross-border business cycle interdependencies five times. Similarly, the Szczecin region [PL428] and other Polish border regions – Gorzów [PL431], Jelenia Góra [PL515], and Zielona Góra [PL432] – were each linked to the economies of four German regions.

On the German side, the pattern seemed more diverse. Some regions showed no convergence with Polish regions (Uckermark [DE40I], Märkisch-Oderland [DE409], Oder-Spree [DE40C], Frankfurt (Oder) (Kreisfreie Stadt) [DE403], and Cottbus (Kreisfreie Stadt) [DE402]), while others exhibited only rare and weak correlations (Barnim [DE405], Bautzen [DED2C], and Görlitz [DED2D]). Particularly noteworthy is the case of Frankfurt (Oder) (Kreisfreie Stadt) [DE403]. The literature frequently describes this region as being strongly connected to those on the Polish side of the border (Dołzbłasz, 2012). However, the present findings, as well as own research to date (Wróblewski, 2022), appear to contradict this claim.

Among German regions, cross-border correlations were most frequently observed in Dahme-Spreewald [DE406] and Spree-Neiße [DE40G], both of which displayed interdependencies with six Polish regions. Slightly less frequent, but still notable, were the cross-border correlations for Vorpommern-Greifswald [DE80N] and Görlitz [DED2D], each of which was linked to five Polish regions.

Conclusions

Territorial cooperation within the EU is a key element of regional policy, contributing to social, economic, and territorial cohesion. It enables regional and local authorities to address common challenges and strengthen various types of relationships, including socio-economic ties.

Financial support from EU funds is crucial for the proper development of territorial cooperation. This is because local governments' own resources are often insufficient to undertake activities beyond their statutory responsibilities, with cross-border cooperation falling into this category. The EU supports such initiatives both along the internal and external borders of its Member States. Examples of such programmes include Phare and successive editions of Interreg under ETC.

The literature indicates that when engaging in cross-border cooperation, local governments in the EU tend to do so primarily with entities located in close proximity to national borders. Consequently, border municipalities and

regions often develop cooperation strategies, though not always in a formalised manner. Polish-German border regions are no exception to this tendency. Inter-reg programmes also place particular emphasis on the factor of neighbourhood, i.e. proximity to the border.

From the perspective of border regions, which are often linked by shared historical experiences, cooperation with regions located directly across the border seems only natural. For this reason, the borderland studies literature often refers to national borders as *scars of history*.

However, this approach may fail to account for the needs of the real economy. For instance, the socio-economic interdependencies of border regions are largely driven by market mechanisms rather than mere border proximity. As a result, their economic conditions reflect a complex network of interconnections with other domestic regions, the national economy as a whole, and, to some extent, the economic situation of border regions on the other side of the frontier, albeit not necessarily those in direct proximity.

It follows that policymakers and officials responsible for territorial cooperation in border regions should prioritise the actual economic conditions of regional economies, placing spatial factors somewhat in the background. However, without a clear understanding of real economic linkages, they risk proposing solutions or taking decisions that lack adequate justification. Therefore, assessing cross-border cooperation and interconnections through the lens of business cycle convergence appears to be of paramount importance.

The analysis conducted for the purposes of this study indicates that the economies of Polish-German border regions generally manifest a low degree of business cycle convergence. Moreover, direct economic ties between immediately adjacent regions are rarely observed. Identifying the directions and degree of cyclical fluctuations' convergence may thus enable policymakers and officials at various levels to better tailor territorial cooperation projects and strategies to the actual needs of their respective regions.

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9. Polish transport in a changing Europe – 20 years of change

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Abstract: Two decades of EU membership are used to evaluate how infrastructure funding has transformed Polish transport. The chapter combines a literature review, EU funding data, statistical indicators and selected case studies of major road, rail, urban transport and waterway investments. Road and rail systems receive particular attention because they reveal the tangible effects of cohesion-policy financing. EU funds made possible projects that exceeded domestic financing capacity, including express roads, railway modernisation, rolling-stock purchases, tram routes and the Warsaw metro. Observable outcomes include expanded infrastructure, improved road safety, and fewer casualties and strong growth in railway passenger numbers, despite the interruption caused by the COVID-19 pandemic. The chapter reveals a clear connection between investment and transport quality. Continued funding can further support decarbonisation, accessibility and competitiveness across the Polish economy.

Keywords: EU funds, rail transport, road transport, investment, transport policy.

Introduction and methodology

How have infrastructure investments changed transport? What are the effects of the large financial investments in the 20 years since joining the European Union? The author seeks to establish the role EU funds have played in transport projects, with the main research area being infrastructure investments in recent years.

The study is based on a literature survey and an analysis of data sources. The majority of modern scientific publications focus on transport policy or investment alone, yet do not directly link them to changes in the transport market. In this chapter, the author also adds a time and spatial context (20 years of Poland's EU membership).

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9.1. The role of transport in the modern economy

Globalisation has greatly strengthened the role transport plays in the modern economy. Access to goods, raw materials and also finished products from all over the world drive development and improve the quality of life. Moreover, the COVID-19 pandemic confirmed transport's hugely significant role, since – the obstacles to international transportation touched all areas of life. To this day, transport is the core part of logistics, supply chains and supply networks, but also the important area of all other sectors of the economy.

According to the purely theoretical definitions of transport, “Transport is a socio-economic activity that determines all other activity” (Wojewódzka-Król & Załoga, 2022, p. 9). The economy (production) and society (settlement) are the primary sources of transport demand, shaping the movement of goods and people, generating different needs, in different configurations and intensities (Maczak, 2012, p. 197). In turn, transport needs are connected to economic development and social well-being (Rudzińska et al., 2012, p. 138). Scholars also focus on the interconnections between transport and economics, analysing historical, administrative and legal issues, on the one hand, and – cost issues on the other (Gwilliam & Mackie, 2017).

Modern transport is subject to intense transformations. Across various industries and branches of transport, these changes affect diverse areas, and occur with different dynamics, and not always at the same time. In general, however, they are the product of broader macroeconomic changes, macroeconomic dynamics and the processes taking place within it. These issues are also widely described in the literature of the subject, these changes.

Among the megatrends affecting mobility are digitalisation and urbanisation, but also sustainability – which affects changes in structure, decision-making processes or, in general, customer behaviour and social reactions (Friesendorf & Uedelhoven, 2021). “Transportation 4.0” (alternatively: Transport 4.0) is also increasingly prominent in transport literature, in particular, supporting intelligent production, automation of deliveries or the use of the Industry 4.0 concept in the transport industry in general (Wong et al., 2024). Digital transformation has become an integral part of transport and logistics development (Zaripowa et al., 2024), the rapid evolution of data management systems and the use of big data for transport (Paffumi et al., 2018). The list of technologies used by modern transportation continues to grow and now includes artificial intelligence, machine learning, 5G, pervasive computing and data analytics (Wang & Sarkis, 2021).

Reducing the impact on the environment is also a key trend, crystallised in Europe's “Fit for 55” agenda. Behind this slogan lies a set of policies and instruments that aim to reduce greenhouse gas emissions by 55% in 2030 compared

to 1990 levels. Discussion is ongoing as to the current and future impact of these reforms on different areas of transport markets (Ovaere & Proost, 2022). Europe's transport sector is undergoing evolution and needs to adapt both in the short term (operationally) and in the long term (in terms of sustainability). Research shows that the transition to zero-emission and low-emission transport is likely to lead to a reduction in greenhouse gas emissions, yet this may prove harder than originally planned (Aparicio, 2017). Considerable attention is being paid to decarbonising public transport in cities (Zawieska & Pieriegud, 2018), since these areas often register the highest concentrations of pollution. Cities are also identified as those areas where the share of bicycle transport is rising (Pucher & Buehler, 2017).

9.2. EU policy and transport in Poland

The unconstrained movement of goods is a fundamental pillar of European integration. The abolition of customs duties or quantitative restrictions on goods transported has long been a key factor stimulating and contributing to development in the transport sector. The free movement of goods also entails harmonising national legislation and completing the internal market, both actions serving to remove obstacles to the unconstrained movement of goods (European Parliament, 2025).

Projects implemented with EU funds play a critical role in regional and national, and international transport (Rosik et al., 2015). Poland's strategic location provides substantial opportunities for developing the logistics industry, including transit services. Poland's presence in the European Union has further strengthened its competitive position in the logistics industry.

It is clearly recognised that Poland's accession to the EU marks the country's second economic breakthrough (after the introduction of a free market economy in 1989). The breakthrough was also stimulated in the transport sector by the influx of significant funding. From the beginning, the possibility of absorption of EU funds was recognised as new, large opportunities and a chance to increase competitiveness for Polish regions (Słodowa-Helpa, 2005). Local government units were also instrumental in creating and implementing development policy in the regions (Jastrzębska, 2011). Recent years have been dominated by discussions on the next EU funds, through the National Plan for Reconstruction and Resilience Enhancement (Krajowy Plan Odbudowy i Zwiększenia Odporności – KPO). These discussions not only point to the possibilities of building infrastructure but also to the effects of using this infrastructure, such as in eliminating transport exclusion (Beim, 2023).

9.3. European funds for transport development

Transport for private purposes generally sustains itself through rational economic calculation, whereas public transport, as non-profitable public service, needs additional stimulation. Thus, support for the transport industry takes the form of financial support for public sector.

“The objective of cohesion policy is to reduce the growing imbalances between regions in the European Union. This policy area accounts for around a third of the EU budget, implemented through operational programmes” (European Parliament, 2024). Funds are made available for defined programming periods. The concept of “absorption capacity” has also been introduced to refer to the Member States’ ability to spend these funds effectively and efficiently (European Court of Auditors, 2018).

In Poland, full responsibility for handling European funds is borne by The Centre for EU Transport Projects (CEUTP, Centrum Unijnych Projektów Transportowych – CUPT). This organisation’s task is to support beneficiaries in the preparing and implementing investments in the transport sector, across all available branches and sectors of transport. In 2022, the CEUTP celebrated its 15th anniversary. Figure 9.1 shows the investments carried out within the framework of projects supervised by CEUTP.

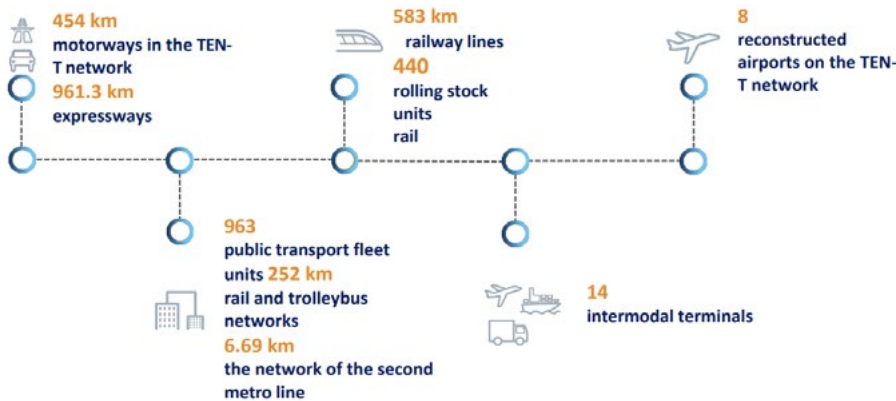


Figure 9.1. EU funds in 2007–2013

Source: (CEUTP, 2022).

These funds were spent mainly on infrastructure (also parts of TEN-T), namely high-speed roads (motorways, expressways) or railways, alongside signif-

icant purchases of rolling stock. Urban transport is a clear beneficiary of EU funds, e.g., numerous tram lines construction projects were financed from EU funds.

In Figure 9.2 are the projects implemented in the next EU perspective – with special consideration of their value.

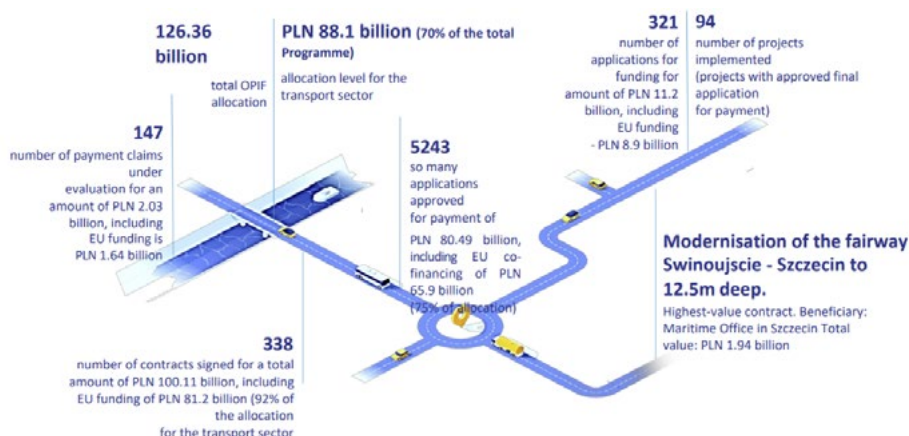


Figure 9.2. EU funds in 2014–2020

Source: (CEUPT, 2022).

Selected examples will be highlighted later in the publication.

9.4. Transport investments – selected examples

Cities play a major role in utilising EU funds. Because of their high concentration of inhabitants and their needs, combined with spatial constraints, they need to build and maintain expensive infrastructure. Three of the eight largest infrastructure projects (Table 9.1) implemented under the 2014–2020 funds concern urban transport.

Table 9.1. Top 2014–2020 investments

Project title	Project value (PLN) EU financing (PLN)
Construction of the second metro line with the purchase of rolling stock – phase III Capital City of Warsaw Public transport	3 564 536 216 PLN 1 952 151 513 PLN
Construction of the second metro line, together with accompanying infrastructure and purchase of rolling stock – phase II Capital City of Warsaw Public transport	2 942 508 171 PLN 1 826 345 155 PLN

Project title	Project value (PLN) EU financing (PLN)
Flood reservoir Racibórz Dolny on the Odra in the Silesian Voivodeship (polder) PGW Wody Polskie Environmental protection	1 995 176 677 PLN 667 040 000 PLN
Modernisation of the Świnoujście-Szczecin waterway to a depth of 12.5 m Maritime Office in Szczecin Maritime Infrastructure	1 935 556 000 PLN 1 226 448 000 PLN
Railways for good connections – modernisation of wagons and locomotives for PKP Intercity S.A. PKP Intercity Railway	1 349 646 634 PLN 515 206 886 PLN
Construction of tramway route to Wilanów with purchase of rolling stock and accompanying infrastructure Warsaw Trams City Transport	1 201 554 915 PLN 554 633 384 PLN
We are speeding up comfortably – modernisation of wagons and purchase of locomotives for PKP Intercity S.A. PKP Intercity Railway	1 156 050 037 PLN 495 765 402 PLN
Construction of express road S19 Lublin–Rzeszów, section Nisko Południe (without junction)–Sokołów Małopolski Północ (with junction) General Directorate of National Roads and Motorways Road Transport	1 132 005 519 PLN 587 297 822 PLN

Source: based on (Krawiec, 2023).

Despite containing only a few selected examples, the table above shows the role EU funds play in transport sector development. They enable the most difficult projects to be financed, whose value invariably far exceeds the current possibilities of financing from cities' own resources. A perfect example is the second underground line in Warsaw. The list also includes railway projects (the purchase and modernisation of the rolling stock), water transport investments, flood control infrastructure. Only one of the eight largest projects concerns road infrastructure; although road transport remains by far the dominant type of transport in Poland, the aim of EU measures is primarily to support other types of transport, which have a smaller impact on the environment. However, this does not diminish the important role of EU financial measures in developing Poland's road infrastructure over the years.

9.5. Investment outcomes and prospects for further changes

The current state of road infrastructure is largely the result of the many projects carried out with the support of EU funds. The map provided by the General Directorate for National Roads and Motorways (Generalna Dyrekcja Dróg

Krajowych i Autostrad – GDDKiA) illustrates the layout of this network, with particular emphasis on new infrastructure projects implemented using EU funds. The map (Figure 9.3) contains projects completed within the framework of the EU perspective 2014–2020.

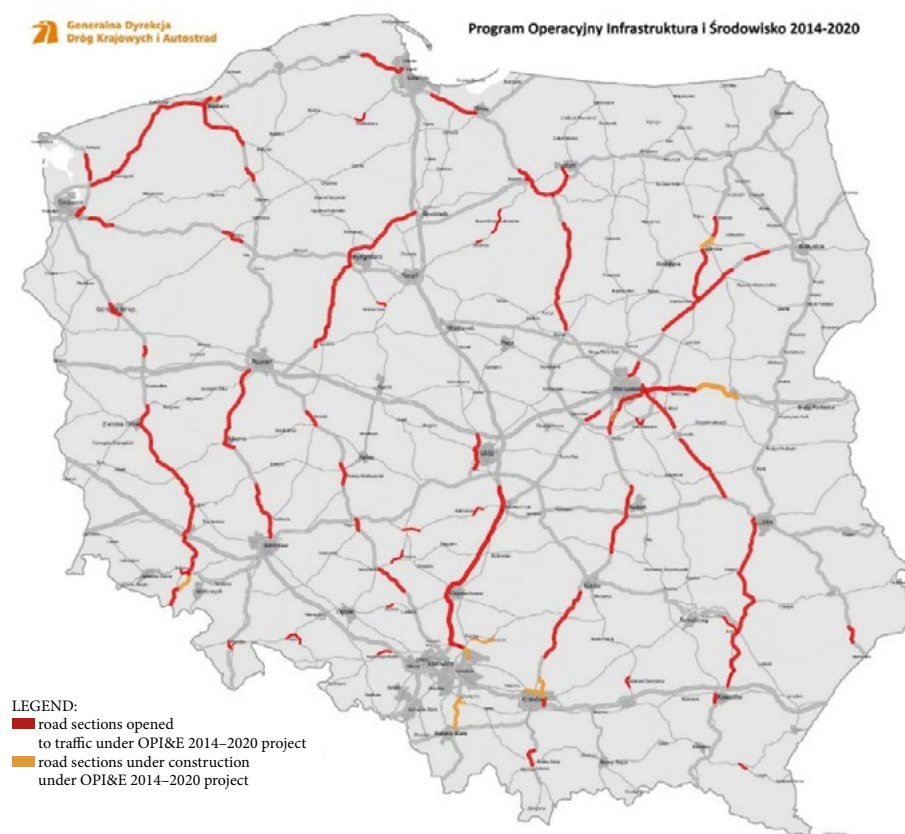
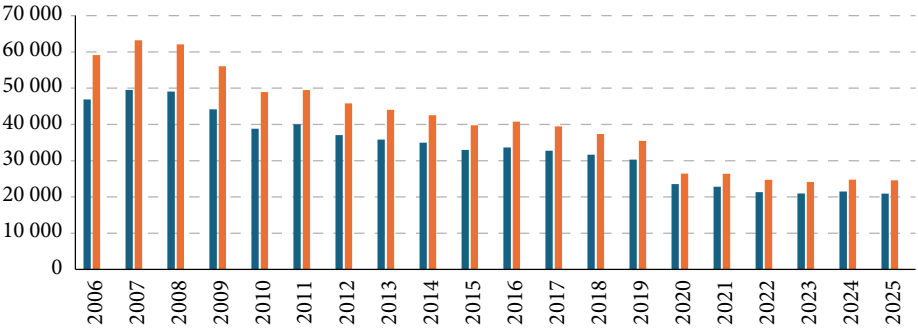


Figure 9.3. Roads constructed under OPI&E 2014–2020 projects

Source: (GDDKiA, 2023).

The construction of a network of high-speed roads is a process spanning years. As the map shows, investments in recent years have enabled the completion of the high-speed road network, involving numerous road construction projects, especially expressways. Most of these were north-south routes, while the arrangement of lateral roads, primarily the A2 and A4 motorways, was mostly completed in earlier periods. These projects utilised both EU funds and private concession agreements.

How does the road network reflects into economic effects and lower external costs of transport? First of all, new roads mean shorter journey times and greater travel comfort. Better-standard roads cut the external costs of transport, while also significantly reduce the number of road accidents, as shown in the statistics presented in Figure 9.4 and Figure 9.5. A downward trend is clearly visible here, and the consistent multi-year expansion of the road network has led to a marked decrease in road casualties. Moreover, while contemporary projects place greater emphasis on railway projects, it is vital to recognise how a significant number of road projects were implemented previously, also heavily supported by EU funds.



Notes: higher figure: series 1 – injuries; series 2 – year; lower figure: series 1 – fatalities; series 2 – year

Figure 9.4. Number of road accidents and injuries, 2006–2025

Source: (Policja.pl, 2026).

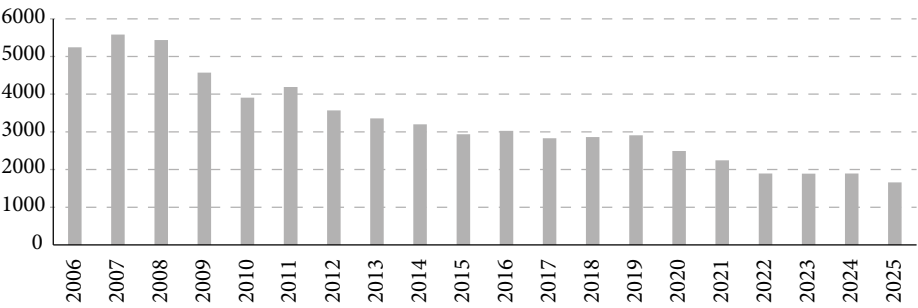


Figure 9.5. Number of road fatalities

Source: (Policja.pl, 2026).

Rail transport remains an important beneficiary of EU funds. As illustrated in Figure 9.6, the 2014–2020 EU perspective saw a significant increase in passenger numbers, a direct effect of the modernisation of rail routes (both main lines and

regional routes) and the purchase of new rolling stock (both by regional and national carriers). Moreover, track repairs resulted in increased train speeds and shorter journey times, while the new fleet means greater travel comfort. In effect, the rail transport sector recovered quickly after the COVID-19 pandemic.

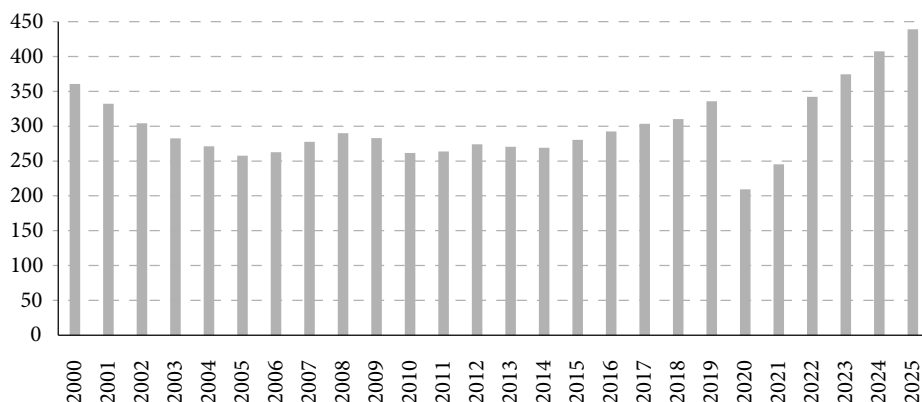


Figure 9.6. Number of railway passengers in Poland by years (mln of passengers), 2000–2025

Source: (UTK, 2026).

Conclusions, main outcomes and research results

Ultimately, when answering whether the investments discussed above have contributed to the development of transport, the data on road safety and rail passenger numbers show clear growth (qualitative, quantitative) in the transport sector. This expansion correlates strongly with the large infrastructure investments in recent years. It can therefore be argued that without the financial resources available under EU programmes, such a rapid development in the transport industry would not have been possible. Moreover, in sectors requiring the involvement of the state and its structures (infrastructure, public transport), access to EU funds has proved critical. Parallel advancements are visible in maritime and air transport, which are also beneficiaries of the EU funds.

The twentieth anniversary of Poland's accession to the EU provides a fitting opportunity to take stock. This chapter contributes to the academic discussion on transport sector development and the changes taking place in the transport industry. Given the dynamics of the whole sector, combined with many macroeconomic challenges and the ever-growing role of international transport,

this subject is likely to remain an extremely attractive field of research, both for researchers working in transport and logistics, and others specialising in regional and European policy.

In short, transport has undergone major changes over the last two decades, precipitated by the availability of EU funds. Moreover, the prospects for the coming years are promising, and further large investment funds provide the potential for developing selected transport sectors and the economy as a whole.

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10. Development of post-transition country firms' legitimization strategies in advanced economies: A mixed-method study of Polish subsidiaries in Germany¹

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Abstract: This chapter investigates legitimacy building by firms from post-transition economies, focusing on Polish subsidiaries operating in Germany. It develops a conceptual framework from the institutional and international-business literature, then extends it with survey evidence from 151 Polish parent firms and qualitative interviews in three company cases. Subsidiary age, ownership structure, autonomy, adaptation, embeddedness and community engagement are examined as sources of market acceptance. Younger subsidiaries focus more on community-development efforts, while subsidiaries with shared ownership show greater local adaptation and stronger external embeddedness than wholly owned units. Case evidence highlights the importance of German market knowledge, local managerial expertise, partnerships and communication strategies. The chapter enriches legitimacy theory by showing that post-transition firms build acceptance through a dynamic mix of adaptation, networks and strategic signalling.

Keywords: legitimacy, international business, emerging markets, post-transition economies, foreign subsidiaries, Polish FDI.

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Introduction: The role of building legitimacy

The challenge of attaining legitimacy in foreign markets has long been explored by scholars, particularly those working with institutional theory as a theoretical foundation (e.g., Kostova & Zaheer, 1999; Xu & Shenkar, 2002; Xu et al., 2004). Factors increasing legitimacy in a foreign market, such as strategy adaptation (Petersen & Pedersen, 2002), have often been studied in the context of advanced economies, while the challenge increases notably for firms from emerging markets and (post-)transition economies (Bian & Emons, 2017; Burgoon & Raess, 2014; Schüller & Schüler-Zhou, 2016).

Polish companies only began to establish subsidiaries abroad after Poland's accession to the EU, with Europe remaining their primary foreign market (Wach, 2012). Nonetheless, the magnitude of Polish foreign direct investment remains modest in comparison to global flows. This can be attributed to the comparatively small population of Polish multinational enterprises. As of 2020, 1,880 Polish entities declared participation in 4,030 foreign entities through shares, branches, or other forms (Statistics Poland, 2022), the majority of which were located in Germany, the Czech Republic, Ukraine, and Russia. Regarding the locations of these foreign entities, substantial net revenues from product, goods, and materials sales in 2020 were attained by foreign units situated in Germany and the Czech Republic, amounting to PLN 36.7 billion and PLN 25.1 billion, respectively. Consequently, the German market is the primary target for Polish multinational enterprises venturing abroad. The authors use the empirical context of Polish subsidiaries in Germany to discuss the legitimization strategies adopted by post-transition country firms entering more advanced countries. The choice of this empirical context results from both the size of the two economies and their close economic linkages, whereby the expansion of Polish firms to Germany has received comparably less attention than the reverse side of the relationship, although Germany is a major location for Polish exports and FDI (Götz & Trąpczyński, 2016).

As the first step, the chapter will present a conceptual framework which integrates extant knowledge on legitimization strategies, particularly in the context of emerging market firms and (post-)transition economies, going beyond legitimacy literature *sensu stricto* and incorporating also other streams which may be important for legitimization in foreign markets. Secondly, insights from a mixed-method study (quantitative and qualitative) will be presented on the chapter to extend the literature-based framework and provide new insights which may inspire future research.

10.1. Conceptual overview

Legitimation refers to how organisations secure their position by adhering to the rules of the institutional environment (Dacin et al., 2007; Kwak et al., 2019; Steinhäuser & da Rocha, 2023). Following our literature review, we develop a conceptual framework which will be visualised on the chapter. Firstly, within the extant literature devoted to legitimacy *sensu stricto* (first-order legitimization strategies), one of the key strategies for emerging market firms to secure legitimacy is through acquisitions (Luo & Tung, 2007).

Another stream within the discussion of first-order legitimization strategies pertains to foreign staffing decisions (Ando, 2011; Belderbos & Heijltjes, 2005; Delios & Bjorkman, 2000), access to (local) networks of managers (Jean et al., 2011), or the cultural adaptiveness/willingness of managers (Davis et al., 2000; Pinkerton & John, 2008). Other scholars zoom into top management team (TMT) characteristics, drawing attention to an international mindset of managers (Beechler & Javidan, 2007) or the diversity of TMT (Singh & Point, 2009).

Moreover, literature on subsidiary autonomy also raises the issue of the governance of foreign subsidiaries, drawing attention to the role of advisory boards or local boards (Carpenter et al., 2001; Daily et al., 2000), as well as the adaptation to local business behaviour (Davis et al., 2000; Kostova & Zaheer, 1999; Yiu & Makino, 2002). Other evidence is provided from the area of marketing and communication, whereby particularly the aspects related to impression management/disclosure in annual report (Linsley & Kajuter, 2008; O'Donovan, 2002; L. Wang, 2014), signal restructuring (Wang et al., 2014), or recently also Corporate Social Responsibility communication (Bai et al., 2019; Seele & Gatti, 2015) have been thematised.

Not least, research on the localisation or adaptation of foreign market operations has often adopted an institutional perspective in order to justify strategic adjustments with the intention of enhancing legitimacy. This research raises the relevance of such aspects as local sourcing (Walker & McCarthy, 2010), or foreign marketing adaptation (e.g., Chen et al., 2016).

Finally, we argue that the concept of legitimization strategies in foreign markets needs to be extended as some activities may contribute to legitimacy-building, without being referenced as such. Such literature includes research on certifications in areas like CSR (Husted et al., 2016), or cultural sensitivity training (Kaihlainen et al., 2019). The significance of knowledge transfer becomes evident when addressing the challenges related to the liability of foreignness. This is particularly crucial when making staffing decisions and fostering transparency, knowledge sharing, and communication between the headquarters and its

subsidiaries. While these factors are interconnected, they are yet to develop a direct and discernible influence on specific legitimacy strategies (Calhoun & Dunn-Jensen, 2014).

A summary of the identified legitimacy strategies of the first and second orders can be found in Figure 10.1.

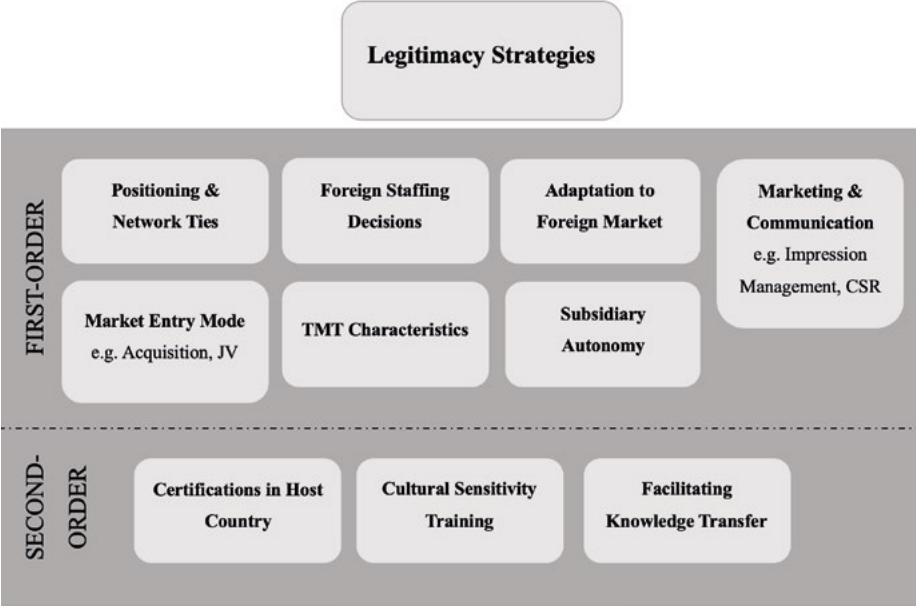


Figure 10.1. Identification of legitimacy strategies

Source: (Trąpczyński et al., 2023).

10.2. Research design

The authors conducted a large representative survey with $N = 151$ firms, selected with a random sampling procedure and the CATI method, focusing on the headquarters of Polish firms investing in Germany. The qualitative research was based on three Polish companies with subsidiaries in Germany, whereby individual in-depth interviews were used as the primary method of data collection.

10.3. Empirical findings

10.3.1. Quantitative research

Taking into account the current capital share of the Polish parent firm in the subsidiary in Germany, we can observe that 8% of the companies from the research sample ($N = 151$) have 10%–49% shares, 45% of the companies have 50–99% shares and 47% have 100% shares.

Taking into account the operation mode of the revenue-wise largest subsidiary in Germany, it is evident that greenfield investment was the most selected mode in our research sample – 79%, with 15% of companies pursuing acquisitions and 6% of companies using joint venture.

Younger subsidiaries (under five years) exhibit the lowest level of autonomy in strategic and operational decisions, likely attributable to the parent company's initial management and oversight (refer to Table 10.1). Conversely, subsidiaries aged 6–20 years exhibit the greatest autonomy, reflecting enhanced trust and comprehension of the local market as they develop. Subsidiaries older than 20 years typically exhibit diminished adaptability in pricing, product, advertising, and distribution relative to those aged 6 to 20 years. This suggests that over time, subsidiaries attain a steady market position that necessitates fewer aggressive adaption techniques.

The youngest subsidiary (under five years) have the greatest commitment to community development yet receive the least assistance from local government. This may indicate a proactive approach by new entrants in gaining legitimacy through community engagement, while lacking robust local institutional connections at this stage. The middle-aged subsidiaries (6–20 years) exhibit the greatest scores in external embeddedness dimensions, suggesting that these subsidiaries may have achieved an optimal equilibrium between external affiliations and internal knowledge assimilation for the purpose of legitimacy enhancement.

The data illustrates a complex portrayal of how Polish enterprises in Germany establish credibility. Autonomy, flexibility to local market conditions, and community development initiatives are identified as essential methods. The disparities related to the subsidiary's age underscore the dynamic nature of legitimacy-building methods, with newer subsidiaries prioritising local adaptation and community participation, whilst older subsidiaries capitalise on their established status and internal expertise.

Regarding patterns associated with the extent of parental control in subsidiaries, those with 100% Polish ownership (full control) demonstrate diminished autonomy in both strategic and operational decisions relative to subsidiaries with

less than 100% ownership (see Table 10.2). This may result from the increased control and monitoring implemented by the parent firm in wholly owned subsidiaries. Companies with shared control (less than 99% ownership) exhibit greater adaptability in pricing, product, promotion, and distribution than wholly owned companies. This may suggest that shared control enhances the focus on adjusting to local market conditions, potentially influenced by local partners or stakeholders.

Subsidiaries with less than full ownership exhibit elevated levels of support from local authorities and enhanced community development initiatives. This indicates that shared control may enhance integration into the local business community and increase engagement with local stakeholders. The disparities in adaption levels between the two groups indicate that ownership structure substantially affects subsidiaries' market adaptation strategies. Shared control seems to promote more assertive adaption tactics, which can prove essential for acquiring legitimacy in a mature and competitive market such as Germany.

The data suggests that the extent of Polish parent company ownership in German subsidiaries influences their legitimacy-building activities. Although autonomy is often elevated overall, subsidiaries with shared ownership are more inclined to participate in local market adaption and community development initiatives. These findings highlight the significance of accounting for ownership structure in the formulation of foreign market entry and legitimacy-enhancement initiatives.

Table 10.1. Legitimacy-building strategies grouped by subsidiary age

Subgroup	Autonomy – strategic decisions		Autonomy – operational decisions		Price adaptation level		Product adaptation level		Promotion adaptation level		Distribution and logistics adaptation level		Support from local authorities / business communities		Firm's community development efforts	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
<5	3.33	0.37	3.34	0.64	5.70	0.48	5.72	0.21	5.36	0.39	5.30	0.26	2.75	0.18	3.94	0.97
6–20	4.04	0.82	4.05	0.91	5.29	0.80	5.44	1.03	5.56	0.79	5.24	1.28	3.02	0.79	3.16	1.15
>20	3.94	0.87	3.86	0.86	5.25	0.85	5.24	0.99	5.40	0.83	5.21	0.92	3.05	0.87	3.64	1.10
Total	3.96	0.84	3.92	0.88	5.28	0.82	5.33	0.99	5.46	0.81	5.23	1.05	3.03	0.83	3.47	1.13

Subgroup	External embeddedness – number and diversity		External embeddedness – strength of links		External embeddedness – transfer of knowledge		External embeddedness – mutual adaptation		Internal embeddedness – the strength of links		Internal embeddedness – knowledge outflow from the subsidiary		Internal embeddedness – knowledge absorption		Internal embeddedness – mutual adaptation	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
<5	2.71	0.12	2.68	0.07	2.57	0.26	2.50	0.18	5.75	0.50	6.00	0.82	6.25	0.50	5.25	0.96
6–20	4.06	1.62	3.70	1.48	3.66	1.49	3.81	1.50	5.77	0.66	5.88	0.72	5.73	0.73	5.62	0.56
>20	3.36	1.22	3.28	1.22	3.16	1.18	3.21	1.16	5.99	0.64	5.82	0.95	5.88	0.74	5.64	0.93
Total	3.60	1.41	3.42	1.32	3.33	1.32	3.41	1.32	5.90	0.65	5.85	0.86	5.83	0.73	5.62	0.81

Source: own elaboration based on the study results.

Table 10.2. Legitimacy-building strategies grouped by ownership level

Subgroup	Autonomy – Strategic decisions		Autonomy – operational decisions		Price adaptation level		Product adaptation level		Promotion adaptation level		Distribution and logistics adaptation level		Support from local authorities / business communities		Firm's community development efforts	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
100%	3.64	0.79	3.57	0.78	5.07	0.87	5.03	1.10	5.21	0.87	4.86	1.03	2.87	0.85	3.03	0.95
<99%	4.24	0.80	4.22	0.85	5.47	0.73	5.59	0.81	5.67	0.68	5.55	0.97	3.17	0.79	3.86	1.14
Total	3.96	0.84	3.92	0.88	5.28	0.82	5.33	0.99	5.46	0.81	5.23	1.05	3.03	0.83	3.47	1.13
Subgroup	External embeddedness – number and diversity		External embeddedness – strength of links		External embeddedness – transfer of knowledge		External embeddedness – mutual adaptation		Internal embeddedness – the strength of links		Internal embeddedness – knowledge outflow from the subsidiary		Internal embeddedness – knowledge absorption		Internal embeddedness – mutual adaptation	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
100%	3.25	1.14	3.13	1.07	3.08	1.07	3.13	1.07	5.93	0.68	5.82	1.03	5.83	0.81	5.54	0.88
<99%	3.91	1.56	3.69	1.47	3.55	1.47	3.66	1.47	5.88	0.62	5.88	0.68	5.84	0.66	5.70	0.74
Total	3.60	1.41	3.42	1.32	3.33	1.32	3.41	1.32	5.90	0.65	5.85	0.86	5.83	0.73	5.62	0.81

Source: own elaboration based on the study results.

10.3.2. Qualitative research

Company A is a Polish manufacturer of kitchen appliances, with numerous foreign subsidiaries (both established and acquired) and exports to over 50 markets. While its first gas / coal cooker was produced in 1957, its appliances are very well known throughout European markets. Around half of the company's production is currently exported. In the basket of foreign markets, the most popular is the German market, followed by Great Britain and Scandinavia.

Company B is a service company from Poznań (Poland), which has developed a premium booking platform for hotels & resorts. Established in 2008, the company now has a team of over 200 across the world in 44 countries and has helped more than 3,500 hotels and resorts supercharge their direct bookings and stand out online with style. Company B's expansion into Germany began in 2012, and a German subsidiary was established in Munster. Initially, the company started with one German representative with Polish heritage, who had lived more than 30 years in Germany, and then focused on finding potential partners for business from hotels & resorts in Germany. The owners decided to present the company as "international" rather than "Polish".

Company C is a Polish manufacturer of public transport vehicles (buses, trolleybuses and streetcars). The company exports Company C's buses to 34 countries: Europe, Africa, Asia; and more than 700 cities. Its production facilities are located in the Wielkopolska Region, including the final assembly of buses and trolleybuses, a welding plant for bus and trolleybus skeletons and streetcars, and an additional distribution centre and warehouse, which serve to streamline the order fulfilment process while raising the level of pre-sales customer service. Company C was the world's first manufacturer to introduce a mass-produced hybrid bus to the European market.

To summarise the commonalities concerning market entry and expansion strategies, all three companies (A, B, and C) entered the German market as a part of their broader international expansion, emphasising Germany's significance as a key market. Companies A and C specifically utilised a combination of exporting and establishing subsidiaries, whereas Company B initially focused on partnership development. Each company demonstrated a high degree of adaptation to the German market: Company A integrated German components to align with local quality perceptions, Company B developed a unique marketing strategy tailored to the German market's peculiarities, and Company C customised its products to meet specific contractor requirements. Companies A and C both leveraged local elements (e.g., German components in products) to enhance their perceived quality and legitimacy in the German market. This approach reflects an understanding of the importance of local market characteristics and

customer expectations. Company A granted significant operational autonomy to its German subsidiary, and Company C's German operations also enjoyed a degree of managerial autonomy. Such autonomy appears to facilitate responsiveness and agility in the German market.

The key differences can be found in the market challenges and the related response. Company B faced unique challenges, such as language barriers and low technological advancement in the German hotel industry, leading to the development of a new marketing strategy and eventual market exit. In contrast, Companies A and C successfully adapted to and thrived in the German market, leveraging their experience and product quality.

These commonalities and differences highlight the varied approaches that firms from post-transition economies can take when entering and operating in advanced economies like Germany. The findings suggest the importance of local market adaptation, understanding and responding to unique market challenges, and the strategic use of local resources and management to build legitimacy. However, the varying degrees of success and challenges encountered by these companies indicate that there is no one-size-fits-all strategy and that firms must carefully consider their industry characteristics, resources, and market dynamics when expanding into foreign markets.

Conclusions

The study highlights the significance of legitimacy-building strategies for post-transition economy firms operating in advanced markets, particularly Polish subsidiaries in Germany. Our findings confirm that embedding in the host-market network is a key legitimization approach, with firms adapting their strategies based on ownership structure, subsidiary age, and market knowledge. The mixed-method approach illustrates how theoretical frameworks align with real-world practices, revealing both expected and novel legitimization mechanisms. Additionally, the role of local managerial expertise and strategic partnerships emerges as crucial for enhancing market acceptance. These insights contribute to institutional theory by integrating a temporal and strategic perspective on legitimacy adaptation. Future research should explore the long-term impact of these strategies and the role of digital transformation in shaping legitimacy-building efforts in foreign markets.

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III

GREEN AND ENERGY TRANSFORMATION

11. Green growth vs. degrowth: Implications for climate neutrality and socio-economic stability in Europe

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Abstract: Europe's path to climate neutrality is assessed through the competing lenses of green growth and degrowth. The chapter synthesises theoretical debates, empirical evidence and EU policy initiatives such as the European Green Deal and Fit for 55. Green growth appears more compatible with existing institutions, market systems and political feasibility, yet evidence on absolute decoupling raises doubts about whether it can deliver climate stability at sufficient speed. Degrowth offers a sharper ecological critique and stresses social justice, consumption restraint, and redistribution; however, it faces serious barriers linked to financial systems, public acceptance, employment and EU cohesion. The chapter argues for a hybrid transformation that goes beyond conventional growth while avoiding uncontrolled contraction. Europe may need policies that combine technological change, fairness and deeper institutional redesign.

Keywords: green growth, degrowth, European Union policy, climate neutrality, socio-economic stability.

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Introduction

The European Union is at the forefront of global efforts to transition toward a sustainable and climate-resilient economy. In the face of escalating climate and environmental challenges, the debate on economic transformation centres on two major economic paradigms: green growth and degrowth. The EU, through initiatives such as the European Green Deal and the Fit for 55 package, has committed to achieving climate neutrality by 2050, while striving to maintain economic prosperity and social cohesion. These ambitious goals raise questions about the extent to which EU policy can or should draw from the principles of each of these economic paradigms in pursuit of genuine sustainability. This chapter analyses the theoretical foundations and practical implications of both green growth and degrowth, examining their potential application in the context of EU policy. Special attention is paid to assessing possible trade-offs between climate neutrality and socio-economic stability, thereby contributing to the broader discussion on economic transformation in the face of environmental challenges.

11.1. Green growth versus degrowth

The aim of this subsection is to present two approaches addressing environmental challenges within economic systems: green growth and degrowth. These concepts offer fundamentally different visions of how societies should respond to pressures concerning climate change.

The concept of green growth first attracted attention during the Rio+20 conference in 2012 (Hickel & Kallis, 2020, p. 469). According to the World Bank definition (2012), green growth is “growth that is environmentally sustainable. It is efficient in its use of natural resources, clean in that it minimises pollution and environmental impacts, and resilient in that it accounts for natural hazards and the role of environmental management in preventing physical hazards and excessive commodity price volatility. Green growth is a tool to achieve sustainable development, not a competing paradigm. It offers a development pathway that reconciles the urgent need for sustained growth with the imperative of avoiding lock-in to unsustainable growth patterns and irreversible environmental damages. Green growth is not anti-growth; it represents a change in how we manage economies for sustainability” (p. 1). Green growth does not reject traditional economic paradigms but rather seeks to maintain economic growth while addressing social and environmental concerns. It assumes that the global economy

can still grow without the expanding use of natural resources and CO₂ emissions (Hickel & Kallis, 2020, p. 1). Green growth still takes into account GDP as one of the main economic indicators, but also places greater emphasis on issues such as eco-efficiency, resource efficiency, and circular economy (Lyytimäki et al., 2018, p. 51).

In contrast, the concept of degrowth presents a fundamental challenge to the dominant paradigm of continuous economic growth, which is perceived as unsustainable from both ecological and societal perspectives and uneconomic in highly developed nations (Alexander, 2012, p. 349). As its proponents argue, the current development model reveals serious limitations across three key dimensions. In social terms, it functions as a mechanism generating inequalities, undermining collective wellbeing (Powers et al., 2019, p. 418). The ecological dimension demonstrates the transgression of planetary boundaries (Fournier, 2008, p. 528), while the economic efficiency of continued growth in advanced economies shows diminishing returns, with increasing marginal costs often outweighing the benefits (Alexander, 2012, p. 349). Critiques of mainstream economics highlight how GDP-centric measurements fail to capture both the ecological costs of economic activity and the diverse forms of value creation that exist outside market transactions (Kallis et al., 2012, pp. 173–178). The fixation on GDP as a primary indicator of societal progress systematically undervalues critical dimensions of human and ecological wellbeing, leading to policy decisions that prioritise short-term economic gains over long-term sustainability and social cohesion (Raworth, 2017, pp. 37–62).

As Akbulut (2021) explains, degrowth proposes deliberately reducing economic activity in wealthy nations to achieve environmental sustainability and social equity through alternative, non-capitalist systems of production and exchange (Akbulut, 2021, p. 99). It seeks to enhance social well-being through voluntary simplicity and redistributive policies (Heikkinen, 2018, p. 44). This approach also recognises the global North-South divide, acknowledging that while developed economies must scale down their material consumption, developing nations still require economic growth to meet basic needs (MacKay, 2021, p. 829).

While green growth theory proposes market-driven solutions, degrowth's fundamental challenge to existing economic systems represents both its key insight and its main practical limitation. Having established these foundational definitions, the subsequent sections provide a comparative analysis of these two approaches, examining their implications for climate neutrality and socio-economic stability.

11.2. Climate neutrality

Analysis of global material footprints shows that economic growth consistently correlates with increased environmental pressures, including “climate change, water scarcity, ocean acidification, biodiversity loss, and chemical pollution” (Raworth, 2017, p. 224). This perspective has significant implications for current climate neutrality debates, suggesting that modifications to existing economic structures may be insufficient. It also invites an examination of the EU’s approach to achieving climate neutrality.

The European Environment Agency’s analysis (2023) provides insights into the EU’s strategic environmental objectives and institutional approach. The European Green Deal’s substantial investment framework aims to enable systemic decarbonisation while acknowledging significant structural constraints. The aforementioned document indicates that decoupling emissions from economic growth encounters challenges not primarily from technological limitations but from institutional capacity constraints in resource allocation and policy coordination. Through the Net-Zero Industry Act (NZIA) and related frameworks, the EU proposes an institutional architecture focused on market integration and industrial strategy to overcome these barriers. The analysis suggests that successful decoupling requires both investments in green technologies and fundamental reforms in economic governance structures, particularly in coordinating transition policies across the EU’s multilevel governance system. However, while this reflects the EU’s commitment to market-based solutions and technological innovation, a critical examination of the empirical evidence raises important questions about the fundamental assumptions underlying such policies.

While green growth presents an attractive narrative, it may fail to address some of the fundamental constraints. Hickel and Kallis’ (2020) research indicates that efficiency gains and technological improvements have not reduced global resource use or emissions at the required rate. Global material consumption increased significantly, with material use rising by 93.4% between 1980–2009 (reaching 67.6 billion tonnes), and material footprint growing by 132% between 1980–2013. Material intensity has notably accelerated in the twenty-first century, growing at 3.85% annually (2002–2013), thereby outpacing GDP growth. Their analysis demonstrates that with sustained economic growth, even under optimistic scenarios with aggressive mitigation policies, projected resource use will reach 95 billion tonnes by 2050, while emissions reduction rates remain insufficient for maintaining temperature increases below the critical 1.5°C or 2°C thresholds (Hickel & Kallis, pp. 471–472, 474–475, 479).

These findings directly challenge the feasibility of absolute decoupling within the current economic paradigm. The degrowth perspective, however, recognises that infinite growth on a planet with finite resources is impossible, regardless of technological innovation. According to this, absolute decoupling at the scale and speed necessary for climate stability is likely unattainable within current economic structures.

Nevertheless, the degrowth approach also demonstrates some limitations when subjected to empirical analysis. According to Pollin (2018), its core proposition of an intentional GDP reduction proves insufficient for achieving necessary emissions targets: a 10% GDP contraction would yield only minimal emissions reductions while potentially triggering severe socio-economic disruptions. This highlights a fundamental weakness in degrowth theory – its frameworks remain largely theoretical and lack both empirical validation and concise implementation strategies. Pollin notes that degrowth advocates lack concrete mechanisms for emissions reduction, with most proponents paying minimal attention to specific carbon reduction targets or implementation methods. In contrast, the Green New Deal's proposal for targeted investment of 1.5%–2% of annual GDP in clean energy infrastructure offers a more viable pathway for achieving necessary emissions reduction while maintaining social stability and economic functionality. Evidence suggests that effective climate policy requires specific technological transformation strategies rather than general economic contraction.

Looking forward, the debate between green growth and degrowth might have crucial implications for EU policy design. The evidence suggests that achieving climate neutrality demands a more fundamental restructuring of economic systems than current policies envision. This transformation must simultaneously address both the scale of economic activity and the structural drivers of environmental degradation. Policymakers should therefore focus on developing frameworks that facilitate a transition ensuring both environmental sustainability and citizens' well-being.

11.3. Socio-economic stability

Despite the ambitious plan to transform the economy to become more sustainable, the European Green Deal does not detach itself from the fundamental principles of a market economy. In addition to reducing greenhouse gas emissions and negative environmental impacts, its goals also include the development of green technologies and innovations, which could provide employment opportunities and increase the long-term competitiveness of the EU economy in sectors related to renewable energy (Fetting, 2020).

However, it should be noted that the energy transition can carry significant societal costs, particularly through increased living expenses and potential job losses. Moreover, climate policies to date have often placed a disproportionate burden on lower and middle-income groups (Chancel, 2022, p. 935), fostering a sense of injustice and public discontent. This has sparked notable protests, from the Yellow Vest movement started in 2018 to the farmers' demonstrations in early 2024. Regional disparities present another challenge, particularly in Eastern Europe, where greater fossil fuel dependency and lower living standards make meeting EU climate goals more challenging, creating political tensions that require careful compromise. Without adequate consideration of these issues, rising social tensions could ultimately impede sustainable development efforts (Kwiatkowska & Rogowski, 2025).

Degrowth, which is a far more radical strategy that assumes a complete reorganisation of the economy and society, raises even greater concerns in this regard. Critics argue that a decrease in production and consumption could trigger a cascade of negative socioeconomic effects, potentially leading to high unemployment rates and decline in citizens' overall quality of life (Pollin, 2018).

This causes degrowth to remain a rather niche concept, discussed mainly in narrow academic circles. Since it requires a complete rearrangement of today's society, it lacks support from the vast majority of politicians, who risk becoming unelectable by advocating such proposals. For decades, people's understanding of well-being has been strongly linked to GDP (Büchs & Koch, 2019, p. 156), which makes it challenging for an idea that completely departs from it to gain wider support. While considering the validity of degrowth, it is therefore worth addressing the relationship between GDP and well-being.

One of the most important studies in this field was conducted by Easterlin (1974). Based on surveys from 19 countries with various income levels, he showed that higher-income individuals were, on average, happier than lower-income individuals. Interestingly, however, the only time series (concerning the US) revealed that the aggregate level of happiness in the United States did not increase over the years, despite the increase in GDP per capita. This finding is now called the Easterlin paradox, and its occurrence has also been proven in other countries both developed and developing (Easterlin et al., 2010).

Other studies, however, challenge this theory. Deaton's (2008) research indicates that there is a strong positive correlation between GDP per capita and life satisfaction. It is strongest in poor countries, but remains positive in rich countries as well, and there is no evidence that beyond a certain level, GDP growth ceases to affect life satisfaction. The varying results of the studies may be due to methodological differences and difficulties in defining well-being. This makes the relationship between GDP and happiness remain ambiguous.

Büchs and Koch (2019, p. 157) point out the significance of people's reactions to potential reductions in income and consumption. The concept of loss aversion, which implies that individuals perceive potential loss to be more severe than an equivalent gain, seems particularly relevant in this context. Even a slight reduction in the perceived standard of living could cause significant citizen dissatisfaction and increased social tensions. Research on the impact of recession on subjective well-being largely supports the loss aversion theory. Of course, it should be borne in mind that degrowth is not synonymous with recession, as it implies a deliberate reduction in economic activity, accompanied by policies designed to boost citizens' well-being. Nevertheless, negative psychosocial effects cannot be ruled out, especially in societies heavily shaped by consumerism.

Responding to concerns about potential socio-economic destabilisation, proponents of degrowth argue that a controlled and planned transition would offer greater stability than the chaotic changes that societies will inevitably face amid an escalating climate crisis. To facilitate this transition, they propose various measures, with reducing working hours and implementing an unconditional basic income as key initiatives. What is important, social justice is one of the cornerstones of degrowth. It assumes that the burden of systemic changes should not fall disproportionately on disadvantaged groups; it additionally emphasises the importance of reducing inequalities and democratising economic processes, primarily through active support for cooperatives and local enterprises, fostering a more equitable and resilient economy (Hickel, 2020).

Degrowth might also raise security concerns. Declining production could weaken the EU's international position, especially against powers such as China and the United States, which remain focused on growth. However, degrowth does not necessarily entail reduced defence spending or weaker activity in strategic areas. Likewise, unbridled growth does not automatically provide geopolitical advantage, while reducing energy and resource consumption can lessen dependence on other countries and provide greater environmental and geopolitical security (Stegeman et al., 2023).

That said, the EU is unlikely to become a strong player on the international stage without internal stability. Degrowth, however, also carries the risk of deepening inequality among EU Member States (Stegeman et al., 2023). Eastern and Southern European countries, which are still in the process of macroeconomic convergence with Western economies, may oppose growth-reducing policies through fear of consolidating their weaker position. These tensions could prove even greater than in the case of green growth, thereby leading to deeper divisions within the EU and weakening its political cohesion.

Both green growth and degrowth involve significant challenges to the EU's socioeconomic stability, with social tensions already being observed in the

implementation of green growth policies. Differences in the level of economic development between Member States and the issue of social justice require special attention, regardless of chosen transition path.

Conclusions

This chapter has analysed green growth and degrowth in the context of the EU's sustainability transition. While degrowth presents compelling arguments from an environmental perspective, its implementation poses significant challenges due to the fundamental misalignment with existing institutional structures of modern economies. These structures, from debt-driven financial systems to international trade relationships, are deeply embedded in the current economic paradigm, making green growth approaches appear more politically feasible in the short term.

However, the evidence of ecological limits suggests that the EU may need to move beyond the traditional growth paradigm. The European Green Deal, while currently aligned more closely with green growth principles, may need to evolve to include more transformative elements inspired by degrowth thinking. The EU's position as one of the world's wealthiest regions, combined with its advanced institutional framework and commitment to environmental leadership, makes it particularly well suited to pioneering such a transition.

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12. Climate transition policies and non-household electricity prices – impact assessment across the European Union¹

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Abstract: Non-household electricity prices across the EU are examined in relation to climate-transition policies and energy-market pressures. Covering all 27 Member States during the 2013–2021 period, the chapter builds panel models with fixed country effects and a broad pool of variables linked to EU ETS prices, fiscal effects, taxes, renewable energy, energy productivity, import dependency and material prices. The annual EU ETS auction price, ETS-related fiscal variables, energy taxes, environmental taxes and renewable-energy shares yield no statistically significant influence on non-household electricity prices. By contrast, the prices of key conventional and strategic materials, including uranium, crude oil, coal and lignite, are strongly associated with electricity costs. The chapter suggests that industrial energy affordability depends heavily on input-material markets, while clean-energy policy effects remained limited during the analysed period.

Keywords: decarbonisation, electricity prices, EU ETS, energy taxes, strategic materials

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Introduction

The European Commission (2021) acknowledges that rising global energy prices represent a major concern and stresses that a faster transition to clean energy would be the best antidote to high energy prices, as it helps to cope with future price volatility while complying with the European Green Deal and meeting climate goals. Although low-carbon transition policies have been blamed for driving energy price rises, they constitute the only strategy for boosting energy market efficiency and resilience (Rudinger, 2021).

A similar viewpoint is shared by representatives of the Centre for European Reform (Cornago, 2022), who warn about the misconception that implementing a coercive tool such as carbon pricing to stay on the desired path towards climate neutrality may fuel high energy prices. They recommend that EU Member States maintain the smooth functioning of the EU emissions trading system as a valuable tool for making industrial polluters pay and using the auctioning revenues to reduce dependence on fossil fuels.

Our chapter makes several important contributions to the existing literature. Firstly, we develop a comprehensive framework for determining electricity prices by focusing on the mechanisms implemented at EU level in order to facilitate the smooth but sustainable transition to low-carbon economy. Thus, we establish and empirically validate a model that specifies the electricity price for the non-household sector as a function of several variables that proxy for the climate transition strategies, as well as of some widely accepted price drivers (fuel prices, ETS allowance price).

Secondly, we focus exclusively on the last completed stage of the ETS mechanism (the 3rd one) and develop a baseline model comprising its entire period of application (2013–2021).

Thirdly, we generate useful insights in terms of policy implications and recommendations that policymakers must consider in their efforts to lower the price of energy while complying with the European Green Deal.

The structure of the chapter is as follows. The second section reviews the results of previously-related studies. The third section describes the methodology and the data used in the study. In the fourth section, the empirical results are presented and discussed. In the last section, we summarise the main findings and highlight their theoretical and practical implications.

12.1. Policy and literature overview

Climate policy generally focuses on reducing greenhouse gas emissions responsible for global warming. This primarily includes policies targeting energy production, transport, industrial processes, and land use. While acknowledging the inevitability of some climate impacts, these policies also aim to increase adaptive capacity, ensuring that communities and ecosystems can cope with changing climate conditions. One of the key directions of climate policy involves promoting the integration of renewable energy sources into the electricity grid (Farghali et al., 2023). Policies that encourage the adoption of clean energy technologies by fiscal instruments and innovations can therefore impact electricity prices (Hosan et al., 2023). Initially, the costs of switching to cleaner technologies may be reflected in electricity rates, but in the long term, these investments should contribute to more stable and potentially lower prices. Although there may be short-term financial impacts, the long-term goal of climate policy and the transition to carbon neutrality is to create a more sustainable and resilient energy system. Proactive policy design, technological innovations, and consumer engagement are key factors in ensuring that the transition contributes to both climate goals and electricity affordability for consumers.

In 2015, the European Commission published its Energy Union Strategy as a key component of the new vision of the Economic Union (European Commission, 2015). This project aims to build an energy union that gives EU consumers – households and businesses – secure, sustainable, competitive, and affordable energy. It is based on five closely related and mutually reinforcing dimensions: (1) security, solidarity, and trust; 2) a fully integrated internal energy market; 3) energy efficiency; 4) climate action, decarbonising the economy; and 5) research, innovation, and competitiveness. In 2020 and 2021, some important strategies, (action) plans, and other initiatives were also adopted under the auspices of the European Green Deal, including the Fit for 55 package. Moreover, at that time the European Commission proposed revising important directives with a significant impact on the energy sector and market, for instance, the Energy Taxation and Emissions Trading Scheme (EU ETS). All these new adopted regulations pose threats not only to established fossil fuel suppliers but also renewable suppliers.

According to Eurostat (2023), the price of energy in the EU depends on a range of different supply and demand conditions, including the geopolitical situation, the national energy mix, import diversification, network costs, environmental protection costs, severe weather conditions, or levels of excise and taxation. From the structure of components point of view, the most important factors influencing electricity prices are conventional fuel prices, renewable

energy prices, environmental taxes, carbon prices based on the cap and trade market, and the prices of raw materials, including rare-earth elements, used in the energy industry.

One of the most controversial relationships analysed in recent years concerns the high impact of EU ETS auction prices on electricity prices, especially since phase 3 (2013–2020). In its recent report, the International Energy Agency (IEA, 2023) indicated that approximately 23% of energy-related emissions worldwide are now covered by a carbon price of some type. Nevertheless, most carbon prices remain below the level required to meet the goals of the Paris Agreement. In fact, the price difference between 2013 and 2021 was the highest among all prices and costs that affect the energy market. However, after the 2023 reform of Phase 4 of the EU ETS (2021–2028), which assumes many key changes, questions arose about the future of the European cap-and-trade mechanism since 2029 (Marchewka-Bartkowiak, 2023). This uncertainty has already generated proposals to withdraw from market-based pricing of CO₂ emissions (Verbruggen, 2021), or to continue the EU ETS. Suggested changes include: implementing appropriate limits (ESMA, 2022), in the face of possible phenomena that may emerge in its endgame, such as changing the structure of investors or problems with liquidity (Quemin & Pahle, 2023); extending the sectoral scheme to all entities subject to the ‘polluter pays’ principle (Pollitt & Dolph, 2021); merging the EU ETS with other similar schemes worldwide (Verde and Borghesi, 2022); integrating the trading of public ‘positive’ emission allowances with private ‘negative’ emission certificates (Burke & Gambhir, 2022).

12.2. Model setting and variables

In order to cover all 27 EU countries throughout the 2013–2021 period, which represents the third stage of the EU ETS, our study used panel data comprising an initial dataset of 22 candidate variables (Table 12.1).

The EU ETS annual average auction price is included in the analysis as a tool of low-carbon transition policies, alongside with two additional variables that account for the fiscal effects of the EU ETS mechanism: the EU ETS annual budgetary revenues and the annual expenditure from the ETS revenues spent on climate, renewable energy, and energy efficiency investments. Environmental taxes represent another climate policy tool used to catalyse energy efficiency and mitigate environmental problems (Sackitey, 2023).

Table 12.1. Candidate variables considered

Variable	Description	Source
Dependent variable		
Electricity price for non-household consumers	annual average national price in Euro per kWh, applicable to the medium non-household consumption band	Eurostat
Variables related to the EU ETS prices and other energy regulatory costs (independent variables)		
European Union Emission Trading System (EU ETS) carbon pricing data	carbon price determined by supply and demand of trading emissions allowances on the spot market	European Energy Exchange
ETS budgetary revenues	amount of auctioning ETS budgetary revenues	European Commission
ETS reported expenditures on climate and energy	amount of ETS auctioning revenues spent on climate and energy	European Commission
Environmental taxes	taxes on goods that have a harmful effect on the environment	Eurostat
Energy taxes	a component of the environmental taxes, representing only the amount of energy taxes (including CO2 taxes)	Eurostat
Variables related to selected energy market prices (independent variables)		
the prices of selected conventional materials used in the energy sector		
Crude Oil Price: Brent	Annual amount for Europe	Federal Reserve Economic Data
Bituminous Coal/Lignite Surface Mining Index	Producer Price Index by Industry	
Global price of Natural gas	Annual average amount	
the prices of selected raw, strategic materials used in the energy sector		

Variable	Description	Source
Global price of Aluminium	Annual average amount	Federal Reserve Economic Data
Carbon and Graphite Product Manufacturing Index	Producer Price Index by Industry	
Global price of Copper	Annual average amount	
Global price of Nickel	Annual average amount	
Global price of Uranium	Annual average amount	
Global price of Zinc	Annual average amount	
Compounds of Precious Metals, of Rare-Earth Metals index	Import Price Index	
Platinum price	Annual average amount	
Variables related to the transition to low-carbon economy (independent variables)		
Energy productivity	the amount of economic output that is produced per unit of gross available energy	Eurostat
Energy efficiency	final energy consumption used for monitoring the progress towards Europe 2020 - 2030 targets	
Final energy consumption by non-households	covers the annual energy consumption of end-users from commercial and public services	
Energy import dependency	shows the share of total energy needs of a country met by imports from other countries	
Share of energy from renewable sources	renewable energy sources for electricity generation	
		Macrotrends.net

Source: own elaboration.

Conventional energy minerals (oil, coal, natural gas) and the raw, strategic materials (such as aluminium, copper, nickel, uranium, zinc, rare earths etc) represent indicators closely linked in theory and practice with the developments on the energy market.

A first stage to discriminate between the potential statistical combinations of the 22 candidate independent variables consists in generating the correlation matrix and retaining in the further regression only those that exhibit a correlation smaller than 0.5. Given that the time dimension of the panel data is very brief (nine observations per country), the data series were not tested for unit roots.

We estimate eight panel models with cross-sectional (country) fixed effects for the dependent variable *electricity prices for non-household consumers* using the pool of independent variables that resulted from the correlation analysis. All models were checked with VIF and the results are not affected by multicollinearity.

12.3. Empirical results and interpretation

The estimation of the determinants of electricity price for non-household consumers is summarised in Table 12.2, which presents the estimates (coefficients and *p*-values) for the eight alternative models.

Regression results (models 1 to 8) provide a consistent depiction of the determinants of electricity price for non-household consumers, despite employing different combinations of independent variables. The *R*-squared indicates high values, with all the estimated models explaining around 87% of the variation in the electricity price. This price seems to be influenced by the prices of conventional and strategic materials and less by the ETS variables and others related to the transition to a low-carbon economy (except for energy productivity). A plausible explanation suggested by Ahamada and Kirat (2015) is that electricity producers in European countries are facing uncertainties regarding the future of the EU ETS mechanism. Consequently, they adopt a prudent ‘wait-and-see’ attitude rather than transmitting its effect to the prices for non-household electricity. Thus, none of the ETS-related variables exerts a significant impact on the dependent variable. This is also true for the variables related to the transitioning to a low-carbon economy. An increase in energy productivity raises electricity prices for non-household consumers, the relationship being statistically significant at 5% across all estimated models.

Table 12.2. Model estimates

Independent variables	Model 1		Model 2		Model 3		Model 4	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Intercept	0.034296	0.0508	0.033790	0.0547	0.027078	0.1622	0.026600	0.1692
EU ETS carbon pricing	-0.000063	0.3368	-0.000060	0.3475	-0.000049	0.4678	-0.000046	0.4917
ETS budgetary revenues	0.000000	0.8436	-	-	0.000000	0.8903	-	-
ETS expenditures on climate and energy	-	-	0.000000	0.864	-	-	0.000000	0.9332
Energy taxes	0.001693	0.2877	0.001720	0.279	-	-	-	-
Environmental taxes	-	-	-	-	0.002005	0.1705	0.002038	0.164
Energy productivity	0.002189	0.0195	0.002184	0.0201	0.002473	0.0123	0.002469	0.0127
Energy import dependency	0.000089	0.4186	0.000090	0.4102	0.000094	0.3942	0.000094	0.3876
Share of energy from renewable sources	-0.000018	0.9449	-0.000021	0.9382	-0.000028	0.9159	-0.000029	0.912
Energy consumption by households	-0.000002	0.1381	-0.000002	0.1912	-0.000002	0.1342	-0.000002	0.1801
Carbon/graphite price	-0.000006	0.741	-0.000006	0.7495	-0.000006	0.7379	-0.000006	0.745
Crude oil price	0.000156	0	0.000155	0	0.000158	0	0.000157	0
Uranium price	0.000747	0	0.000745	0	0.000745	0	0.000742	0
No. of observations	241		240		241		240	
R-squared	87.02%		86.96%		87.07%		87.01%	

Independent variables	Model 5		Model 6		Model 7		Model 8	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Intercept	-0.303541	0	-0.301593	0	-0.310169	0	-0.308195	0
EU ETS carbon pricing	-0.000087	0.18	-0.000083	0.1927	-0.000074	0.2654	-0.000070	0.2877
ETS budgetary revenues	0.000001	0.6936	-	-	0.000000	0.738	-	-
ETS expenditures on climate and energy	-	-	0.000001	0.741	-	-	0.000000	0.7987
Energy taxes	0.000982	0.5335	0.001030	0.5127	-	-	-	-
Environmental taxes	-	-	-	-	0.001383	0.338	0.001426	0.3238
Energy productivity	0.002095	0.023	0.002091	0.0237	0.002319	0.017	0.002317	0.0173
Energy import dependency	0.000069	0.5228	0.000073	0.5001	0.000073	0.4993	0.000076	0.4796
Share of energy from renewable sources	0.000089	0.7379	0.000083	0.7533	0.000077	0.7708	0.000073	0.7838
Energy consumption by households	-0.000002	0.1665	-0.000001	0.2319	-0.000002	0.162	-0.000001	0.2209
Carbon/graphite price	-0.000064	0.0082	-0.000063	0.0091	-0.000064	0.0081	-0.000063	0.0089
Bituminous coal and lignite price	0.002022	0	0.002005	0	0.002024	0	0.002008	0
Uranium price	0.000606	0.0001	0.000604	0.0001	0.000606	0.0001	0.000605	0.0001
No. of observations	241		240		241		240	
R-squared	87.40%		87.34%		87.44%		87.38%	

Source: authors' estimations

Our findings align with the existing literature in several aspects. Commercial consumers may experience more fluctuating demand based on production cycles and operational needs (An et al., 2022; Dalen & Larsen, 2015). Hence, different usage patterns can result in various influences on pricing. Moreover, regulatory frameworks and policies are tailored to specific challenges (Rokicki et al., 2021). Non-household consumers might be subject to different regulations related to market competition and industrial competitiveness. Industries with high energy intensity, such as manufacturing or heavy machinery, may be more directly impacted by changes in the prices of conventional and non-conventional materials, which are critical for their production processes.

In this regard, our outcomes indicate that prices of conventional and strategic materials appear to be the main determinants of electricity price as follows: uranium price exerts a positive impact on the dependent variable, statistically significant at 1% across all estimated models; the crude oil price (included in four models) and its counterpart variable, the price of bituminous coal and lignite (included in the other four models), both have a positive impact on the dependent variable, statistically significant at 1% across all estimated models; finally, the price of carbon and graphite exerts a negative impact on the electricity price for non-household consumers, statistically significant at 1% in half of the estimated models, but insignificant in the rest of the models.

Conclusions

The study identifies and analyses a broad array of factors related to the energy market, climate policies and mechanisms for achieving carbon neutrality that may influence electricity prices for non-households.

The results are nuanced in terms of the tools used within the low-carbon transition framework. The annual average auction price of the EU ETS and its fiscal effect represented by the annual expenditure of ETS revenues on climate, renewable energy and energy efficiency investments exert no impact on the prices of the non-household sector. Energy and environmental taxes or the use of renewable energy follow the same pattern, and are not reflected in non-household electricity prices.

Our findings demonstrate that the prices of graphite and carbon, uranium, and bituminous coal and lignite as critical metals for the decarbonisation of the energy sector are statistically significant determinants of the electricity price. Thus, higher prices of core energy materials are passed through into electricity prices.

Thus, it can be concluded that electricity prices reflect the evolving transition to a low-carbon economy, since electricity producers appear to include the price

of key factors in their production cost functions. This confirms the empirical identification of a transmission mechanism from clean energy policies and measures taken to transition energy to the price of electricity, although its influence (documented for the period 2013–2021) remains weak.

On the basis of the above outcomes, we recommend that policymakers prioritise and incentivise the development and adoption of renewable energy technologies. Increased investment in solar, wind, and other sustainable sources can contribute to a more diversified and environmentally friendly energy mix, potentially reducing reliance dependence on conventional and strategic materials. Additionally, implementing robust energy efficiency programmes for industrial sectors is crucial. By encouraging the adoption of energy-efficient technologies and practices, policymakers can mitigate the impact of rising prices of conventional materials, particularly in energy-intensive sectors.

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13. The European Union's energy security based on renewables

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Abstract: Energy security is considered through the EU's efforts to reduce dependence on imported fossil fuels by expanding renewables. The chapter reviews energy-security concepts, import-dependency patterns, post-2022 shifts in supplier relations, EU climate policy and supply chains for solar photovoltaics and wind turbines. Renewable energy can reduce exposure to imported gas, oil and coal, but it does not automatically remove dependency risks. Photovoltaic production is dominated by Chinese firms across raw materials, components and assembly, creating a new vulnerability for Europe. Wind energy offers a stronger European position because EU companies remain important turbine producers and assemblers. The chapter points to a broader resilience agenda: domestic technological capacity, supplier diversification, grid expansion, storage, recycling and sustainable lifecycle management must accompany renewable deployment.

Keywords: renewable energy sources, European Union, energy security, energy dependency.

Introduction

Energy security has traditionally been associated with ensuring stable access to energy resources at acceptable prices. For the European Union, however, this objective has become increasingly complex due to its high dependence on external suppliers, geopolitical instability and the need to reconcile security of supply with climate objectives. The transition towards renewable energy sources is therefore not merely an environmental transformation, but also a strategic process aimed at reshaping the foundations of the European energy system. At the same time, the shift away from fossil fuels does not necessarily eliminate external dependencies. Instead, it may alter their structure by increasing the importance of raw materials, components or supply chains. This issue is particularly visible in renewable-energy industries, where the EU's presence differs considerably across sectors. The aim of this chapter is to assess the EU's position in strengthening energy security through the devel-

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opment of renewable energy and to indicate challenges. Particular attention is devoted to the structure of selected renewable-energy value chains and to the extent to which domestic production capabilities, supply diversification and technological capacity can contribute to reducing external vulnerabilities. The analysis also addresses the infrastructural and environmental challenges accompanying this transition.

13.1. Energy security

The European's (EU) energy system is continuously evolving due to the implementation of climate and energy policies at both the community and national levels. The growing accessibility of new energy production technologies and reliable supply appear to be achievable within the EU's borders in the near future.

Energy security is defined as the uninterrupted availability of energy in various forms, with acceptable quality and prices, while minimising the negative impact on the natural environment. The key components include the physical availability of energy and its economic affordability. These two aspects correspond to the fundamental dimensions of energy security: the geostrategic and economic. It is essential to note that energy security is multi-dimensional (analysed on many levels) and dynamic; it is shaped by market conditions and geopolitical situations (Gökgöz & Güvercin, 2018).

The geostrategic dimension refers to ensuring the continuous availability of energy in various forms, which consists of two components. The first is the geographic component, which includes the origin of energy resources, their transport routes, the level of risks associated with deliveries, the ratio of foreign to domestic sources, the location of production units within the energy system, and the distribution networks. The second component is strategic; this determines whether energy will be continuously accessible. There is no single universal method for developing an optimal energy security strategy or assessing the state of energy security in individual countries (Rabbi et al., 2022).

The economic aspect refers to the costs of sourcing energy resources and their prices. Economic security ensures that energy prices neither lead to energy poverty (the inability to meet energy needs due to excessive costs and/or market prices) nor hinder the socio-economic development of a given country. Several factors influence energy prices: market trends, political decisions, non-tariff trade policy instruments, production and distribution efficiency, and even infrastructure effectiveness (Yu et al., 2022).

13.1.1. Import dependency

First of all, it is important to emphasise that energy supply security does not equate to independence from energy imports. Otherwise, countries required to import energy for geographic or technological reasons would consistently experience energy insecurity and face economic development challenges. As Rokicki et al. (2023) note, import dependency consists of two crucial components: the supplier and the risk associated with energy supply (rather than the fact of importing itself).

The European Union has limited fossil fuel resources, making imports a necessity, as they account for over half of the EU's energy needs. In fact, all EU Member States are net energy importers (European Council, 2024a). Since the 1990s, dependence on natural gas imports has increased steadily, starting at approximately 50%. According to Eurostat (2024), this dependence rose to about 90% by 2019. Meanwhile, dependence on crude oil imports remained consistently high, exceeding 90% during the same period (Figure 13.1).

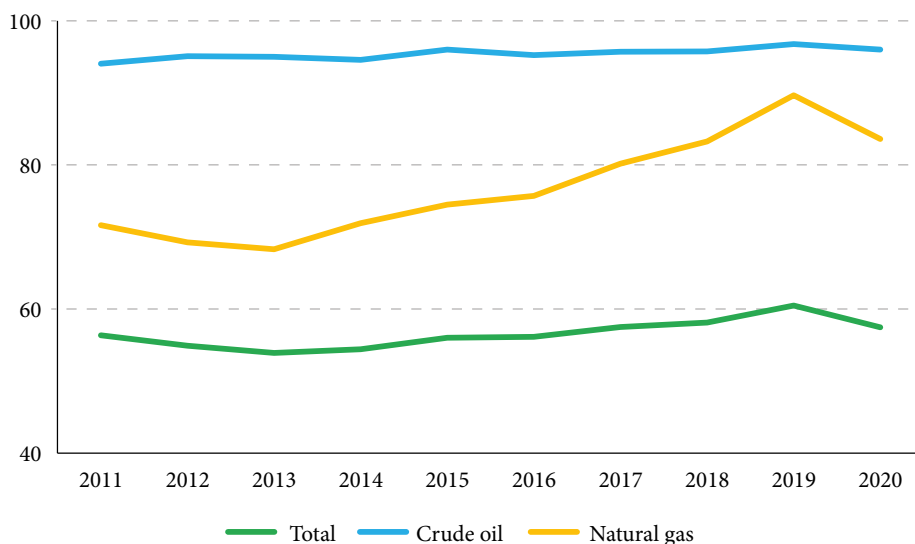


Figure 13.1. EU's energy import dependency (2011–2020)

Source: (Eurostat, 2020).

The European continent lacks substantial resources, and deposits of natural gas and crude oil are primarily exploited by Norway (a key supplier, though not an EU member) (Fischer, 2021). Since the 1990s, hard coal extraction has decreased fourfold due to the EU's regulations and policies, which is a sign of leaving fossil fuel-based energy behind. Despite this decline, its largest coal producer remains Poland (Eurostat, 2022a).

13.1.2. Directions of energy import in the EU

The issue of the EU's dependence on the supply of energy resources from beyond the Urals is significant. While Member States differ in their reliance on fossil fuel imports, at the beginning of the second decade of the 2020s, as many as 18 economies depended on a single supplier (Russia) for over 75% of their natural gas (Sharefedin, 2022). Regarding crude oil, the situation was the most critical along the EU's eastern external border, e.g. Poland 72%, Finland 84% (Demagog, 2022).

The outbreak of war in Ukraine triggered the introduction of political and economic sanctions aimed at Russia's economy, resulting in a reduction in the intensity of the EU's fossil fuel trade. Comparing the second quarter of 2022 to the same period in 2023, a significant drop in crude oil imports from Russia was recorded (a fall from 8.7% to 1.6%), leading to growth in purchases from other trading partners. Similarly, during the equivalent period, the EU halved its natural gas imports from Moscow, from 5% to 2.5%. According to Eurostat (2024a), the EU's new trading partners, by volume of imports, include:

- crude oil: Norway (13.7%), the United States (13.6%), and Kazakhstan (10.2%),
- natural gas: Norway (44.3%), the United Kingdom (17.8%), and Algeria (16.5%),
- liquefied natural gas: the United States (46.4%), Russia (12.4%), and Qatar (10.9%).

Fuel for the EU's nuclear power plants mainly originates from uranium mined in countries such as Kazakhstan (26%) and Russia (16.9%). After extraction, uranium is processed and enriched, often at facilities located in Russia, before being supplied as nuclear fuel. In recent years, the EU has sought to diversify its sources of nuclear fuel to reduce dependency on a single supplier (Eurostat, 2022b).

13.2. Renewables-based economy

The departure from exploiting deposits of raw materials, which for years were a crucial foundation of energy sourcing (e.g., hard coal or lignite), along with the growing dependence on external fossil fuel supplies, has led to the pursuit of a third path to achieve energy security. The EU has identified renewable energy sources (RES) as a primary pillar of its economic transition towards ensuring secure energy supplies while minimising negative environmental impacts (Potrč et al., 2021).

13.2.1. European climate policy

The Paris Agreement entered into force in 2016 after being ratified by at least 55 countries responsible for no less than 55% of global greenhouse gas emissions. It primarily engages the seven largest CO₂ emitters (China, the United States, the EU, India, Russia, Japan, and Brazil). This agreement represents a framework of actions aimed at mitigating global warming. Notably, the EU, on behalf of the community, along with all its Member States, signed and ratified the agreement. Subsequently, the European Climate Law, adopted in 2021, translated the climate goals for 2030 and 2050 into binding, legally enforceable regulations (European Council, 2024b).

The European Green Deal development strategy, introduced in December 2019 by the European Commission, is designed to combat natural resource depletion, ongoing climate change, and significant environmental degradation. Its vision is for Europe to become a climate-neutral, fair, and prosperous society with a modern, resource-efficient and environmentally friendly economy. By 2050, the European Union aims to achieve climate neutrality, assuming concurrent economic growth. Implementing this strategy involves redesigning the socio-economic system of the EU and incurring significant financial costs, enabling the EU to transform into a modern, competitive, and eco-friendly economy (Adamowicz, 2022).

13.2.2. Renewable energy sources

Renewable energy sources (RES) have undergone significant development over the last decade, becoming the second-largest source of electricity generation in the EU. Their share increased from 20% to nearly 40% between 2010 and 2020. At the same time, fossil fuels have lost their prominence in energy production thanks to the EU's climate policies and the shift towards a green economy (EMBER, 2021).

According to the EU's classification (Eurostat, 2024b), RES include:

- wind energy,
- solar energy,
- biomass and biogas,
- hydropower,
- tidal power and
- geothermal energy.

The driving forces behind green energy are solar power and wind energy. These two resources demonstrate the fastest year-on-year growth in electricity production in the RES sector within the EU. These two pillars are becoming fundamental to the energy security of the Old Continent (Olczak, 2020). A critical issue to consider is the EU's dependence on installation manufacturers.

13.2.3. Solar photovoltaics production market

China is the world leader in photovoltaic panels (PV) production, with its market share growing from 55% to over 84% within a decade (Conte, 2022). The competitive advantage lies at the very beginning of the supply chain – raw materials. China's investments in Africa have facilitated its access to these resources. Currently, the Red Dragon controls over half of the global raw materials (and processed materials) essential for solar panel production. China dominates nearly 90% of the market for components, while in the final stage, namely assembly, it commands a 70% market share (European Commission, 2020).

In contrast, the EU's involvement in solar panel production is minimal (Figure 13.2). Not only does its market share decline within each subsequent link in the chain, but the highest figure is a mere 6% in access to raw materials. The Achilles' heel of the EU's economy is, without a doubt, its zero contribution to component production (European Commission, 2020). The absence of domestic firms engaged in producing and supplying highly demanded products forces purchasing from foreign companies. Among the six largest PV systems producers, each is a Chinese enterprise (Statista, 2022a).

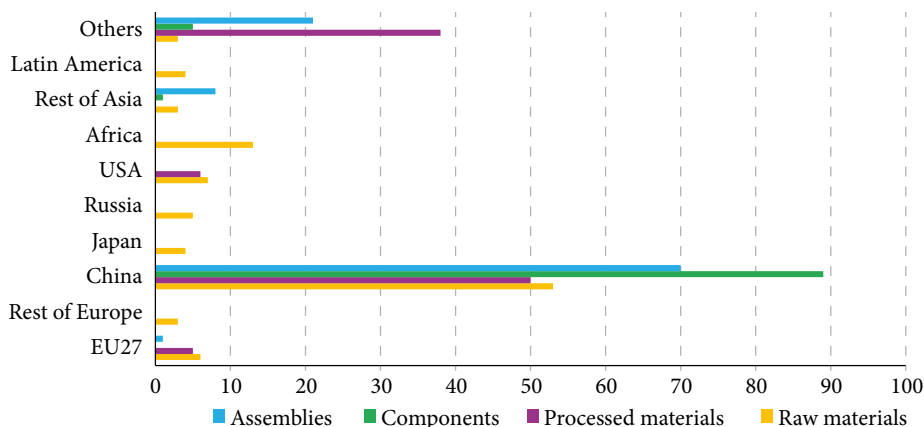


Figure 13.2. Solar PV: key players along the supply chain

Source: (European Commission, 2020, p. 39).

13.2.4. The wind turbine market

When analysing the wind turbine market (Figure 13.3), the trend runs contrary to what is observed in the PV market. While in the initial production stage, namely raw material access, China has achieved global dominance in the possession and control of deposits, its involvement diminishes, moving further up the supply chain. Though over half of the components are still produced in the Asian market, at the final stage – assembly – China's share is approximately 20% (European Commission, 2020).

Contrary to the EU's minimal presence in the PV panel supply chain, its participation in the wind turbine production process increases at each subsequent stage. However, access to raw materials is worse than in the previous case, as none exists. The EU's presence in subsequent links reaches double digits: e.g., 12% in materials and 20% in components. Nearly 60% of global assembly occurs within EU Member States (European Commission, 2020). Consequently, four of the six largest wind turbine manufacturers are European companies: the global leader, Denmark and three German firms. This provides a strong argument for the feasibility of ensuring energy security by orienting the EU economy toward wind energy. Nevertheless, Chinese companies are catching up. Following the top four, the fifth and sixth spots are occupied by one American and one Chinese company, respectively (Statista, 2022b).

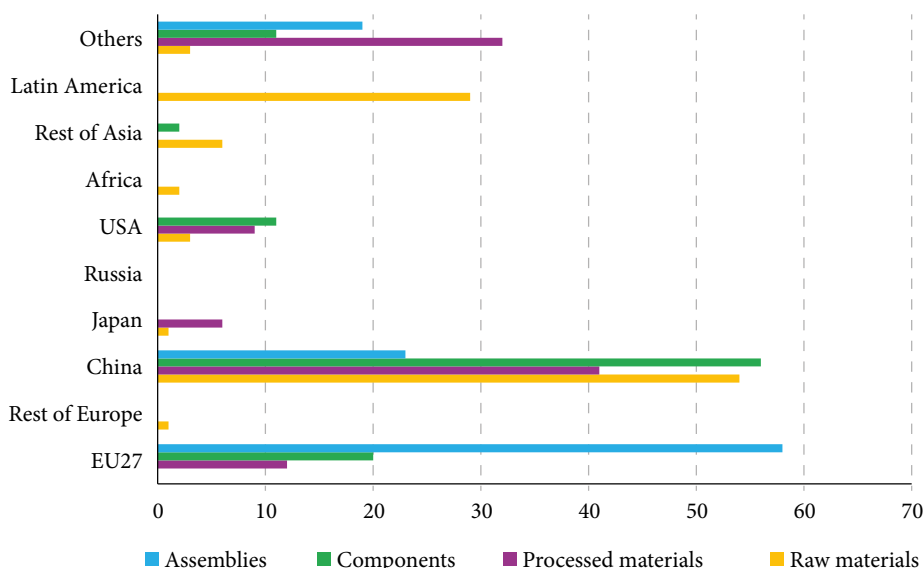


Figure 13.3. Wind turbines: key players along the supply chain

Source: (European Commission, 2020, p. 30).

13.2.5. Challenges

The lack of adequate infrastructure for transmitting energy generated from renewable sources is a significant challenge in the EU. While renewable energy production has increased, the transmission grid often struggles to accommodate fluctuating energy supply from sources like wind and solar. This mismatch leads to inefficiencies, energy losses, and bottlenecks, especially in areas where production exceeds local demand. Upgrading and expanding the grid and integrating energy storage solutions are crucial to ensuring the reliable and efficient distribution of renewable energy across the EU (European Council, 2023).

A pressing issue facing the renewable energy sector is waste management from installations that have reached or are nearing the end of their operational lifecycle. The more solar and wind farms in existence, the greater the volume of waste that must be managed and, where possible, recycled. While technological advancements have extended product lifespans with each new generation, the lifecycle of some of the first turbines and panels installed in the early 21st century has ended. Currently, the EU must manage over 200,000 tons of used equipment, and projections for 2050 anticipate a sixtyfold increase in waste from solar panels and wind turbine blades (Statista, 2024).

While recycling used solar panels and wind turbine blades presents significant challenges, it also opens up opportunities for innovation, new recycling technologies, and the establishment of emerging industries. A prime example is the Polish company Thornmann Recycling, which has developed cutting-edge technology to separate individual layers of bonded materials. Thornmann is part of the German Composite Cluster, which brings together firms from Germany, Austria, and Switzerland, amplifying shared knowledge's spillover effect. The recycled materials produced are repurposed to create drainage grates, cable duct covers, and sewer covers (Urban, 2022).

Conclusions

Climate change is driving societies to seek new energy solutions, as traditional methods of energy production from coal, gas, and oil are increasingly viewed as unacceptable. The EU's climate policy focuses on expanding the use of renewable energy sources and reducing reliance on external suppliers. Faced with high import dependency, the EU is investing intensively in RES to mitigate risks associated with international energy market instability.

Case studies highlight the dominance of Chinese firms in photovoltaic panel production, yet such reliance on major manufacturers creates new dependen-

cies and risks. Because photovoltaic panel production is heavily concentrated in China, the EU remains vulnerable to fluctuating market, political and trade conditions. To truly strengthen energy security, the EU should develop its local technology production and diversify its supply sources, thereby reducing dependency on single foreign suppliers.

The wind energy sector presents a far more favourable scenario, as European companies rank among global leaders, forming a foundation for energy security. The energy transformation aims to enhance energy security and protect the environment and contribute to achieving sustainable global development goals.

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14. Defining environmental goods in international trade

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Abstract: The elusive category of environmental goods is traced across three decades of international trade debates. The chapter compares initiatives by APEC, OECD, WTO, UNCTAD, the World Bank, the World Customs Organization and recent bilateral or plurilateral agreements. Each initiative reflects different motivations, from analytical classification to tariff liberalisation, and different assumptions about product-based and purpose-based approaches. The discussion shows why no unified list has emerged: dual-use goods, limited precision of Harmonized System codes, technological change, greenwashing risks and divergent priorities between developed and developing countries all complicate classification. Recent agreements such as ACCTS may revive wider efforts, but the chapter stresses that any useful framework must be dynamic, transparent and sensitive to development concerns as well as environmental value.

Keywords: environmental goods, green goods, WTO, EGA, ACCTS, APEC, OECD.

Introduction

In recent years, the issues of sustainable development and climate protection have emerged as key determinants shaping both economic policy and economic activity across virtually all sectors and levels of the economy. This trend is equally evident in the sphere of international trade, one of the crucial dimensions of globalisation and a central channel through which economic activities undertaken by individual states are transmitted globally. Given the scale and importance of contemporary international trade, the implementation of sustainable economic policies – whether at the level of nation-states or enterprises – cannot be meaningfully pursued without reference to this domain. In this regard, numerous diverse initiatives have been undertaken in recent years, with varying degrees of effectiveness, aimed at greening international trade and enhancing the sustainability of the instruments and measures employed within international trade policy.

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One of the issues concerning international trade and sustainable development is the concept of environmental goods (EGs) in international trade. This is commonly used in debate, trade policy and various reports by a number of international organisations and trade policy decision-makers. However, this broad and common usage has not yet resulted in the development of a single universally accepted definition. This is due to the various approaches/methodologies taken by individual entities attempting to define what environmental goods are, which in turn is often dictated by different motivations. Those attempts are also to some extent hampered by technological developments in this area and the need to constantly adapt trade rules and the appropriate approach in policy-making.

This chapter aims to present the key definitions of environmental goods in international trade. It introduces the most important attempts to define the EGs in chronological order over the last three decades, emphasising the diverse approaches and motivations. It also highlights the methodological differences in defining the respective lists of goods, as well as the challenges and limitations arising from the approaches adopted.

14.1. Defining environmental goods

14.1.1. APEC list

In the mid-1990s, issues related to ‘green economy’, environmental technologies, and the potential of the environmental goods and services sector began to gain importance in economic debate. The first attempt to combine formally trade objectives (reduction of trade barriers) with environmental protection objectives (improved access to green technologies) emerged among APEC countries. In 1997, representatives of the countries decided to launch the ‘Early Voluntary Sectoral Liberalisation’ (EVSL), which assumed faster trade liberalisation in 15 specified sectors, including environmental goods and services. In line with the assumptions adopted at the time, the APEC agreement was intended to open markets and promote technical cooperation. These negotiations led to the development of the first list of environmental goods for the purposes of EVSL, together with end tariff rates and timetables for liberalisation (OECD, 2005; Sugathan, 2013).

Since the Harmonised System (HS) nomenclature does not designate environmental goods as a separate sector, the planned liberalisation had to be implemented on a product-by-product basis. Using the OECD definition of environmental industry activities as a reference, APEC developed a positive list of products, specified by HS codes, to be covered by the agreement. Recognising

that individual economies had product-specific concerns, some flexibility was introduced with regard to the pace of the elimination of tariffs (OECD, 2005).

Developing the EG list by APEC countries was a complex task, largely because some countries were cautious about expanding the list and liberalisation. The forum brings together both developed and developing countries, whose interests in protecting specific sectors often differ. In addition, some countries expressed concerns about ‘dual use’, with some goods used both in the environmental sector and in other sectors. This means that the effects of liberalising trade in such goods go far beyond the environmental sector, which raised concerns among some APEC members. The creation of such a list also posed technical and administrative challenges arising from the HS system itself. Individual tariff lines included both goods relevant to environmental protection and those that do not necessarily serve this purpose, but are classified under the same 6- or 8-digit tariff code. Those concerns subsequently led APEC members to develop a rather limited list that directly resulted from the negotiated offers in the context of trade liberalisation (OECD, 2005). The first APEC list included 109 items (104 unique HS codes excl. duplicates) within 10 broad categories¹ (Mathur & Guin, 2006). However, the list developed at that time was not formally adopted as the basis for the trade liberalisation. In the years that followed, it functioned primarily as a working document and an analytical tool for individual APEC working groups, as well as a point of reference in discussions on environmental goods at the multilateral level (OECD, WTO).

The working list of environmental goods was eventually formally adopted in its revised form at the APEC Summit in Vladivostok in September 2012. At that time, the 21 APEC economies made a political commitment to reduce tariffs on EGs to 5% or less by the end of 2015, taking into account each member’s economic circumstances. This declaration was accompanied by the adoption of the list, which comprised 54 6-digit HS sub-headings. The decision was particularly significant, as it represented the first formally adopted commitment to liberalise trade in environmental goods undertaken by a substantial group of trading partners (Vossenaar, 2013).

The adopted list, based on 54 HS subheadings, was in fact defined more narrowly and included specific EGs, which in most cases covered only a portion of those subheadings (defined as “ex-outs”). 6-digit subheadings describe products too generally to capture solely environmental goods. In the APEC list, the term “ex-out” indicates that only a specific portion of a given subheading qualifies as an environmental good, based on the additional product criteria

¹ Those were: air pollution control, water pollution control, solid waste management, remediation/clean-up of soil and water, noise/vibration abatement, monitoring, analysis and assessment, potable water treatment, recycling systems, renewable energy plant and heat and energy management

and notes. Only in a relatively small number of cases could a whole 6-digit HS sub-heading be considered an ‘environmental good’. The APEC list contains EGs relevant for various ecological categories, such as: renewable energy generation (15 sub-headings); environmental monitoring, analysis and assessment equipment (17 sub-headings); environmental protection, including air pollution control, management of solid and hazardous waste as well as water treatment and wastewater management (21 sub-headings); and one environmentally preferable product (bamboo). The list includes both finished products and parts (Vossenaar, 2013).

In June 2021, APEC trade ministers called for the list to be revised. This revision was considered necessary to reflect the considerable technological advancements in the areas of environmental and climate protection, including the development of new products and technologies (e.g., energy storage solutions). Moreover, discussions concerning the list’s expansion underscore the importance of incorporating the perspectives of lower-income economies. The original list, developed predominantly from the viewpoint of more technologically advanced APEC economies, has yielded limited developmental benefits for less developed countries. The renewed list should also ensure compatibility with modern sustainability standards and goals, and its comprehensive nature must also address non-tariff barriers, which constitute a significant obstacle to trade and thus hinder the strategic role of trade in supporting environmental protection and climate action. The new comprehensive list should also be based on an approach that takes into account global value chains for environmental goods. Furthermore, the need for a dynamic mechanism for updating the list in the future is strongly emphasised (Krithika & Mrunmayee, 2025; Kuriyama, 2021).

14.1.2. Organisation for Economic Co-operation and Development (OECD)

A parallel approach to the definition of environmental goods emerged within the OECD, which had previously undertaken efforts to conceptualise this category of goods in the late 1990s. A key element of the discussion that was already in progress at that time was developing the first conceptual classification of environmental goods and services. According to the definition, developed jointly by the OECD and Eurostat within the framework of the Joint OECD/Eurostat Task Force on Environmental Goods and Services, “The environmental goods and services industry consists of activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This

includes cleaner technologies, products and services that reduce environmental risk and minimise pollution and resource use” (OECD/Eurostat, 1999).

The next step involved publishing an official list of environmental goods by the OECD in 2001. This list contained 132 unique 6-digit HS codes and overlapped with the earlier APEC list by approximately 27%. While the number of products included in both lists did not differ significantly, the degree of overlap may seem surprisingly low due to several reasons.

Firstly, there was a difference in thematic emphasis between the lists. The OECD included more products in ‘Hazardous waste storage and treatment equipment’ and ‘Waste collection equipment’, while APEC expanded the list more heavily into environmental monitoring, analysis and assessment. Secondly, certain tariff lines were omitted from the APEC list, as those specific goods had already been incorporated into lists developed for other EVSL initiatives. This referred particularly to chemicals, for which all substances included in the OECD list were classified by APEC under a separate and comprehensive EVSL proposal for chemicals and, consequently, were not included in the APEC EGs list. Thirdly, the OECD list lacked the same level of specificity for certain product categories. If the OECD had elaborated these subcategories more thoroughly, the overlap between the two lists would have been greater (Steenblik, 2005; Sugathan, 2013).

The APEC list and the OECD list were developed at the same time and, despite the differences, both projects influenced each other. Their respective nature and scope were largely determined by the distinct objectives underlying their formulation. The OECD list was designed primarily for analytical purposes and was therefore developed deductively, drawing on the general classification framework for the environmental industry established in the late 1990s (OECD/Eurostat, 1999), and subsequently supplemented with more specific examples. The APEC list, by contrast, was intended to serve as a basis for trade liberalisation among the organisation’s member economies. Consequently, it assumed a more technical and operational character (including the feasibility of classifying goods within customs procedures). Its final form was the outcome of product nominations submitted by APEC members during trade negotiations. These political negotiations produced a detailed list of specific products, which were subsequently arranged according to an agreed classification structure. For APEC economies, the EGs list represented only one component of a broader trade liberalisation encompassing other sector under the EVSL framework. Nevertheless, both lists served as important reference points in the wider discourse on trade in environmental goods, a discussion that was later continued at the WTO. In subsequent years, both lists, together with proposals advanced by other international organisations, including the WTO or UNCTAD, were integrated into

the Combined List of Environmental Goods (CLEG), a statistical instrument used for analysing trade in environmental goods (comprising approximately 250 tariff lines) and updated on an ongoing basis (Sauvage, 2014; Steenblik, 2005).

14.1.3. World Trade Organisation – from the Doha Round to EGA negotiations

Significant efforts to define a list of environmental goods began in a multilateral forum with the launch of the Doha Development Round in 2001. This coincided with the publication of previously compiled lists, which also became a point of reference for the WTO negotiations. In accordance with the provisions of the Doha Declaration, it was announced that talks would begin on “the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services” (WTO, 2001). Consequently, environmental goods emerged as one of the components of multilateral negotiations conducted by WTO members, despite the absence of a preliminary definition of these goods. Establishing such a definition was intended to form part of the forthcoming negotiations.

From the outset of the Doha negotiations, it was acknowledged that WTO members faced numerous challenges in this domain. The absence of a clear definition of EGs and reference criteria for validating the inclusion of products in this category was central to the difficulty in formulating any mutually accepted list. Another important challenge involved addressing the needs of developing countries. It was pointed out that previously developed lists (APEC, OECD) focused on EGs that were important from the economic interests of highly developed countries. This raised concerns that the potential liberalisation of EGs trade would largely serve the interests of more developed economies. A further significant issue was the inclusion of dual-use products within the prospective list and the determination of their primary purpose and the extent to which they contribute to environmental protection. Various methodological approaches in defining EGs were presented, including the product-based approach (goods that are pre-determined on a specific list of goods), the project-based approach (proposed by India; goods are considered environmental if this is specified by a specific project aimed at environmental protection), and the environmental end-use approach (classification depends on the item’s final application in protecting the environment) (Lendo, 2005; WTO, 2005). The supporters of developing a multilateral EGs list emphasised the need to focus on ensuring flexibility in the implementation of such a list and the related liberalisation commitments on the part of developing countries, while maintaining the broadest possible support and implementation of such a list by all WTO members (Stilwell, 2008).

It was apparent that initiating the discussion from a definition of EGs would present considerable challenges. In the initial phase of the Doha Round, a number of key WTO Members² adopted a 'list approach' and submitted proposals for EGs lists to be subject to negotiation and liberalisation within the WTO. Several of the proposed lists referred to the OECD definition of environmental industries and/or APEC's conceptualisation of environmental goods. In 2004, the WTO compiled these submissions into the 'Consolidated List of All Proposals,' for informational purposes only. The list included a total of 480 entries,³ of which 56% fell under the umbrella of "pollution management." Most of these entries were related to wastewater management (118), solid and hazardous waste management (108), and renewable energy plants (108). However, the combined list did not reflect a consensus among WTO members. It conflicted with the project-based approach favoured by some developing countries (e.g., India, Malaysia, Argentina), and although the list-based approach was supported by a larger number of members, reaching a compromise proved impossible. Differences in the approach underpinned the failure of WTO negotiations on environmental goods at that time (ICTSD, 2007; WTO, 2005).

Facing the impasse in negotiations, a group of highly developed WTO countries known as the Friends of Environmental Goods (FEG) submitted a new joint proposal, subsequently referred to as the Friends List, as an informal document (JOB(07)/54) in April 2007. It was a scaled-down version of earlier proposals, and its shorter form was intended to secure broader consensus and support from other WTO members. The list included 153 HS codes, compiled from the individual proposals of the FEG countries, while project-based proposals from some developing countries were excluded. Although it never became an official WTO list, the Friends List provided a foundation for multilateral discussions on liberalising trade in environmental goods (de Melo & Balineau, 2013; Sugathan, 2013).

In July 2014, 14⁴ WTO members launched plurilateral negotiations under the WTO's auspices on the Environmental Goods Agreement (EGA). The talks aimed to eliminate tariffs on environmental goods that would support climate and environmental protection policies. The aforementioned Friends List became a reference point in the period leading up to the formal negotiations. However, during the talks themselves (2014–2016), numerous proposals were put forward,

² Canada, the European Communities, Japan, Korea, New Zealand, Qatar, Switzerland, Chinese Taipei, and the United States.

³ One entry per HS heading or sub-heading; 36 entries without HS code.

⁴ Australia, Canada, China, Costa Rica, the European Union, Hong Kong, Japan, New Zealand, Norway, Singapore, the Republic of Korea, Switzerland, Chinese Taipei, and the United States. During the negotiations, Iceland, Israel, and Turkey also joined the talks.

both building on previous ideas, including the APEC and OECD lists, and introducing many new national initiatives. The adoption of the APEC EG list in 2012 acted as a political catalyst for commencing negotiations within the WTO framework. At the same time, it was recognised that the APEC list was only one reference point and, as such, was considered too short and insufficiently ambitious. During the EGA talks, the negotiating countries identified around 450 EGs that could potentially be included in the agreement. These products encompassed sectors such as renewable energy, energy efficiency, air pollution control, and waste management. In the final phase of negotiations (August 2016), the discussed product list comprised goods from approx. 300 tariff lines. A fundamental difficulty in the EGA negotiations was again the lack of a shared definition of the environmental good. Many products labelled as 'environmental' can serve multiple purposes, which casts doubt on whether they should be classified as such. There was also the issue of determining what qualifies as an 'environmentally preferable' product. During the negotiations, which relied on a list-based approach, these uncertainties sparked long and intense debates over which goods should be included in the EGA. Although proposals were made to incorporate dynamic mechanisms into the EGA list, thereby allowing products to be added/removed in the future (e.g., due to technological progress), no agreement was reached. Negotiations on the EGA were suspended in December 2016. Consequently, the Friends List and the EGA working lists remain only historical reference points and sources of data for analysis. As of now, the WTO has not formally established a universally recognised list of environmental products (Das et al., 2018; de Melo i Solleder, 2020; WTO, 2025).

14.2. Other initiatives

The initiatives described earlier, while setting the main tone for discussions on defining environmental goods and attempting to create a list of these products, were not the only efforts in this area. One such attempt, albeit limited in scope and impact, was the World Bank's definition of so-called climate-friendly goods in 2007. Building on the Friends List, the World Bank identified 43 items⁵ that primarily contribute to combating climate change and accelerating the reduction of GHG emissions through energy efficiency, renewable energy, and pollution control. As suggested in the WB's report (World Bank, 2008), a narrower choice

⁵ In 2008, the World Bank additionally published a shortened version of the list, containing only 12 goods (related to wind power, solar power, energy-efficient lighting, and "clean" coal), primarily for analytical purposes and to simulate the effects of trade liberalisation for this list. However, this list was never formally submitted to the WTO as a proposal for broader discussion (Wooders, 2009).

of climate-friendly products could be more acceptable to a broader group of countries, thereby enabling faster and wider liberalisation of international trade in these goods. However, the World Bank did not propose a formal definition of climate-friendly goods, treating its suggestions functionally and descriptively, and the presented list was used for analytical purposes. The WB's list served as the foundation for an informal proposal in 2007 submitted to the WTO by the US and the EU to eliminate tariffs on these 43 'climate-friendly' products by 2013 (Sugathan, 2013; World Bank, 2008).

The concept of environmental goods presented by UNCTAD also found its place in the debate as a reference point. In 2003, UNCTAD introduced this concept by defining such goods in two ways: "as equipment, material or technology used to address a particular environmental problem or as a product that is itself 'environmentally preferable' to other similar products because of its relatively benign impact on the environment" (UNCTAD, 2003). While the first approach was similar to earlier concepts, the second was framed in UNCTAD's proposals as so-called Environmentally Preferable Products (EPP), which "from a life-cycle perspective, cause significantly less 'environmental harm' than alternative products that serve the same purpose" (UNCTAD, 2003). UNCTAD's proposals⁶ encompassed a broader aspect of environmental impact and delivered a more extensive conceptualisation. It addressed not only narrowly defined goods or technologies directly aimed at environmental protection but also those that contribute indirectly through a reduced environmental impact. This approach took greater account of the expectations of developing countries (which, unlike developed countries, typically do not have the latest environmental technologies to the same extent) and, as such, became a reference point for less developed countries in response to proposals submitted in the WTO (see 14.1.3). It should be emphasised, however, that to date UNCTAD has not developed a clear and universally accepted list of environmental goods, and in its most recent analyses on EGs trade, it refers to sources such as the CLEG presented by the OECD (UNCTAD, 2025).

The World Customs Organisation (WCO) also plays a supportive role in defining environmental goods. While it has not developed a separate, dedicated list of environmental goods, its work in defining and updating HS codes serves as support, e.g., by providing more precise codes for dual-use items. In this context, the upcoming HS 2027 review is particularly important, as it could incorporate new codes for environmental products into the customs/trade classification system and further specify, e.g. through detailed subcategories, additional cli-

⁶ The original list proposed by UNCTAD contained 158 products (ICTSD, 2007).

mate-friendly goods. As a starting point, the WCO identified 454 unique HS6 codes of climate-friendly goods from existing lists (WCO, 2022).

Attempts to define and establish lists of environmental goods occur not only at the multilateral level or international organisations but also through bilateral trade agreements concluded in recent years. In February 2022, New Zealand and the UK signed the first FTA containing a comprehensive list of 293 HS 6-digit codes of environmental goods (Ecorys, 2023). Under the agreement, the Parties defined EGs as “goods which can positively contribute to the clean growth and sustainable development objectives of the Parties, including climate change mitigation and adaptation, and wider environmental goals” (Article 22.7, NZ-UK FTA, 2022). Another similar step was taken in the Singapore-Australia Green Economy Agreement (signed in October 2022), which also includes a broad list of 372 HS subheadings based on a wide definition of environmental goods (e.g., products with high recycled content, remanufactured and refurbished products; products contributing to the protection of natural resources and biodiversity or food systems; clean transportation) (Annex B 1.1, SAGEA, 2022).

One of the most interesting recent initiatives in this area is the Agreement on Climate Change, Trade and Sustainability (ACCTS) signed by Costa Rica, Iceland, New Zealand, and Switzerland on 15 November 2024. The agreement provides for the elimination of tariffs and other barriers on more than 300 environmental and energy-saving goods, and the list it contains is one of the most comprehensive lists of environmental goods in any international agreement (MFAT, 2025). The Agreement will be open to accession for WTO members that are prepared to uphold its level of ambition.

Conclusions

Although nearly three decades have passed since the first attempts to define environmental goods, there is still no single, universally accepted definition. The various initiatives undertaken in this area have produced a partial conceptual core focused on products that contribute to environmental protection and climate objectives. However, both the scope of the definition and, even more importantly, efforts to establish a detailed list of such goods continue to differ. Methodologically, two main approaches have dominated the discussion: the product-based/list-based approach and the purpose-based approach. Within the first approach, even the range of proposed lists has varied, reflecting the different motivations behind their development. Lists intended as a basis for trade-liberalisation negotiations tended to be narrower, often shaped by political considerations, including attempts by some countries to protect specific sectors

from deeper liberalisation. By contrast, lists prepared for analytical or academic purposes typically covered a broader set of products.

Differences are also visible in the terminology itself. In addition to environmental goods (EGs), other terms such as ‘climate-friendly’ or ‘environmentally preferable’ products (UNCTAD) are frequently employed, and in public debate these are sometimes referred to more generally as ‘green goods’. Although these concepts overlap to some extent, the term ‘green goods’ is broader and is often used informally in reference to environmental goods, which are defined in a more technical and narrower way.

Regardless of the terminology, establishing these lists has encountered persistent difficulties in determining what qualifies as an environmental good. This stems from several factors. In addition to the wish to protect certain sectors and the divergent interests of developed and developing countries, challenges arise from the presence of dual-use products and from the difficulty in clearly assessing the environmental impact of many goods. In this context, the risk of greenwashing should also be noted: states and industries may push for the inclusion of products whose positive environmental effects are limited or ambiguous. Technical obstacles have accompanied this debate from the outset, particularly the limited ability to identify environmental goods within the Harmonized System used in international trade. The HS broad product categories make it difficult to distinguish EGs in trade statistics. Finally, ongoing technological progress remains an additional challenge, requiring lists to be dynamic and continually updated to incorporate new environmental technologies.

Efforts to define and establish a concrete list of environmental goods have therefore not resulted in a coherent, unified framework, neither for analytical purposes nor for trade policy. In fact, multilateral initiatives in this area have weakened in recent years. A new development, however, is the explicit inclusion of environmental goods lists intended to support trade liberalisation in some of the latest FTAs concluded by countries pursuing ambitious climate and environmental goals. In this context, some expectations are directed towards the bilateral or plurilateral (ACCTS) agreements that could eventually be opened to additional willing participants, thereby broadening both the scope of product definitions and the process of liberalising trade in environmental goods.

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15. The role of Fair Trade in sustainable transition of Europe

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Abstract: Fair Trade is presented as a grassroots socio-economic force that can support Europe's sustainable transition. The chapter uses a conceptual and literature-based analysis to show how the movement operates simultaneously in civil society, markets and public regulation. It raises awareness of poverty, labour exploitation, environmental harm and unequal global exchange, encouraging citizens to act as responsible voters and consumers. Certification systems and Fair Trade criteria create market space for goods produced under socially and environmentally responsible conditions, making sustainability a dimension of competition. The movement also influences public debate and regulatory change by cooperating with institutions and promoting ethical procurement, transparency and due diligence. The chapter portrays Fair Trade as a bridge between social mobilisation, market choice and legal transformation aligned with the Sustainable Development Goals.

Keywords: sustainable development, sustainability, sustainable transition, Fair Trade, responsible production, responsible consumption, sustainable market economy.

Introduction

Growing global challenges of a social and environmental nature have made the achievement of the UN's Sustainable Development Goals not so much a desirable direction of development but a necessity. However, it implies a complete transformation of socio-economic life, not only taking environmental and social aspects into account in economic development, but also correcting mistakes and solving problems that threaten our planet. Such a shift requires fundamentally changing our behaviour and habits – a challenging task that often involves effort, numerous sacrifices and costs, as well as consumption restraint. Nevertheless, we have no other choice if we want to pass the planet on to the next generations in good condition.

The European Union aims to lead the world in this sustainable transition and is undertaking numerous activities in this direction, constantly seeking new ideas, policies, solutions and tools. Therefore, this chapter aims to present the role that Fair Trade social movement and market play in Europe's sustain-

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able transition. In the countries of Western and Northern Europe, Fair Trade has been developing dynamically since the beginning of the second half of the 20th century, and constitutes an unusually complex grassroots socio-economic initiative promoting sustainable development. In fact, Fair Trade is an international social movement working to raise public awareness of global challenges, mainly extreme poverty and its widespread consequences. By establishing specific criteria for socially responsible production, this has created a market for Fair Trade products that permeates existing product markets (Śliwińska, 2024, pp. 177–178). The specificity and multidimensionality of this initiative therefore affects all three basic institutions of social life – civil society, the market and the state – and consequently plays an important role in the sustainable transformation of these three dimensions.

15.1. Fair Trade – idea, social movement, market

The concept of fairness in trade has long been the subject of scientific enquiry; the ancient philosophers were the first to consider the nature of a fair exchange and fair price (Śliwińska, 2024, pp. 64-65). According to the Greek thinkers, every exchange should be fair, and regarded as such only those that involved equal value of the economic goods exchanged. Since then, various schools of economics have addressed this topic, and the discourse on fairness in trade remains relevant today; in fact, its importance is growing especially in the face of global threats of a social and environmental nature and the related need for sustainable development. Trade fairness, however, is often understood in divergent different ways. The most common views are that it represents freedom and equal opportunities to access markets in a broad sense, or on the other hand, that it is associated rather with an equal distribution of wealth, or even broader, adapting distribution of wealth to the needs of individual market participants (de Bres, 2016; Starmans et al., 2017; Valiente-Riedl, 2013, pp. 6–10). However, the concept of fairness of trade can also be viewed in broader terms, in the context of intergenerational solidarity and costs, such as the environmental costs that today's international trade generates for future generations.

Different interpretations of the concept of the fairness of trade have generated substantial controversy around the Fair Trade movement and market, particularly about its nature and market versus anti-market character (Śliwińska, 2024, pp. 5–6).

Fair Trade is a grassroots socio-economic initiative that emerged in the second half of the 20th century in Western European countries and the US. Its primary goal is to combat extreme poverty and the marginalisation of the most vulnerable participants in the international market, mainly producers from the global South. Thus, on the one hand, Fair Trade represents an international social movement promoting social and environmental justice and the rights of women, farmers, workers and indigenous communities to decent working and living conditions (Evans, 2008; Smith, 2008). On the other, it constitutes a market for Fair Trade products, i.e. products that meet specific criteria for socially responsible production established by Fair Trade organisations (Table 15.1 and 15.2), the largest and most important of which are the World Fair Trade Organization (WFTO[1]) and Fairtrade International (FI, n.d.).

Table 15.1. 10 principles of Fair Trade set by WFTO

1.	Creating Opportunities for Economically Disadvantaged Producers
2.	Transparency and Accountability
3.	Fair Trading Practices
4.	Fair Payment
5.	Ensuring no Child Labour and Forced Labour
6.	Commitment to Non Discrimination, Gender Equity and Women's Economic Empowerment and Freedom of Association
7.	Ensuring Good Working Conditions
8.	Providing Capacity Building
9.	Promoting Fair Trade
10.	Climate Action and Protection of the Environment

Source: (WFTO, n.d.).

Consequently, consumers are able to choose from a growing range of products that meet Fair Trade criteria. As can be seen from Tables 15.1 and 15.2, these criteria refer to different understandings of fairness in trade and incorporate to varying degrees these elements addressing both the need for a more equitable distribution of wealth, as well as the need to create equal development opportunities. What is extremely important and characteristic about Fair Trade, however, is that it is an entirely grassroots and voluntary initiative for all its participants, both on the demand and supply side. Thus, it does not limit the functioning of the market mechanism; on the contrary, it introduces additional decision-making elements into the market for all its participants in the form of Fair Trade criteria.

economic development with safeguarding the social and environmental balance (UN 'Brundtland Report' 1987); instead, it also simultaneously contributes to solving global problems already endangering humanity. Sustainable transformation should therefore be conceptualised in broad terms as a process of social change that facilitates achieving sustainable development defined in this way.

For Europe, which has ambitions to lead the world in sustainable development, this means the need for fundamental changes within the basic three institutions that shape social life – the state, the market and civil society: pursuing sustainable development and achieving the SDGs constitutes such a complex undertaking that it requires the involvement of all stakeholders. Indeed, there is now no doubt that sustainability is the responsibility of all, governments, businesses and society. Instead, the discussion revolves around the desirable division of powers and responsibilities between these institutions and the most effective and efficient ways to achieve the various SDGs, given that the measures taken so far have not produced the expected and desired results. It has become clear that sustainability issues cannot be achieved through top-down regulation alone, nor can they be left entirely to market forces. However, defining the extent to which these issues should be regulated by top-down regulations or left to the market – where sustainability becomes a core element of competition – remains an extremely difficult and as yet unresolved task (Gorynia & Śliwińska, 2024, p. 26). In this situation, the role of civil society becomes crucial. Through its political and market choices, society exerts a powerful influence on both the political and business worlds, and thus on the top-down regulations that emerge and the ways in which businesses operate, whether sustainably or not.

It can therefore be said that sustainable transformation must take place in three dimensions, namely the state, the market and society. Identifying different kinds of solutions, strategies or tools that may enhance and accelerate this process is crucial. In this context, the Fair Trade social movement has long played a key role, because this extremely comprehensive initiative has a broad impact on all three of these institutional spheres: firstly, on society by raising public awareness of social and environmental global challenges; secondly, on the market, by bringing key sustainability values to the market as product differentiators; thirdly, on the state, by working with public authorities and institutions to raise their awareness of possible ways to counter global challenges through appropriate policies and regulations. Moreover, the way Fair Trade operates also contributes to the cooperation and integration of the activities of all three of these institutions, which is perfectly in line with the need to build partnerships for sustainable development expressed in SDG 17. The following sections will elaborate on all three dimensions of the Fair Trade initiative's impact on Europe's sustainable transformation.

15.3. Society – raising social awareness and responsibility

The emergence and development of Fair Trade initiative continues to contribute to raising public awareness of the need for sustainable development and increasing public responsibility for issues related to it. This is happening in a variety of ways.

The Fair Trade social movement, since its inception at the beginning of the second half of the 20th century, has taken as its main goal the fight against extreme poverty associated with hunger or malnutrition, dire working and living conditions, the exploitation of child labour, various forms of modern slavery, the marginalisation and lack of development opportunities of the most vulnerable participants of international exchange, mainly producers from the global South. All of these objectives are now reflected in the various UN Sustainable Development Goals, in particular 1 (no poverty), 2 (zero hunger), 3 (good health and well-being), 4 (quality education), 5 (gender equality), 8 (decent work and economic growth), 10 (reduced inequalities), and 12 (responsible consumption and production).

In other words, from the very beginning, Fair Trade has addressed issues of extreme importance for sustainable development. By running various social campaigns and creating alternative distribution channels for handicraft and food products to support the poorest producers from the global South, it has made consumers in developed countries aware of critical global social challenges, predominantly the extreme poverty of many market participants and the resulting consequences. While emphasising the social and economic aspects of sustainable development, in the recent decades, Fair Trade has also increasingly addressed challenges of an environmental nature.

Moreover, Fair Trade does not simply stop at raising public awareness of social and ecological global challenges, but awakens the public's need to counter them, indicating opportunities for grassroots measures to counteract existing and emerging problems; it therefore demonstrates the role that various communities and even individuals can play in this process. Thus, it teaches people to take responsibility for common global problems and not to expect the state alone to solve them. On the contrary, it teaches to support public institutions and NGOs in overcoming them and to take their own initiatives to solve the most serious problems.

The extremely comprehensive and multifaceted nature of the Fair Trade initiative drives the processes of raising awareness of global challenges of a social and environmental nature and urging all society's members to bear responsibility for these. Numerous initiatives integrate local communities and are expanding

their international reach. These include such events as Fair Trade Week (Fairtrade Nederland, n.d.), Fairtrade Fortnight (Fairtrade Ireland, n.d.), or Fair Trade Month (Fair Trade Federation, n.d.), as well as numerous local actions, from Fair Trade breakfasts held at various locations accessible to local citizens to mobile cafes serving Fair Trade coffee and cocoa, or collaborating with local businesses and creating a friendly environment conducive to ethical and fair trade. The scale and scope of activities depend on the creativity and involvement of the local community. This often intersects with local or regional authority cooperation, thereby creating a self-perpetuating mechanism of mutual inspiration between the local community, business and public authorities. This is particularly true of Fair Trade Towns (n.d.), which form an international community of more than 2,000 towns within the framework of the international Fair Trade Towns initiative (FFT), where raising awareness and education about contemporary global challenges go hand in hand with concrete actions supporting ethical and fair trade through promoting goods and services that contribute to sustainable development, including Fair Trade products and services.

Raising awareness and fostering social responsibility for contemporary global social and environmental problems is crucial, since an informed citizen means an aware consumer and an aware voter. This civic awareness therefore has a key impact on the functioning of the market and the state.

15.4. Market – responsible consumption and sustainability as a new dimension of competition

By raising public awareness, the Fair Trade movement contributes to the growth of responsible consumption and production so crucial to sustainable development. This is because consumer awareness and responsibility determine market strategies, how it functions, and how businesses operate. As companies are competing aggressively to meet consumer needs in order to boost sales and strengthen their market position. Therefore, if consumers demand goods that are socially and environmentally sustainable, companies will compete on those grounds. Consumers who are aware and educated will compel companies to change their ways and adopt sustainable operating practices. Thus, by raising public awareness of global social and environmental challenges and existing opportunities to counter them, the Fair Trade movement directly accelerates the transition to responsible and sustainable consumption and production.

At the same time, the emergence of criteria for Fair Trade products (product certifications, e.g., Fairtrade, Nature Fair, Fair for Life, Fair Trade USA, or Small

Producers Symbol – SPP) and Fair Trade companies (business model certifications, e.g., Guarantee System (GS) of World Fair Trade Organization) have created a market for socially and environmentally responsible Fair Trade. This creates an opportunity for consumers to select goods whose production did not involve exploitative working conditions and underpayment, child labour or any form of forced labour. Consequently, the Fair Trade initiative directly introduces such values into the market as solidarity and responsibility for others, especially the most vulnerable market participants, as differentiators of goods and services.

Shaping these consumer attitudes is crucial to all aspects of sustainable transformation in European market economies, since it is consumers who largely dictate corporate behaviour among companies competing for greater sales. Consequently, if consumers consciously and critically assess the ways in which companies operate and produce, both social and environmental sustainability will become key elements for companies to build competitive advantage. Therefore, the Fair Trade social movement and market, as an entirely grassroots initiative, plays an important role in this process.

15.5. State – changing legal framework for the functioning of the European market

By raising public awareness of sustainability challenges and building public accountability for them, Fair Trade also contributes to transforming state policies and regulations towards their support of sustainable development.

Ultimately, an informed citizen is an informed voter. As sustainability has gained prominence in Europe in recent decades, citizens are paying ever-greater attention to whether the political parties they elect have specific plans to address environmental and social risks in their political programmes. This is also reflected in EU policies and regulations. The flagship example is the European Green Deal and the related Fit for 55 regulatory package, although it is worth noting that sustainability issues have a long history of permeating the legal framework for the operation of the EU market. Examples include the following: the EU public procurement directives (2014), which introduced the possibility of including social and sustainability certifications in public procurement procedures; the EU directive (2022) on corporate sustainability reporting (CSRD), which was created to ensure transparency of companies' activities and offer better information on their contribution to sustainable development; the EU directive (2024) on Corporate Sustainability Due Diligence (CSDD), which requires companies to take care of human rights and environmental protection not only within their own operations but across their entire supply chains.

It is difficult to imagine that such an accelerated creation of EU regulations related to sustainable development could have taken place without several decades of intensive activity of what van Dam considers the 20th century's most successful and widespread social movement (van Dam, 2018, p. 21), shaping citizens' awareness of global social and environmental challenges and awakening the need to counteract growing global problems. It should be emphasised that the Fair Trade movement has not only indirectly affected these issues by raising the consciousness of citizens-voters; it has also acted and continues to act directly, by cooperating with authorities and public institutions to raise their awareness of possible ways to counteract global problems through appropriate policies and shaping the legal framework for the EU market, addressing the most urgent problems and possible ways to counteract them by modifying the rules of the European market, often through concrete proposals for regulatory changes.

However, participants of the Fair Trade movement and market are fully aware that this is only the beginning of a long journey, and that complete top-down regulation of sustainability issues is neither sufficient to achieve the SDGs nor possible. This creates space for social movements targeting sustainable development, such as Fair Trade, which will continually raise the bar for achieving the various Sustainable Development Goals, along with developing new tools and strategies, and identifying new challenges that need to be addressed through top-down regulation and bottom-up socio-business action.

Conclusions

In the face of growing global social and environmental threats, sustainable transition is no longer merely a desirable course of development: it is a necessity. Europe seeks to lead this difficult process by seeking various regulatory solutions and supporting it through various types of programmes and strategies that encourage citizens and businesses to work in favour of sustainability. In this context, a highly relevant question is what role a grassroots socio-economic initiative such as Fair Trade can play in sustainable transition.

The discussion in this chapter suggests that sustainable transformation occurs in three main dimensions – social, market and state – with the Fair Trade social movement and market playing a crucial role in all of these dimensions. Firstly, since the beginning of the second half of the 20th century Fair Trade has raised public awareness of global challenges of a social and environmental nature – in particular, extreme poverty and its widespread consequences – and the possibilities of countering them, both at the level of state policy and, above all, grassroots initiatives. This is a key aspect of building social responsibility, since an aware

citizen is also an aware consumer and an aware voter. Secondly, the existence of Fair Trade and the creation of a market for Fair Trade products that meet certain criteria for socially responsible production has fostered responsible consumption and the new dimension of competition between companies - sustainability. Thirdly, the dynamic development of this initiative has contributed directly and indirectly to changing the legal framework for the European market towards taking into account the need for sustainable development, including combating the marginalisation and overexploitation of the most vulnerable participants in international trade.

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IV
ECONOMIC AND SOCIAL RESILIENCE
IN TRANSFORMING EUROPE

16. EDIHs in Poland as intermediaries supporting digital transformation of SMEs¹

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Abstract: Polish European Digital Innovation Hubs are reviewed as new intermediaries in SME digital transformation. The chapter combines a literature review with case evidence and 44 semi-structured interviews conducted with DIH and EDIH managers as well as European Commission representatives. In Poland, EDIHs act as regional orchestrators linking SMEs, public-sector organisations, clusters, research actors, innovation networks and European programmes. Their services include skills development, networking, access to finance and test-before-invest support, although individual hubs differ greatly in resources, maturity and service portfolios. Early activity focused mainly on awareness raising, digital maturity assessments, roadmaps and webinars, with AI services still limited. The chapter indicates that future impact depends on credible use cases, sustainable hub business models and SME readiness in data quality, skills and managerial mindset.

Keywords: digital transformation, SME, European Digital Innovation Hubs.

Introduction

Digital transformation is essential for businesses to remain competitive in today's fast-changing market. It enables companies to improve their operational efficiency, enhance the customer experience, and innovate their products and services. By adopting new technologies, businesses can automate processes, reduce costs, and respond more quickly to market demands. Furthermore, digital transformation opens up opportunities for data-driven decision-making, which helps companies to better understand their customers and optimise strategies. Overall, it is a key factor for long-term growth and sustainability in the modern economy (Fura et al., 2025; Hai et al., 2021; Kraus et al., 2021).

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Given the various challenges faced by companies operating in the EU, including those related to globalisation changes, the green transition, the uncertain geopolitical situation related to the war in Ukraine, and recent trade policy conflicts with the US, initiatives to support, especially SMEs in facing this complex situation are of utmost importance. In this context, it is interesting to discuss the relevance and first results of the European Digital Innovation Hubs (EDIH) network performance. The EDIH Network is the driving force behind Europe's digitalisation. With the support of the European Commission, it brings together EDIHs, small and medium-sized enterprises (SMEs), and public sector organisations (PSOs) to make the EU's Digital Decade 2030 targets a reality. This is the key EU programme devoted to the digital transformation of SMEs in 37 EU and non-EU Member States. EDIHs offer tailor-made services, adapted to the enterprise's identified digitalisation needs in the following areas: *test before invest*, networking, skills and training, access to finance in preferential tariffs. The *test before invest* service is a flagship service of EDIHs, allowing companies to experiment with digital technologies before making significant investments.

The mission of the EDIH Network is the following:

- Boost digital transformation across the EU;
- Achieve the targets of the EU's Digital Decade 2030: 90% of SMEs reach at least a basic level of digital intensity and 75% of EU companies using Cloud, AI or Big Data;
- Enhance competitiveness position and digital capabilities of European companies (European Commission, 2023).

The study highlights the relevance of EDIHs in the Polish entrepreneurial landscape. The chapter uses the term *European Digital Innovation Hub* to refer to both *Digital Innovation Hubs* and *European Digital Innovation Hubs*. Although the two types of hubs differ in terms of organisation and governance, they are analysed together because of their shared objective of driving SME digitalisation. Digital Innovation Hubs encompass a wide and varied range of institutions that act as regional one-stop centres for companies, especially SMEs, looking to implement digital technologies. These hubs generally emerge from national or regional initiatives and are often based within research organisations, universities, or industry clusters under an EU framework launched in 2016. In contrast, European Digital Innovation Hubs (EDIHs) are a formally designated subset of DIHs, selected through a competitive process under the Digital Europe Programme, initiated in 2021. In April 2025, the European Commission launched the EDIH 2.0 call for proposals.

While an extensive literature exists on innovation intermediaries as actors playing an increasingly important role in bridging different innovation stakehold-

ers (Bourdin et al., 2020; Feser, 2023; Howells, 2006, 2024), EDIHs, are not widely studied, due to being a relatively new actor in the intermediation landscape. The chapter therefore aims to fill this research gap. The following research question formulated in the study: *What is the state-of-the-art and perspectives for the future for Polish European Digital Innovation Hubs?* Drawing on the literature review, EDIH case studies and companies use cases, we identify the main characteristics and roles played by EDIHs at the regional level in Poland. We also formulate key digitalisation challenges for SMEs and for EDIHs in Poland.

The rest of the chapter is structured as follows: Section 1 provides a short review of the literature on the digital transformation of enterprises, Section 2 presents the experience of EDIH in Poland in supporting the digital transformation process of enterprises. Last section concludes by offering a list of key challenges in the field of digitisation, divided into challenges for EDIHs and for SMEs

16.1. Digitalisation transforming economies and societies – literature background

During the past two decades, research on digital transformation has received growing attention, with a wide range of topics investigated. Driving this, first of all, is globalisation's effect of intensifying the pressure on businesses to adapt, necessitating efficient integration strategies to not only survive but also operate in increasingly competitive environment (Kraus et al., 2021). Robotics, artificial intelligence, big data, Internet of Things, mobile and blockchain technologies are paving the way for the Fourth Industrial Revolution (Vironen and Kah, 2019).

The growing importance attributed to technologies used in digital transformation, AI in particular, prompts questions about the benefits of using these technologies, yet we must not overlook the risks brought by the use of these technologies or the ethical issues that should be raised in connection with the increasing use of AI. The opportunities of securing higher income levels and better quality of life are therefore weighted against the risks connected with greater inequality, ethical concerns, and labour market threats (Kuźnar, 2019; Przeglasińska and Oksanowicz, 2020; Vironen and Kah, 2019).

Current digital transformation is expanding opportunities not only in terms of who can participate in innovation or entrepreneurship, but also in terms of what and how they can contribute (Haefner & Sternberg, 2020). Moreover, in the current wave of digitalisation, we witness the widespread digitisation of physical objects with embedded software (Haefner & Sternberg, 2020).

While the potential benefits and opportunities raised by the Fourth Industrial Revolution are largely highlighted in academic discussions, some issues still require further development i.e. the level of digitalisation of the EU SMEs is still below expectations. This is a challenge faced by SMEs in all EU Member States.

Poland must close a substantial gap by 2030 to reach the Digital Decade target in cloud, big data and artificial intelligence (AI). The current uptake of those technologies ranges between 3% and 19%, compared with the EU target of 75% by 2030. It is crucial to promote capacity building among Polish enterprises to digitalise further, as in 2022 only 40% had at least a basic level of digital intensity (EU average: 55%) (Table 16.1). This contrasts with the Digital Decade target of 90% of SMEs having ‘at least a basic level’ of digital intensity by 2030 (European Commission, 2023). Overall, the digital performance of Polish SMEs as depicted in the DESI 2022 compared to the EU average is rather poor.

Table 16.1. DESI 2022 results for Poland

Indicator	DESI 2022 Poland	DESI 2022 EU
At least basic digital skills (% individuals)	43% 2021	54% 2021
At least basic digital content creation skills (% individuals)	57% 2021	66% 2021
ICT specialists (% individuals in employment aged 15-74)	3.5% 2021	4.5% 2021
Enterprises providing ICT training (% enterprises)	18% 2020	20% 2020
Overall fixed broadband take-up (% households)	69% 2021	78% 2021
5G spectrum (Assigned spectrum as a % of total harmonised 5G spectrum)	0% 04/2022	56% 04/2022
SMEs with at least a basic level of digital intensity (% SMEs)	40% 2021	55% 2021
Electronic information sharing (% enterprises)	32% 2021	38% 2021

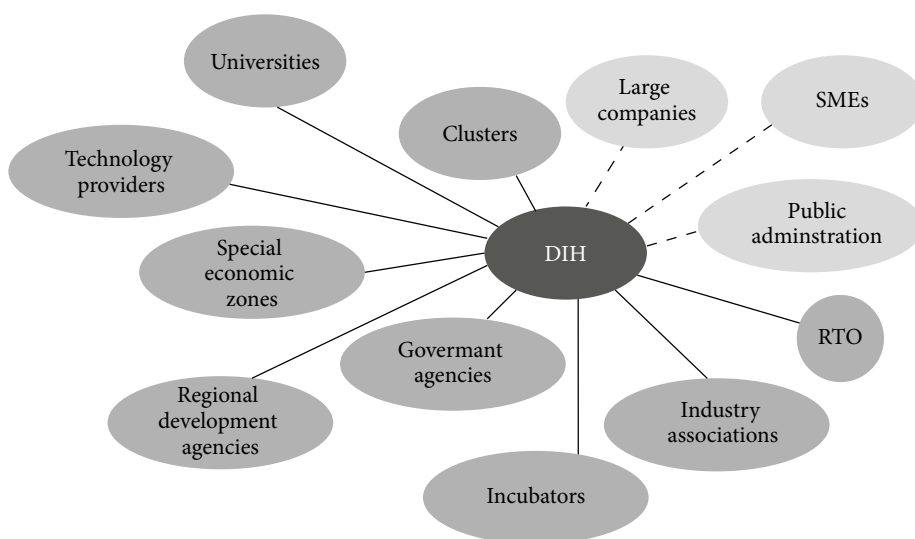
Source: based on (DESI 2022 Poland Country Report).

16.2. Experience of Polish digital innovation hubs

The chapter is based on 44 semi-structured interviews conducted between April and August 2023 with managers of Digital Innovation Hubs, European Digital Innovation Hubs across the EU and European Commission representatives re-

sponsible for implementing the EDIH programme at the EU level. Nonetheless, the attention is focused on DIHs and EDIHs operating in Poland and the results presented in this section refer to the Polish experience with this form of digital transformation support.

As shown in Figure 16.1, a DIH in Poland plays the role of an orchestrator, connecting the numerous actors interacting within the regional innovation ecosystem. On the one hand, these include SMEs, large companies and public sector organisations, which either turn to the DIH to make use of its range of services or themselves offer such services to other enterprises playing the role of members of consortia of individual DIH. Other entities that the DIH connects with its activities, especially in the area of networking, include clusters, incubators or diverse actors in the broader area of regional innovation support. The DIHs also act as a bridge between other actors at European level, such as other EDIHs, thematic DIH networks or the Enterprise Europe Network.



Notes: Entities marked in light grey are those to which the DIH offers its services (SMEs, large companies, public administration). In the diagram, they are connected to the DIH by a dotted line. The remaining entities in grey, connected to the DIH by a solid line, are actors in the regional innovation system with whom the DIH cooperates in various fields. Entities not connected by a line to the DIH are those operating and cooperating with the DIH at European level: other EDIHs, DIH thematic networks, the Enterprise Europe Network, or Testing and Experimentation Facilities (TEFs).

Figure 16.1. DIH as an orchestrator in Polish regions

Source: own elaboration.

As of 2023, almost all Polish DIHs and EDIHs offered AI-related services to SMEs. Figure 16.2 shows all the Polish DIHs or EDIHs which, at the time of the survey, stated that their portfolio included services covering a range of topics and involving the use of artificial intelligence to varying degrees. Their coverage extended across the whole of Poland. The DIHs highlighted in white in the diagram were additionally members of thematic DIH networks dedicated to developing artificial intelligence. Interviews with EDIH managers, however, indicate that interest in AI-based services was nonetheless negligible, based mainly on general training or workshops aimed at building awareness of the possibilities of using AI at the enterprise level.

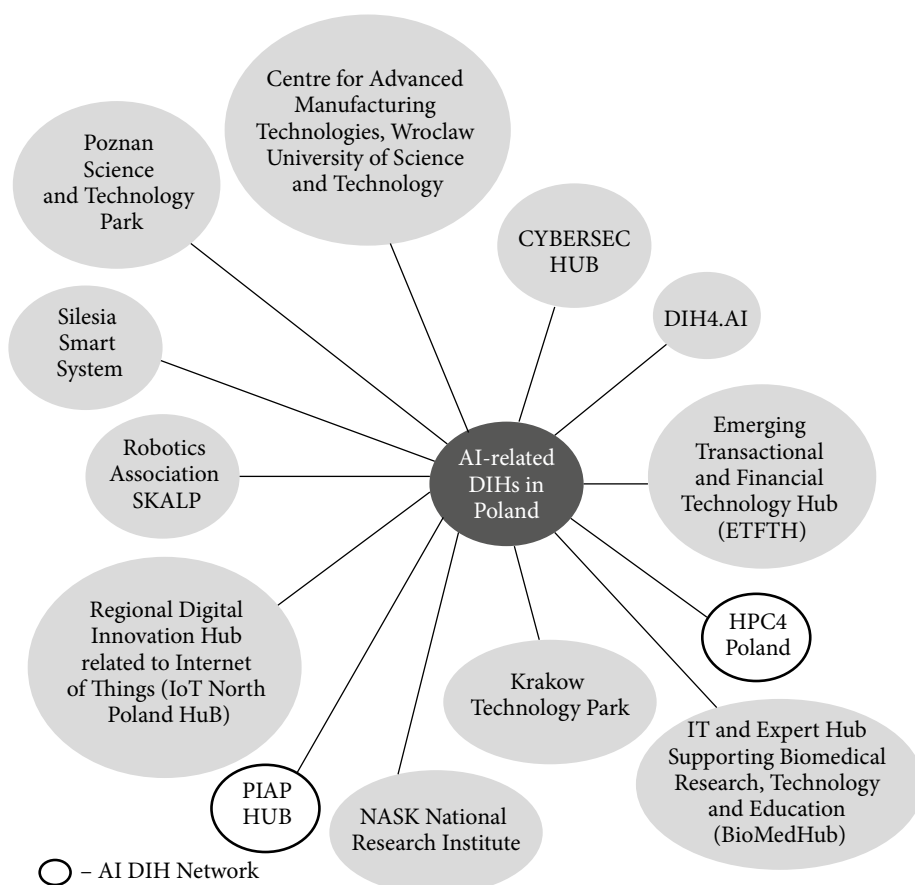


Figure 16.2. AI-related Digital Innovation Hubs in Poland (as of 2023)

Source: based on Digital Innovation Hubs catalogue.

What are the lessons learnt of the interviewed Polish EDIHs in terms of their performance and capability of accelerating digital transformation of companies?

- EDIHs are interdisciplinary instruments, entities playing the role of orchestrators in the regional innovation ecosystems;
- EDIHs differ hugely from one another in terms of their potential, portfolio of services provided to the companies, number of personnel engaged in administrative tasks etc. (for more details, see De Nigris et al., 2023). From this perspective, it seems unfeasible to compare their performance or the challenges they face on a daily basis.
- They are one-stop shops that offer an overall tailor-made support to companies, based on the digital maturity assessment, in the majority of cases with a regional perspective.
- They provide different kinds of services (skills development, networking, access to finance, *test before invest*); among these, the *test before invest* is a flagship initiative, distinguishing them from other programmes or regional innovation intermediaries offering innovation and digitalisation support services.
- The Polish structures are based on existing networks/experience in previous digital programmes. Overall, in 2023 they provided pilot services, rather in terms of awareness raising, “evangelisation” about digital transformation. Such an approach reflected identified company needs in terms of digital transformation in Poland. Digital maturity assessments, a roadmap for digital transformation, networking and webinars were the main types of services provided to companies by Polish EDIHs. AI-related services were rather additional ones, related to awareness-raising.
- It is hard to assess the role of DIHs in boosting digitalisation of Polish companies to date. Interviewed DIHs and EDIHs expect to come up with more tangible results of their activity in this second phase EDIH programme.

The study highlights the place of EDIHs in EU policy documents regarding digital transformation of companies, defines different roles played by EDIHs as intermediaries. It discusses the significance of such actors cooperating with SMEs in their path to digital transformation in Poland.

At the European level, EDIHs are present in 90% of the 251 European regions. As of 2023, in Poland there were 22 entities listed in the EDIH catalogue, 11 being funded under Digital Europe Programme, 3 Seals of Excellence and 8 being funded by other initiatives. They were in the first phase of their operational activity.

Conclusions

This study's findings shed light on the roles played by EDIHs regarding the digital transformation of companies. They indicate challenges and propose some solutions to them for both Poland's SMEs and its EDIHs. However, it is too early to assess the role of EDIHs in boosting the digitalisation of Polish companies. Interviewed EDIHs anticipate delivering more tangible results of their activity in the second wave of the EDIH programme.

DIHs act as orchestrators in the Polish entrepreneurial ecosystem. They differ hugely one from another in terms of potential, portfolio of services provided to the companies, number of personnel engaged in administrative tasks, and other aspects. They also provide different kinds of services (skills development, networking, access to finance, *test before invest*). The current Polish structures build directly on existing networks/experience in previous digital programmes such as the Horizon Europe programme, EEN, and DIHs, which give them an opportunity to build upon previously built networks and facilitates contact with companies.

Key digitalisation challenges for SMEs include securing access to good-quality data (a prerequisite for any digital transformation within a company), building digital skills of the whole businesses, and not fearing digital transformation, entailing the transformation of managerial mindsets (Table 16.2).

Table 16.2. Key digitalisation challenges for EDIHs and Polish SMEs based on this study

For whom?	Key digitalisation challenges
For EDIHs	– find individual ways to attract businesses and to convince them that digital transformation is a must while providing dedicated, tailor-made digital services – reflect on the sustainability of EDIHs business models – show to businesses that digital transformation can give tangible results based on use cases from other SMEs that took part in the EDIH Programme
For Polish SMEs	– have access to good-quality data, gather them and design a good digitalisation strategy with the support of EDIH experts – not to be afraid of starting a digital transformation journey due to observing its opportunities and risks – build digital skills of the whole businesses

Source: based on the empirical study's results.

Key challenges for EDIHs include the necessity to find an individual approach to convincing SMEs that digital transformation is an imperative that

provides concrete results in terms of improving a company's market position, higher adaptability to customer needs, and building sustainable EDIH business models in order to be able to operate once public money becomes unavailable. The best way to persuade SMEs of the need to start their digital journey is to build on use cases from other satisfied companies that had already embarked on the transformation path with the support of EDIH experts.

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17. Implications of selected digital solutions for the globalisation process

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Abstract: Digital technologies are explored as forces capable of reshaping globalisation rather than simply accelerating it. The chapter reviews artificial intelligence, work automation, telemigration, 3D printing, block-chain and the Internet of Things, drawing on the literature and reports from international organisations. These solutions can improve efficiency, enable new forms of coordination, transform production and expand digital service delivery. At the same time, they may reduce traditional outsourcing, alter global value chains, intensify competition for data and technological control, and deepen tensions between corporate efficiency and state security. Transnational corporations may seek flexible digital networks, whereas governments increasingly prioritise sovereignty, resilience and strategic autonomy. The chapter anticipates a form of techno-geopolitics, in which technological capability and data governance become central to the future of global economic integration.

Keywords: digital solutions, digitalisation, globalisation, transnational corporations, nation states, global economy.

Introduction: Digital advances in the 21st century

Over the course of the 21st century, impressive progress is taking place in the development of digital technologies.¹ Consequently, the unfolding digitalisation of economies and societies² offers increasing opportunities to integrate technological solutions that can significantly shape the globalisation process. Indeed, most have significant potential to cause disruptions to the process as we have seen it so far, arguing for the need to modify existing paradigms and

¹ One of the most important reasons for this is the exponential growth in the amount of machine-readable information and digital data transmitted via the Internet, which in turn enables their further processing (IJP, 2021).

² This manifests itself, e.g., in the dynamic growth in the value of digital service exports, the share of e-commerce sales in retail over the 21st century, or the exponentially increasing cross-border data flows (Hązła, 2024a).



beliefs relating to the role of key globalisation actors such as nation states or transnational corporations (TNCs).³

In the context of the above trends, the aim of this chapter is to review selected digital solutions and then consider their potential implications for the functioning of transnational corporations, nation states and the global economy. For this reason, the chapter is divided into two main parts. The first discusses the following digital solutions: the development of AI, work automation, telemigration, 3D printing, blockchain technology and the Internet of Things. The second part is devoted to inferring the implications of developing the aforementioned solutions for TNCs, nation states and the global economy using inductive reasoning. Given the conceptual nature of the discussion, the key research method involves analysing the body of literature and reports from international organisations.

17.1. Digital solutions

This subsection reviews selected solutions whose implementation may have momentous implications for the way transnational corporations, nation states and the global economy operate. These are largely aligned with the concept of the ‘Nine Pillars of Industry 4.0’: Big Data, work automation, simulation, Internet of Things, augmented reality, 3D printing, cyber security, cloud computing, and horizontal and vertical systems integration (Leong et al., 2021). However, the implementation capabilities of some of these solutions were validated during the COVID-19 pandemic (in particular, augmented reality), while other technologies not included in the original concept (e.g., telemigration and blockchain technologies) have gained prominence. This led to slight adjustments being made to the original proposal.

17.1.1. Development of artificial intelligence (AI)

The development of AI provides the basis for many solutions that, until recently, were not possible due to the lack of required computing power. AI has already surpassed human capabilities in data retrieval and processing, optimisation and planning, and recognition of known patterns (Manyika et al., 2017), which has inspired a growing number of authors to envisage scenarios where AI will quickly

³ Given the multitude of socio-economic crises, increasing geopolitical tensions and the consequences of the COVID-19 pandemic and the war in Ukraine, the process of globalisation in the 21st century differs significantly from its 20th-century iteration, in which transnational corporations led the way through the progressive liberalisation of trade and capital flows, addressed in (Hązła 2024b).

become significantly better than humans in all possible activities (Bostrom, 2014). However, it is likely to take many more decades to achieve high-level machine intelligence (HLMI), where AI is able to perform all activities better than humans, for the simple reason that the high potential in applying AI to routine or computational activities does not translate into creative skills that require improvisation or searching for new patterns (Lindenberg, 2018). It is therefore possible that over the course of the 21st century, 'soft skills' related to social and emotional reasoning and collaboration with people, which are seemingly more difficult to automate, may take precedence over 'hard skills' (Baldwin, 2020).

17.1.2. Work automation

The growing capabilities of artificial intelligence, meanwhile, provide the basis for work automation. At the current level of technology, up to 80% of repetitive physical activities and up to 70% of data analysis and processing activities could already be automated, together accounting for up to 51% of employment in the United States (Manyika et al., 2017). The only barrier that still remains is the cost of software, meaning that employing human labour remains an economically rational decision for most professions (Lindenberg, 2018). However, this is poised to change in coming decades: an empirical analysis of robot prices from 2000 to 2013 found that they are falling by an average of 10% per year (Manyika et al., 2013). Maintaining this dynamic implies that the cost of implementing workplace automation solutions will halve every seven years, which will mean the obsolescence of many professions involving simple, repetitive tasks (Grace et al., 2018). For example, recent years have seen the emergence of more and better AI models, with ChatGPT at the forefront. The effects of its increasing integration into the business models of many companies will include, higher productivity but also a growing risk of many full-time jobs being replaced (Wu, 2024).

17.1.3. Telemigration

Another trend related to labour displacement is telemigration. This involves the outsourcing of jobs to countries with lower employment costs using ICT, without the need for physical contact. Currently, this invariably takes the form of hiring part-time workers on freelance contracts, for which they compete on portals such as Fiverr, Freelancer, Toptal or Guru, (Nabilla, 2024). Telemigration accelerated significantly during the 2020–2021 pandemic. After a few months of adjustment, it became apparent that up to 37% of US employees could perform

their work entirely remotely, without compromising its quality, thereby saving several hours a day otherwise spent commuting (Dingel & Neiman, 2020). This has paved the way for the perceived ‘removal’ of geographical barriers to hiring and propelled the outsourcing of office jobs from developed countries. As a consequence, workers in developed countries will increasingly be affected by technological unemployment, as can already be seen in the computer software sector, where jobs are being relocated to India (Kaur 2023). This is likely to become an argument for expanding the social safety nets in developed countries in coming years, which will need to be financed through greater taxation of TNCs (Rodrik & Stantcheva, 2021).

17.1.4. 3D printing

By contrast, 3D printing is an example of a technology that can challenge many of the existing presumptions about production and foreign trade patterns. Today, 3D printers can work on a variety of materials, such as plastic, steel, ceramics or even human proteins (Hao & Lin, 2020). The possible range of their applications is likewise growing rapidly: between 2010 and 2020, the global 3D printing market grew from USD 1.2 billion to USD 13 billion, representing an average annual growth rate of 27% (Wohlers et al., 2020). Since the COVID-19 pandemic, the potential of 3D printing in mitigating the risk of disrupted supply chains has also been recognised. During the lockdowns of global manufacturing plants in China, some medical facilities began to source the necessary equipment themselves using this technology, thereby also proving its usefulness in highly specialised industries (Kleinman, 2020). Although for the time being 3D printing is a niche solution, with the increasing geopolitical tensions between the West and China and the reshoring of manufacturing, it is possible that in the future it will act as a catalyst for significant shifts in the current global trade model. Indeed, it offers an alternative solution for TNCs seeking to minimise costs, which will no longer need to develop foreign subsidiaries in low-production-cost countries.

17.1.5. Blockchain

Blockchain technology is emerging as another potential paradigm-shifter to date. Since the introduction of the Bitcoin code in 2008, blockchain has been mainly associated with cryptocurrencies, whereas they are in a sense a by-product of a broader solution. The basic idea behind blockchain is to create a distributed (decentralised) database that is accessible to all users. Any user can view bal-

ances and make transactions at any time, as their record is not controlled by any central entity such as a central bank, a fact that significantly reduces the cost of handling them (Hougan & Lawant, 2021). Two main conclusions are currently being drawn from this premise. Firstly, blockchain technology is finding an increasing number of applications in institutions that manage huge databases, such as public sector organisations, supply chain management systems, property registries, statistical offices, international organisations and many others. Thus, it has the potential to address many of the data management needs of developing countries, leading to the bridging of gaps resulting from low levels of digital infrastructure development (Gillpatrick et al., 2022). On the other hand, the nature of blockchain technology also offers a greater array of tools than ever to those interested in tax evasion or even money laundering (Prendi et al., 2023). As a result of these technological opportunities, TNCs are increasingly prioritising small, liquid assets, enabling them to circumvent taxation on an even larger scale than previously possible (Trentini, 2021). Combined with the aforementioned solutions designed to restrict the establishment of foreign subsidiaries, the nature of TNCs is likely to change significantly in years to come.

17.1.6. Internet of Things (IoT)

The final technology in this review is the Internet of Things. It consists of systems of interconnected devices that collect and exchange data with each other and can be controlled and monitored online (Aguzzi et al., 2014). Until recently, its applicability was limited by the cost of large-scale data transmission, but with the increasing integration of 5G technology, the affordability and reliability of the Internet of Things is also expanding (Teckshawer, 2023). This expansion is reflected in the number of 'smart' devices connected to the internet, totalling 8.6 billion in 2019, which could reach 29.4 billion by 2030 (Statista, 2023). Like the previously described technologies, IoT development will shape the globalisation process by enhancing the role of digital corporations in the global economy. On one hand, this will further erode traditional paradigms of international production, as an ever-increasing number of TNCs will begin to shift their sphere of activity towards information processing and downstream sectors such as marketing, social media, user health monitoring or traffic management (Saidu et al., 2015). On the other hand, a growing number of nation states are becoming sceptical of unregulated information engineering, with responses ranging from the protection of personal data in democratic countries to the complete subjugation of the internet in autocratic countries (Azhar, 2021). To these premises, it is worth noting the standardisation requirements necessary for the integrated

functioning of the Internet of Things, which are most likely to occur within state groupings such as the European Union (Saidu et al., 2015). Paradoxically, this regulatory fragmentation could drive an increasing regionalisation of the Internet, and thus of the activities of digital TNCs.

17.2. The implications of digital solutions

The dynamic development of digital technologies will have a significant impact on the existing operating model of transnational corporations, nation states and the global economy as a whole over the coming decades. This subsection attempts to identify the directions in which these may evolve in this period, building on the earlier description of key digital solutions.

17.2.1. Transnational corporations

In the case of TNCs, it can be surmised that they will make less and less use of outsourcing production to industrialising countries, with China at the forefront. This is related to rising geopolitical tensions and the desire to de-risk supply chains, but also the opportunities offered by labour automation and 3D printing. The growing applicability of the Internet of Things will, in turn, encourage deeper cooperation between countries with a high level of regional integration, facilitating the introduction of necessary regulations and standards, contributing to the emergence of local clusters. On the other hand, as more and more spheres of activity move to the virtual world, increased use of telemigrant services will be possible, and blockchain technology will encourage a change in the basic form of foreign investment. Instead of FDI historically tied primarily to manufacturing activities, portfolio investments and other intangible assets will gain in importance, facilitating tax avoidance by TNCs.

17.2.2. Nation states

The implications for nation states will largely depend on their current level of development, although many patterns will remain common to most of them. Labour automation and telemigration will be a challenge mainly for developed countries, while it may become an opportunity for industrialising and developing countries. Given the lower labour costs in developing countries, telemigrants from these countries will be able to compete on price with robots for longer

than workers in developed countries, who will be affected by technological unemployment. To avoid increasing social unrest, developed countries will need to expand their social safety nets, which in turn will require higher corporate taxation. Instead, 3D printing may deprive many developing countries of their competitive advantage of low production costs, the basis for their attracting substantial foreign direct investments since the 1990s. The Internet of Things, on the other hand, threatens to further exacerbate technological inequalities, as its smooth functioning requires a highly developed digital infrastructure that is absent in most catching-up economies. As digital TNCs will operate in isolation from the previous constraints of geographic distance, many of the previous beneficial externalities associated with their operations, such as job creation, local infrastructure development or falling prices of consumer goods, will cease to occur. Over the course of the twentieth century, these have provided a strong argument for cooperation between nation states and TNCs, resulting in countries ceding much of their power to shape the globalisation process. However, the 21st century will see an increasing number of cracks on the existing model, and cooperation might quickly turn into competition.

17.2.3. Global economy

All this will translate into significant changes across the global economy. The reduced international activity of TNCs will most likely translate into a stagnation or decline in the aggregates hitherto considered as indicators of the level of progress in the globalisation process, in particular concerning exports of goods and FDI flows. On the other hand, there will be an increase in the importance of digital forms of cooperation, based on data flows and new technological solutions such as blockchain and the Internet of Things. The importance of regional integration groupings and some international organisations will also grow, reflecting the increased efforts of states to keep new forms of TNC activity related to data engineering and tax avoidance in check. Combined with rising geopolitical tensions and the aspirations of states to regain sovereignty in strategic industries, it will thus be possible to observe a progressive regionalisation of the global economy.

Conclusions: The globalisation process in the wake of digitalisation

Although the above review of selected digital solutions is not exhaustive, it does expose certain regularities related to the post-progressive digitalisation of

the global economy. Solutions such as AI, work automation, telemigration, 3D printing, blockchain or the Internet of Things may also contribute to rising geopolitical tensions in the international arena, despite their undeniable potential to support the technological convergence of developed and developing countries. This is due to their disruptive nature, with the potential to alter many existing paradigms regarding the international division of labour and production. While TNCs will seek to exploit a new range of opportunities, nation states are likely to attempt to regulate them to a greater extent than before, which will also translate into accelerated processes of regional integration of groupings such as the EU or ASEAN. It is therefore possible that over the coming years we will see the emergence of what might be termed 'techno-geopolitics', which will increasingly condition the evolution of the globalisation process.

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18. The cold chain as a resilience feature of the supply chain

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Abstract: Cold-chain technologies are discussed as a practical source of resilience for temperature-sensitive supply chains. The chapter reviews literature on supply-chain resilience, sustainable supply-chain management, cold-chain applications and international rules governing food and pharmaceutical logistics. Cold chains preserve product integrity, reduce spoilage, limit waste, support vaccine and medicine quality, enable global distribution and help firms adapt to climate-related and operational disruptions. Regulatory compliance is central, with standards such as ATP, ISO 22000, ISO 23412, Good Distribution Practices and IATA temperature-control rules shaping transport and storage. The chapter also notes drawbacks: high energy use, infrastructure costs, monitoring demands and environmental burdens from refrigerants. Resilience improves when cold-chain systems are paired with energy efficiency, natural refrigerants, renewable power, traceability and waste-reduction strategies.

Keywords: supply chain resilience, cold-chain technologies, global supply chain, sustainability, regulatory compliance.

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Introduction

Global supply chains are increasingly exposed to geopolitical tensions, climate-related events, infrastructure failures, and operational disruptions. These challenges are particularly significant for temperature-sensitive products, whose quality and safety depend on uninterrupted storage and transportation under controlled conditions. Against this background, cold-chain technologies can be viewed not only as a means of product preservation but also as an important source of supply-chain resilience and sustainability. This chapter examines the relationship between cold-chain management, resilience, sustainable supply-chain practices, and regulatory compliance, while also considering the environmental and operational challenges associated with temperature-controlled logistics.

18.1. Supply chain resilience

Resilience can be defined as ‘an ability to recover from or adjust easily to misfortune or change’ (*Merriam-Webster dictionary*, 2025) or ‘the capacity to withstand or recover quickly from difficulties, toughness’ (*Oxford dictionary*, 2025). These two terms best reflect resilience in the context of business and management. In relation to supply chains, resilience takes on an additional dimension, which indicates the difficulty in building resilience and maintaining it over time. The supply chain as a network of cooperating companies (Christopher, 1998), the purpose of which is to deliver finished goods to the market (Quinn, 1997), is a complex structure. Supply chains can be treated as super-organisations (Ballou, 1992), complex organisational systems (Roh et al., 2017), and business ecosystems (Bechtel & Jayaram, 1997). A resilient supply chain is only as resilient as its weakest link, meaning that all of its components are equally resilient, despite each having a different scope of operation, different characteristics, different features, and different capabilities. This is where the role of the leading company in the supply chain, the leader, is fully revealed. This leader should manage the resilience of the entire supply chain – adopt the position of the architect of resilience, set standards, and support their implementation. The key is the introduction of unilateral, broad and multi-threaded cooperation in the supply chain, which is based on reliable resources and process foundations, clearly defined goals and solid commitment and mutual obligation (Coleman, 2012).

Loss of resilience does not necessarily mean disruption to the supply chain or its complete inability to act. Loss of supply chain resilience should be understood through the effects of its operation, i.e. the value delivered to the end

customer, or otherwise the level of customer service. Loss of the previous ability to operate may be expressed in incomplete deliveries or extended delivery lead times. At the same time, it should be noted that the supply chain may not only be unable to deliver value and serve customers at the previous level, but may even cause losses on the recipient's side, which in the quantitative sense can be treated as delivering negative value (World Economic Forum, 2013). Resilience is therefore a complex category.

The idea of resilient supply chains naturally draws from the concept of organisational resilience, which is based on five pillars: leadership, organisational culture, people, systems, and workstation organisation (Bell, 2002). Another set of pillars of a resilient supply chain is included by Wilding (2013). In his model of a resilient supply chain, Wilding considers close cooperation, supply chain engineering, risk management, and agile management as very essential elements.

Resilience can be assessed from both a reactive and proactive perspective. In the reactive approach, rebuilding the potential of the supply chain after a crisis situation allows it to achieve a higher level of resilience, shifting it to a more stable equilibrium (Christopher & Peck, 2004; Sheffi, 2005). The proactive approach, on the other hand, involves bolstering supply chain resilience in a way matching the anticipated future threats; here, the level of resilience directly depends on the accuracy or quality of forecasts, which may only be verified when a crisis situation occurs. Signs of supply chain resilience include the ability to weaken internal and external factors that cause disruptions, as well as the ability to prevent the transmission of disruptions along the supply chain. This issue is crucial for analysing their resilience, and many studies are required to elaborate with precision the methods and directions of disruption transmission, and then to control it in an organised way. This is currently a vital research thread in supply chain management, and is currently the subject of several studies, including Świerczek's pioneering work (2012). Other scientific research studies the behaviour of supply chains in the wake of various disasters (disaster supply chains) have already provided a substantial empirical data. The scientific studies within this research stream include seminal works for developing comprehensive theoretical foundations in disaster supply chain management, such as Hale & Moberg (2005), Ergun et al. (2010), Dash et al. (2013), Pfeiffer et al. (2017), Ateş (2023), and Ojo (2024).

Currently, increasing resilience can be classified as one of the most important directions of the evolution of supply chains (Szymczak, 2015), especially those which have already achieved satisfactory results in other aspects of functioning. There, resilience is now embedded into many business strategies, the main rationale being events that disrupt the operations of businesses. Many such events have occurred in recent years, especially sudden and unpredictable ones, such as

the global financial crisis (2007–2008), Fukushima tsunami (2012), Brexit (2020), worldwide COVID-19 pandemic (2020), and Russia's invasion of Ukraine (2022). These shocks inflicted both an economic impact on supply chains, forcing them to function in completely different business realities overnight, and a physical impacts which abruptly paralysed operations. Only very few supply chains managed to cope with these threats, implementing various solutions to survive and strengthen themselves for the future.

Beyond geopolitical and macroeconomic shocks, the imperative to boost supply-chain resilience is also propelled by 'disruptive technologies' and rapid technological advancement described as Industry 4.0. This increases the interest in resilience in two ways. Firstly, supply chains want to be prepared for upcoming changes in the way industries and markets operate, and secondly, they want to implement these technologies to increase their resilience to unforeseen events. Technologies such as artificial intelligence (AI), machine learning (ML), block-chain and digital twins can enhance supply chain resilience.

Cold-chain technology is equally important for increasing the resilience of the supply chain, specifically its ability to deliver temperature-sensitive goods without compromising their quality and suitability for use. This applies to all perishable goods, fresh agricultural products, seafood, frozen foodstuffs, some chemicals and pharmaceuticals, photographic films – collectively referred to as 'cool cargo'. The cold chain must provide an uninterrupted sequence of refrigerated supply, production and distribution activities including transport and storage to maintain the safety of materials, production in progress, and finished products. At the same time, this minimise losses and waste.

18.2. Sustainable supply chain management

While sustainability has certainly been a business and management buzzword for many years, its interpretation varies across different industries and areas of management. However, making the supply chain sustainable is certainly an effect of appropriate management efforts, which gave rise to the concept of supply chain management. Sustainable supply chain management involves a firm's strategic efforts to achieve social, environmental, and economic goals through the systematic coordination of buyer-supplier relationships and inter-organisational business processes (Carter & Jennings, 2002). According to IBM (2025), the scope of managing sustainable supply chain – both objective and subjective – is crucial, as sustainable supply chain management involves integrating environmental, social and financial considerations into the sourcing, production and distribution of goods and services. The practice involves the entire supply

chain, all participants, entire lifecycles of products and services. Sustainability is perceived in its three dimensions, and has three pillars: social, environmental, and economic (Purvis et al., 2019). This is why supply chain sustainability encompasses aspects like improving working conditions, social risk reduction, promoting diversity, implementing anti-corruption policy, respect for human rights, reducing greenhouse gas emissions, conserving and recovering energy, saving water, recycling materials, moving away from single-use packaging, contributing to long-term economic development of nations and supporting well-being of future generations.

Evidently, a sustainable supply chain goes beyond the 'green supply chain' concept discussed since the mid1990s. To express a holistic approach to sustainability within supply chains, the term 'white supply chain' was coined. Suk-sanchananun et al. (2024) developed a model of white supply chain in the food industry. Their White Supply Chain Management (WSCM) approach integrates three key components: Green Supply Chain Management (GSCM), Corporate Supply Chain Management (CSCM), and Ethical Supply Chain Management (ESCM). These components, when combined, create a universal approach to sustainability that encompasses environmental, social, and ethical considerations.

The white supply chain approach seems to be appropriate for analysing cold chains particularly as many issues specific to the cold chain are relevant within the scope of GSCM. One issue is the adoption of ecological refrigerants, such as chilled water (refrigerant R-718), ammonia (refrigerant R-717), and hydrocarbons (refrigerants: R600a – isobutane, R290 – propane, R1270 – propylene), as well as natural components of the atmosphere, such as air (refrigerant R-729) and carbon dioxide (refrigerant R-744). These alternatives all have favourable physical parameters, good thermodynamic properties, high chemical stability and excellent cooling efficiency, in addition to being safe for humans and the environment. It is therefore important for all parties in the cold chain to decisively and systematically move away from harmful synthetic refrigerants.

The second important issue is the reduction of atmospheric emissions of freons (CFCs – chlorofluorocarbons), fluoro compounds derived from methane and ethane which are used in compressors of refrigeration devices. Studies have shown that freon molecules do not disintegrate and remain in the atmosphere for up to 100 years, contributing to ozone depletion, i.e. the lowering the amount of ozone (O₃) in the Earth's atmosphere, mainly in the polar regions (Crutzen, 1970; Molina & Rowland, 1974). This permits increased amounts of ultraviolet radiation to reach the Earth, which is harmful to living organisms. Freons have been mostly replaced in refrigeration by hydrochlorofluorocarbons (HCFCs), e.g., the popular R134 refrigerant, which despite being greenhouse gases, have a much smaller impact on ozone destruction.

While the challenges facing CSCM and ESCM in cold chains mirror general issues typical for all supply chains, specific and detailed issues related to the organisation of materials flow at a controlled temperature can be distinguished here. Within the scope of CSCM, a key challenge is ensuring cooling efficiency (in storage and transport) in the international cold chain, which runs through different climate zones. This necessitates the careful selection of logistics service providers and transport companies possessing the appropriate refrigeration equipment. Another issue is the safety of the products being moved in terms of the risk of contamination and poisoning (such as potential terrorist attacks). Managing these challenges will foster relations with stakeholders, while at the same time promoting good supply chain practices. Within the scope of ESCM, particular attention should be given to securing and, if possible, using products for which the cold chain has been broken at a given stage of the flow, thereby preventing them from being traded.

18.3. Regulations influencing the cold chain

Due to the international scope and complexity of operations within the global supply chain, there is no single, universal set of regulations governing the technologies used in the cold chain. Instead, depending on the specific application and region, regulations from various regulatory bodies apply. One differentiating factor is the industry, particularly pharmaceuticals and food. Another factor could be the branch of transport to which the regulations apply.

In the case of pharmaceuticals, the U.S. Food and Drug Administration (FDA) has established regulations (CFR 21 Part 211) for the storage and transportation of drugs, with requirements related to temperature control. Similar regulations are enforced in other countries by national health agencies. Regarding food, most countries have regulations established by national or regional food safety agencies covering the storage and transportation of food. These regulations focus on maintaining appropriate temperatures for different types of food to prevent spoilage or the development of pathogens (Stern Review, 2006).

Regulatory scope is another differentiating factor, with regulations setting limits in areas such as temperature, data monitoring, equipment, and packaging. In terms of temperature control, regulations may specify the required temperature ranges for different products during storage and transportation. In some countries, data monitoring is mandatory and involves recording and storing temperature data throughout the cold chain to ensure compliance with the regulations. Furthermore, regulations may require qualification and validation of equipment used in the cold chain (e.g., refrigerated vehicles, freezers) as well

as packaging materials (e.g., insulated containers) to ensure compliance with specific performance standards.

Despite variations in the geographic scope of logistics operations, certain regulatory bodies set the standards for the industry. These include national health agencies, such as the FDA in the United States, industry organisations related to pharmaceuticals, food, or cold-chain logistics, and international organisations, such as ISO (International Organization for Standardization).

Technologies used in the cold chain must comply with specific international standards and regulations that ensure the safety of transportation and storage. The most significant of these are: the Agreement on the International Carriage of Perishable Foodstuffs (ATP), which outlines the requirements for transportation vehicles carrying perishable food items; ISO 22000, the international standard for food safety management, which also covers temperature control in the cold chain; Hazard Analysis and Critical Control Points (HACCP), a system used to identify hazards and critical control points to ensure food safety; the ISO 23412 standard, which pertains to the last mile delivery of refrigerated goods, covering temperature and insulation regulations; and Good Distribution Practice (GDP) for pharmaceuticals, which governs temperature control during the transportation of medicines and vaccines.

The ATP Convention plays a key role in ensuring proper temperature control within the supply chain of perishable food products. It was drafted in Geneva in September 1970 and covers various aspects, including transportation conditions (e.g., for raw meat, fish, milk), technical requirements for transport vehicles, certificates, and distinguishing marks for vehicles carrying these products. Perishable goods include the following categories: plant-based food, animal-derived products, products obtained through the refinement of plant or animal materials, and live plants. Its regulations aim to optimise vehicles for transporting such items, which is crucial for safeguarding public health.

The ATP Convention plays a pivotal role in controlling temperatures within the supply chain of food when specific transportation conditions are required (Aditjandra et al., 2025). It establishes standards for isothermal transport vehicles, refrigerators, freezers, and heated vehicles, minimising the risk of disruptions in the cold chain. The provisions of the agreement ensure the use of appropriate technologies, such as refrigeration units and thermal insulation, allowing food products to maintain quality and health safety at every stage of transportation. In the context of the cold chain, ATP not only provides clear standards for vehicles and containers transporting food that requires controlled temperatures, but also regulates the mandatory use of technologies such as refrigeration units and thermal insulation, minimising the risk of disruption to the cold chain.

Although the ATP Convention regulates temperature-controlled transportation, it is not universally binding in an international context. It applies to signatory states that have ratified it, mainly in Europe but also in countries such as the USA, Kazakhstan, Morocco, the United Kingdom, and the Russian Federation. While it is binding for international road and rail transport, many countries also apply its provisions to domestic transportation.

The ISO 22000 standard does not provide specific guidelines for managing the cold chain but focuses on establishing a Food Safety Management System (FSMS) that encompasses all aspects of food safety, including temperature control. Therefore, ISO 22000 can be used to develop a cold-chain management plan that meets specific needs and complies with other relevant regulations.

By incorporating the following elements into the FSMS, the ISO 22000 standard helps effectively manage cold-chain processes, minimising the risk of food spoilage or contamination due to temperature fluctuations:

- Hazard Analysis and Critical Control Points (HACCP) – Identifying potential hazards throughout the food supply chain, including temperature control failures. In the context of the cold chain, this may include identifying critical control points (CCPs), such as receiving temperatures, storage conditions, and transportation conditions.
- Operational Prerequisite Programmes (PRP) – Programmes that establish basic food safety conditions, which can be tailored to cold-chain management. Examples of PRPs related to the cold chain include: procedures for the calibration and maintenance of temperature monitoring equipment, training for cold-chain personnel in proper temperature control procedures, documentation of temperature control procedures and monitoring logs, validation of cleaning and disinfecting procedures for cold-chain equipment (Gustavsson et al., 2011).

ISO 22000 does not specify exact temperature values but requires the establishment of appropriate temperature ranges based on the type of food and applicable regulations. The FSMS should also include procedures for monitoring temperatures at critical control points and maintaining compliance records. In the case of temperature deviations, corrective procedures should be implemented to minimise risks to food safety. Overall, the ISO 22000 standard provides a framework for managing food safety, including processes related to the cold chain. By implementing an FSMS that incorporates these principles, it is possible to ensure that cold-chain operations are in line with best practices and contribute to overall food safety.

ISO 23412, on the other hand, establishes international standards for logistics companies involved in refrigerated transportation, mandating the use of modern

temperature monitoring and control technologies. Through the application of refrigeration units, intelligent transportation management systems, and advanced insulation, stable temperature conditions can be maintained even during complex deliveries with multiple transshipment points. The implementation of this standard is crucial for enhancing the safety and quality of deliveries of sensitive products, minimising the risk of spoilage and economic loss. It defines requirements for providing temperature-controlled transportation services for shipments containing temperature-sensitive goods (including food) in road transport. It covers all stages of refrigerated delivery, from the acceptance of goods from the service user, through transfer between refrigerated vehicles or containers, to final delivery to the destination. The standard places significant emphasis on the application of modern refrigeration technologies. It not only outlines requirements for cooling systems in vehicles and containers (as in ATP) but also highlights the need for real-time temperature monitoring using temperature sensors, GPS systems with temperature logging functions, and IoT technologies. The use of automated routing and route optimisation systems is recommended to minimise transport times and the risk of temperature fluctuations due to long stops or inefficient planning. This standard also specifies procedures for the safe transfer of goods between refrigeration units, ensuring the continuity of the cold chain. The use of electronic tracking systems for shipments is also highlighted, allowing customers and logistics service providers to monitor the transport.

ISO 23412 has limited applicability. Firstly, it does not cover all branches of transport, and does not apply to air, sea, or rail transport. Secondly, it does not cover shipments with their own cooling system or direct refrigerated deliveries. Thirdly, the ISO 23412 standard does not provide guidelines for measuring the temperature of the shipment itself, but only sets requirements for the transport system, not the quality of goods before their pickup. Finally, the transport of pharmaceuticals and medical products is subject to separate regulations (ClassNK 2021).

In the context of cold chains, GDP plays a key role in ensuring the proper storage and transportation conditions for temperature-controlled products. Good Distribution Practice (GDP) constitutes a quality system that outlines the responsibilities and processes for managing the risks associated with the wholesale distribution of pharmaceutical products. It includes the organisational structure of companies, procedures, resources, and processes. Quality control systems in the pharmaceutical industry are crucial for ensuring the safety and high quality of medicinal products. Companies are required to continuously monitor processes such as the transport, distribution, storage, and sale of drugs, in accordance with both national and international regulations. Pharmaceutical

wholesalers must ensure the high quality of medicinal products. Consequently, warehouse owners must provide appropriate storage conditions, including maintaining cleanliness, controlling humidity, monitoring room temperatures, ensuring air circulation, and proper labelling. Distributors are also obligated to demonstrate the legality of drug sources and monitor the supply chain. GDP regulations apply to companies involved in the purchase, sale, storage, and transportation of drugs intended for human use, as well as veterinary drugs. The requirements also extend to the personnel of distribution companies. GDP regulations must be implemented by warehouse and pharmaceutical storage owners, and the quality of distribution is overseen by qualified staff.

GDP mandates that companies use appropriate refrigeration technologies, such as coolers and refrigeration units, for products requiring cooling and ensure continuous temperature monitoring throughout the supply chain. The warehouse owner must have a permit confirming compliance with health and safety and GDP standards. An important element is the monitoring of room temperatures, temperature mapping, and the installation of temperature sensors and data loggers. In this regard, automated temperature measurement systems help reduce the risk of losses and avoid financial penalties (Stajniak & Konecka, 2014).

An example of the practical application of regulations in cold chain supply is the International Air Transport Association's (IATA) Temperature Control Regulations (TCR), which address issues related to temperature management in air transport. Through collaboration with leading agencies and organisations, the IATA has significantly improved the preparation for transporting COVID-19 vaccines, which posed a major challenge in the context of refrigerated pharmaceutical supply chains (IATA, 2023).

18.4. Cold chain applications in sustainable supply chain

In the context of the modern, competitive market, establishing an effective cold supply chain that incorporates sustainable suppliers is essential. Manufacturers and suppliers of cold products are increasingly adopting sustainable practices and striving to adhere to recognised environmental standards. While the implementation of these practices requires both time and significant investment in infrastructure, the long-term benefits may include enhanced market appeal for both products and services (Chaabane et al., 2022). Suppliers of frozen food products, often located in remote regions, must integrate sustainable practices to ensure their products meet global acceptance and regulatory requirements (Kartoglu & Ames, 2022). The inherent characteristics of cold chain technologies (CCT) facilitate the achievement of this objective.

A primary goal in the application of cold-chain systems is the preservation of product integrity throughout the supply process. Within the context of transforming into a green supply chain (GSC), the utilisation of cold-chain technologies is one of priorities. CCTs are designed to maintain optimal temperature conditions, thereby preserving the quality and efficacy of temperature-sensitive products. This function underscores the environmentally beneficial aspect of cold-chain technologies, as they play a crucial role in safeguarding the integrity of such products throughout the supply chain. Cold-chain systems contribute significantly to reducing food spoilage by ensuring that appropriate temperatures are maintained during storage, transportation, and distribution (Gustavsson et al., 2011). The reduction in food waste subsequently decreases the environmental impact associated with food production, including lower water consumption, less land use, and fewer greenhouse gas emissions. Moreover, as Demirkiran et al. (2022) found, the adoption of proper cold-chain technologies enhances operational efficiency. Efficient cold-chain systems are capable of optimising energy consumption by maintaining precise temperature control without resorting to excessive cooling (Shishodia et al., 2021). This optimisation can be achieved through innovations such as insulated packaging, intelligent sensors, and route optimisation software, which together contribute to a reduced carbon footprint.

Global supply networks depend heavily on frequent and extensive transportation operations, which often place considerable strain on delicate food products. By regulating the temperature during transportation and storage, cold chain technologies (CCT) can reduce the reliance on chemical preservatives. These technologies have been shown to significantly minimize the need for preservatives in food products (Mercier et al., 2017). The maintenance of optimal temperatures inhibits microbial growth, which not only allows for more natural and potentially healthier food products but also reduces the environmental impact associated with the production and disposal of chemical preservatives. In addition, modern consumers are increasingly concerned with the types of preservatives used throughout the food supply chain. Therefore, the reduction of potentially harmful substances can provide a competitive marketing advantage (Novitasari et al., 2019).

Similar to the food industry, temperature-sensitive pharmaceuticals and vaccines are particularly vulnerable to degradation. Cold-chain technologies ensure the stability and efficacy of these products by preventing their deterioration. Given the often high cost of pharmaceuticals, the implementation of these technologies can help to reduce logistics and disposal costs. This, in turn, decreases the need for overproduction and the disposal of expired medications, thereby minimising resource consumption and mitigating the risk of environmental contamination. Cold-chain technologies (CCT) enable logistics operators

to mitigate economic risks and reduce the likelihood of spoilage and degradation, often resulting from supply chain disruptions. The advancement of cold-chain technologies increasingly incorporates environmentally sustainable practices. These practices include the use of recyclable or biodegradable packaging materials, the adoption of natural refrigerants with lower environmental impact, and the integration of renewable energy sources to power cold storage facilities (Evans, 2023). These strategies align with the principles of Green Supply Chain Management, as reflected in current industry practices and outlined in relevant recommendations.

One of the practical objectives of cold-chain management is to ensure compliance with regulatory requirements. During cross-border transportation operations, there is a heightened risk of encountering conflicting norms and regulations. Cold-chain practices help to maintain adherence to stringent regulatory standards governing the storage and transportation of temperature-sensitive goods. Achieving this goal involves three key components: temperature monitoring, documentation and traceability, and standard operating procedures. Temperature monitoring is essential for ensuring compliance and validated temperature sensors provide accurate data that aligns with regulatory requirements. Continuous temperature monitoring across the cold chain is also vital for maintaining compliance, which involves the deployment of data loggers, thermometers, and other monitoring systems to track and record temperatures throughout storage, transportation, and handling (ISO, 2024). In many cases, digitalisation of the supply chain is an important co-factor determining usage of CCT (Ramanathan, et al., 2022). For documentation and traceability, electronic data management systems, commonly used in supply chain management, facilitate efficient record-keeping and enhance compliance. Detailed records of temperature data, including timestamps and product identification, are crucial for demonstrating compliance during audits (Bremer, 2018). These records allow product movements to be tracked and any temperature deviations identified, thus reducing the risk of distributing spoiled goods. This is particularly important because food contamination can quickly lead to regulatory authorities potentially imposing costly penalties, with the consequent damage to suppliers' reputations.

Finally, another critical aspect of ensuring regulatory compliance is the establishment of standard operating procedures (SOP). Developing and implementing standardised procedures for all cold-chain activities helps business partners adjust transportation and warehousing operations as needed. These procedures should include protocols for temperature monitoring, handling practices, corrective actions in the event of deviations, and equipment maintenance. Reliability in cold-chain operations is further supported by the documentation generated and secured throughout the supply chain (Li, 2023), ensuring con-

sistency and ongoing compliance with regulatory requirements. By adopting robust cold-chain practices and focusing on regulatory compliance, companies can preserve the integrity and safety of temperature-sensitive products across the supply chain. This not only protects public health but also builds market trust and facilitates global trade, supporting overall supply chain operations. Additionally, when coupled with marketing efforts that emphasise sustainability goals, such practices can effectively meet customer expectations and enhance brand reputation.

Cold-chain infrastructure provides the flexibility necessary for businesses to respond to fluctuating environmental conditions, enabling them to adapt and thrive in dynamic and increasingly unpredictable environments. Climate change is exacerbating the frequency and severity of extreme weather events such as droughts, floods, and heatwaves, making it increasingly difficult to sustain supply chain operations under adverse weather conditions. As a result, cold-chain infrastructure plays a crucial role in enhancing supply chain resilience, particularly for products sensitive to temperature fluctuations. This infrastructure allows businesses to maintain operational continuity and thrive even amidst changing environmental conditions. Extreme weather events can disrupt transportation routes, damage infrastructure, and interfere with power supplies, all of which can negatively impact cold-chain operations. Cold-chain infrastructure, which includes refrigerated storage facilities, insulated packaging, and controlled atmosphere transport systems, ensures that optimal temperatures are maintained despite external disruptions (Q. Chen, 2022), which is essential for ensuring product quality and safety during environmental disturbances. Decreasing additional risk potential is well documented and proven (X. Chen et al., 2022). Furthermore, rising global temperatures, particularly heatwaves, exacerbate logistics costs and the potential spoilage of goods in transit. A robust cold-chain infrastructure addresses this by means of alternative transportation methods, such as refrigerated trucks or air cargo, even when traditional routes are hindered by weather events or damage to infrastructure. Real-time monitoring systems provide valuable data, enabling businesses to adapt their supply chain operations accordingly. Moreover, advancements in sensor technology and data management systems facilitate real-time temperature monitoring throughout the cold chain, enabling companies to respond proactively to any temperature deviations caused by environmental factors (Osorio, 2017). This capacity for quick corrective action minimises the risk of product loss or spoilage. Investing in resilient and flexible cold-chain infrastructure is not only essential for maintaining product quality but also for enhancing agility in the face of environmental uncertainty. By ensuring the ability to adapt to disruptions, businesses can minimise supply chain interruptions and continue to thrive in a dynamic global

market. Timely and error-free delivery is particularly critical in lean operations, where safety stock is minimal or non-existent. As such, maintaining an efficient delivery schedule has operational and marketing significance, further emphasising the importance of resilient cold-chain systems.

One of the key principles of Green Supply Chain (GSC) Management is its integration of waste reduction strategies into daily operations. While incorporating reverse logistics streams to promote the reuse or recycling of products and materials, minimising waste should always take precedence over efforts to recycle and reuse. The ultimate goal of an environmentally sustainable supply chain is to reduce unnecessary waste. Cold-chain technologies are instrumental in achieving this goal by extending the shelf life of perishable products, which in turn minimises waste within the supply chain and throughout the food production cycle, from farm to fork. Scientific evidence supports the role of cold-chain technologies in waste reduction. The Food and Agriculture Organization (FAO) estimates that one-third of global food production is lost or wasted (Gustavsson et al., 2011), resulting in substantial environmental consequences, including wasted water, land, and greenhouse gas emissions. Perishable goods such as fruits, vegetables, and meat are particularly vulnerable to spoilage due to microbial growth and biochemical degradation. By extending this shelf life and minimising waste, cold-chain technologies optimise resource usage across the entire food supply chain.

Furthermore, a reduced environmental footprint through lower water usage is another significant objective within green supply chain practices. Decreased food spoilage translates into less water wastage during production, transportation, and storage. In addition, reduced land use helps mitigate environmental impacts, benefiting producers, distributors, and consumers alike. Many businesses highlight their water savings in marketing campaigns to attract environmentally conscious customers. Food production is also land-intensive, and less food waste directly reduces the demand for agricultural land. Another critical area of focus within supply chain sustainability is the reduction of greenhouse gas emissions, particularly those associated with transportation operations. However, food waste also contributes to greenhouse gas emissions, including methane released during decomposition (Aramyan, 2021). Therefore, by minimising food waste, cold-chain technologies indirectly alleviate some of the environmental burden associated with global logistics operations, particularly emissions linked to transportation and food decomposition.

The energy source is a key aspect in assessing CCT technologies. The environmental impact of cold-chain technologies is therefore a multifaceted issue, encompassing both positive and negative aspects. Cold-chain technologies play a significant role in reducing the spoilage of perishable goods, thereby min-

imising food waste. Such waste reduction lessens the environmental burden associated with food production, such as water consumption, land use, and greenhouse gas emissions. Additionally, cold-chain technologies often reduce the need for chemical preservatives in food products, as optimal temperature control inhibits microbial growth, resulting in potentially healthier products while minimising the environmental impact associated with the production and disposal of chemicals. Advancements in cold-chain technologies have also led to improvements such as enhanced insulation materials, energy-efficient refrigeration systems, and route optimisation software. These innovations contribute to reducing energy consumption compared to older technologies (Meneghetti & Ceschia, 2020). However, the energy demand of refrigeration units used in storage facilities and transportation remains significant, potentially contributing to greenhouse gas emissions, depending on the energy source. Traditional refrigerants used in some cold-chain systems are potent greenhouse gases, and while strict regulations are phasing out certain harmful refrigerants, leaks and improper disposal of older refrigerants continue to pose a threat to the climate (Dong, 2021). Furthermore, disposable packaging materials used in cold-chain logistics generate waste.

Fortunately, recent developments in reusable and recyclable packaging materials provide more sustainable alternatives, along with other environmentally friendly advancements in cold-chain technologies. Replacing traditional refrigerants with ammonia, carbon dioxide, or hydrocarbons, which have lower global warming potential, offers a more sustainable option. Moreover, powering cold storage facilities with renewable energy sources, such as solar, wind, or hydroelectric power, significantly reduces reliance on fossil fuels and associated emissions. Additionally, utilising thermal energy storage systems enables the optimisation of energy consumption by storing excess cooling capacity during off-peak hours for use during periods of peak demand (Q. Chen, 2022). In regions where solar power availability is increasing, the opportunity to further reduce the carbon footprint is particularly promising.

Conclusions

While current cold-chain technologies still present particular environmental challenges, ongoing advancements are pushing the industry towards a more sustainable future (Bottani, 2019). Focusing on energy efficiency, the use of natural refrigerants, renewable energy integration, and waste reduction strategies will be essential for minimising the environmental impact of cold-chain operations and simultaneously strengthening risk mitigation plans (Kristanto et al., 2023).

As sustainability becomes an increasingly central component of supply chain management, particularly in the face of global warming, cold-chain technologies present a significant opportunity to support the long-term viability of global logistics operations while advancing environmental goals.

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19. Labour migration and workforce shortages: Building resilience in post-pandemic Europe

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Abstract: Post-pandemic Europe faces labour shortages that reveal deeper demographic and structural pressures. The chapter examines labour-market data, sectoral shortages, migration patterns and policy responses across Member States, with attention to intra-EU mobility, third-country migration and displaced Ukrainians under temporary protection. Migration has helped sustain healthcare, agriculture, construction, transport, logistics, manufacturing, care and hospitality, especially as economies reopened after COVID-19. Several countries have moved toward more targeted labour-migration policies, including easier access for skilled workers and simplified employment procedures. Yet integration barriers remain: language, qualification recognition, housing, social services and labour-market segmentation can reduce migrants' contribution. The chapter treats migration as a strategic resilience tool, but not a stand-alone fix. Durable labour-market stability also requires education, lifelong learning, participation measures and inclusive social protection.

Keywords: labour market, migration, Europe, resilience, workforce shortages.

Introduction

The COVID-19 pandemic became one of the most serious socio-economic challenges of the early 21st century, exposing weaknesses in European labour market structures. Mobility restrictions, economic activity interruptions and sudden labour demand changes led to prolonged employment and human resource distribution disruptions. Consequently, many European countries experienced labour shortages, particularly in sectors requiring a stable workforce, such as healthcare, agriculture, transport and construction. At the same time, the pandemic crisis highlighted the importance of labour migration in stabilising the labour market and supporting economic recovery. Migrants, who are often employed in critical occupations, played a key role in maintaining continuity of

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services and supply chains. In this context, labour mobility is not only seen as an economic phenomenon but also as part of a broader strategy to strengthen the resilience of European economies. This chapter aims to analyse the links between economic migration and labour shortages in Europe in the post-pandemic period, identifying mechanisms that can help build labour market resilience. The following sections present the characteristics of post-pandemic labour shortages and the role of migration in addressing them.

19.1. Labour shortages in Europe after the COVID-19 pandemic

The pandemic significantly exacerbated pre-existing labour shortages in many sectors of the European economy, creating persistent imbalances between labour supply and demand. Although labour markets initially contracted in the early stages of the pandemic, structural pressures later re-emerged and intensified in many cases as economic activity resumed. Recent labour market reports indicate that shortages remain widespread, with almost all EU/EFTA countries experiencing persistent shortages in key occupations. Particularly severe gaps exist in healthcare, engineering, IT, welding, and other technical and craft trades. These patterns reflect deep-seated structural trends rather than short-term cyclical changes (European Labour Authority, 2025). Shortages are particularly significant in sectors with poor job quality and are often found in professions that typically do not require tertiary-level education. Persistent labour shortages have resulted in a high EU job vacancy rate, reaching a record 3% in the second quarter of 2022. The highest rates were observed in the Netherlands (4.9%), Belgium and Austria (both 4.8%), and the Czech Republic (4.7%), while the lowest rates were found in Romania, Bulgaria and Spain (all 0.9%). At a sectoral level, the highest job vacancy rates in the EU were observed in administrative and support service activities (4.7%), accommodation and food service activities (4.2%), information and communication (4.1%), and construction (4.0%). Relatively lower rates were observed in electricity, gas, steam, and air conditioning supply (1.7%), financial and insurance activities (2.0%), and manufacturing (2.3%). Because some of these high-vacancy sectors (e.g., construction) are central to the green and digital transitions, resolving these bottlenecks will facilitate economic transitions (European Commission, 2023).

The vacancy rate remains particularly high in some Member States, despite the recent slowdown in economic activity driven by supply-chain issues and inflationary pressures. This indicates that labour shortages remain a structural problem for EU labour markets in the aftermath of the COVID-19 pandemic (Council of the European Union, 2024).

In Q3 2025, the job vacancy rate in the euro area was 2.1%, down from 2.3% in Q2 2025 and down from 2.5% in Q3 2024. In the EU, the job vacancy rate was 2.0% in Q3 2025, down from 2.1% in Q2 2025 and 2.3% in Q3 2024 (Eurostat, 2025). Among EU countries, the highest job vacancy rates in Q3 2025 were recorded in the Netherlands (4.1%) and in Belgium (3.8%), followed by Malta (3.4%), Austria (3.2%) and Cyprus (3.0%). The lowest rates were observed in Romania (0.6%), Bulgaria and Poland (both 0.8%), followed by Spain (0.9%), Slovakia and Finland (1.0%)

In the euro area, the impact of the 2020 job vacancy rate was stronger during the pandemic than during the 2009 economic downturn. While the job vacancy rate declined slightly in 2009 compared with the previous year (by 0.1 percentage points, compared with 0.3 percentage points in the EU), it returned to its original level in 2010. By contrast, the rate dropped by 0.5 percentage points in 2020, followed by a rebound of 0.7 percentage points in 2021 and 2022. However, it decreased again, by 0.2 percentage points in 2023 and a further 0.4 percentage points in 2024 (Figure 19.1).

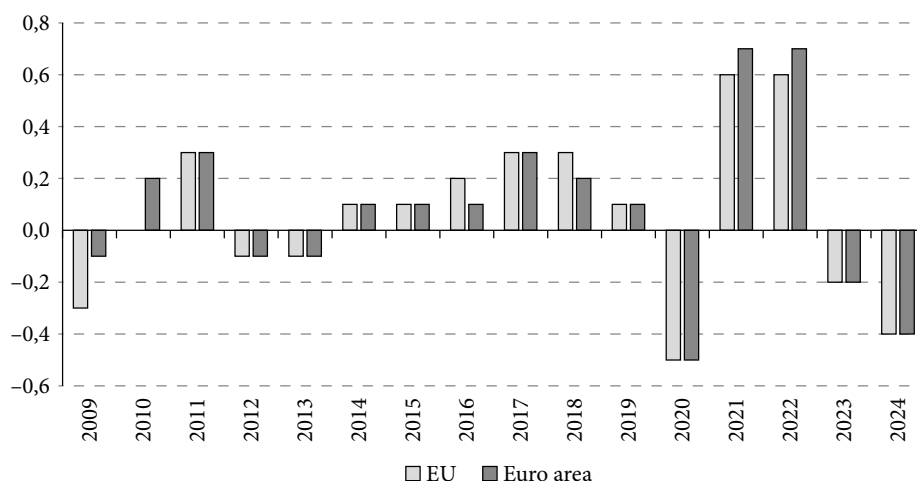


Figure 19.1. Annual change in job vacancy rates, 2009–2024 (percentage points)

Source: (Eurostat, 2025).

The EU also experienced a similar impact on job vacancy rates in 2020 due to the pandemic, although the recovery occurred more rapidly than after the 2009 economic recession. At the peak of the 2009 crisis, the EU job vacancy rate fell by 0.3 percentage points compared with the previous year. It then remained stable in 2010 and increased by 0.3 percentage points in 2011, offsetting the effects of the recession. By comparison, the rate fell by 0.5 percentage points in 2020 due

to the pandemic, followed by a 0.6 percentage-point recovery in both 2021 and 2022. Nevertheless, the job vacancy rate began to fall again in 2023 (by 0.2 percentage points), and further in 2024 (by 0.4 percentage points) (Eurostat, 2025).

The pandemic contributed to increased shortages for high-skilled workers in construction and agriculture, and shortages for intermediate, specific skills in manufacturing, construction, transport, and finance. Eurofound's (2023) analysis of job vacancy rates in Q3 2020 shows that shortages were particularly acute in sectors such as information and communication, administrative and support services, human health and social work, accommodation and food services, and professional, scientific, and technical activities. Furthermore, labour shortages were reported in most EU Member States.

19.2. Migration as a compensatory mechanism for labour market shortages

Following the outbreak of the pandemic, the importance of economic migration in alleviating labour shortages across Europe became increasingly recognised. As economies reopened and production resumed, many sectors were hit by structural deficits in their workforces, exacerbated by demographic ageing, reduced labour market participation and mismatches in skills. According to the European Commission (2023a), labour shortages have become widespread across Member States, particularly in occupations requiring high and medium levels of skill. In this context, cross-border labour mobility – both within the EU and from third countries – has played a stabilising role in supporting economic recovery.

As borders reopened and economic activity increased, demand for mobile workers rose significantly. Migrants filled labour gaps in sectors experiencing persistent shortages, including healthcare, agriculture, transport, construction, hospitality and other service industries. Data from Eurostat indicates that foreign-born workers are now overrepresented in several shortage occupations, particularly in healthcare and long-term care, as well as in seasonal agricultural work. Their contribution enabled the continuity of production and service delivery, thereby supporting post-pandemic economic recovery and mitigating inflationary pressures linked to labour constraints.

Since 2020, notable shifts in migration patterns and structures have been observed. While free movement within the EU remains an important channel of labour mobility, inflows from non-EU countries have also become more significant. Notably, migration from Ukraine following Russia's invasion in 2022 has had a crucial impact on Europe's labour markets. Under the Temporary Pro-

tection Directive, which was activated by the Council of the European Union in 2022, millions of displaced Ukrainians were granted access to the EU's residence and labour markets. Meanwhile, shortages in manufacturing, logistics, and care services have been increasingly filled by workers from the Western Balkans, North Africa, and parts of Asia.

In response, several Member States have adopted more proactive and targeted migration policies. Germany, e.g., has reformed its Skilled Immigration Act to make it easier for qualified workers from outside the EU to enter the country, while Poland has introduced simplified employment procedures for certain nationalities. In turn, Spain has introduced reforms to regularise certain categories of migrant workers and address sector-specific shortages. These policy adjustments reflect a broader shift from crisis-driven responses towards more strategic labour migration management.

Despite these developments, significant challenges related to migrant integration persist. Language barriers, cultural differences, the non-recognition or delayed recognition of professional qualifications, and limited access to housing and social services can all hinder effective participation in the labour market. The OECD (2022) emphasises that improving skills recognition procedures and providing targeted integration support are crucial for maximising migrants' economic contribution. A lack of effective integration policies may increase the risk of labour market segmentation and social exclusion.

In the long term, economic migration is likely to remain a structural component of European labour market policy. Given the ongoing demographic decline and ageing populations in many Member States, the supply of labour from outside the EU will be essential for sustaining growth, financing welfare systems and maintaining competitiveness. Therefore, economic migration should be viewed as a strategic instrument for enhancing the resilience of European economies to future demographic and economic shocks, rather than solely as a short-term response to crisis-induced shortages.

19.3. Building labour market resilience

Strengthening labour market resilience in Europe in the post-pandemic period requires a multi-level, integrated policy approach combining migration management, education and training systems, active labour market policies and inclusive social protection frameworks. The pandemic exposed structural weaknesses in Europe's labour markets, including sectoral labour shortages, demographic ageing, labour market segmentation and skills mismatches (European Com-

mission, 2023b; OECD, 2023). At the same time, however, it also demonstrated the importance of flexibility, institutional adaptability, and coordinated policy responses for maintaining economic stability during systemic shocks (Béland et al., 2021). Economic migration plays a central role in this resilience-oriented framework. A growing body of recent research highlights how migrant workers help fill immediate labour shortages and enhance long-term economic dynamism and innovation capacity (Dustmann et al., 2022). Migration can offset the adverse labour market consequences of an ageing population, particularly in countries experiencing rapid demographic decline. In this sense, when supported by effective institutional arrangements, migration policy should not merely be viewed as a short-term corrective tool, but as a structural component of sustainable labour market strategies.

Across the European Union, Member States have increasingly implemented targeted initiatives to better align labour supply and demand. These include sector-specific recruitment schemes for nationals of third countries, streamlined visa and work permit procedures, the digitalisation of migration administration and reforms to accelerate the recognition of professional qualifications obtained outside the EU. For example, Germany's recent reforms have broadened skilled migration pathways through its updated Skilled Immigration Act, while Spain and Poland have introduced regulatory changes to facilitate the regularisation and employment of foreign workers in shortage occupations. According to Eurofound (2023), such targeted recruitment policies have become more prevalent in response to persistent shortages in sectors such as healthcare, construction, transport and information technology.

At the same time, resilience-building strategies increasingly emphasise the development of domestic human capital. Investing in education, vocational training and lifelong learning is considered vital for reducing long-term dependence on migration, while also addressing technological change and the green transition (Brunello & Wruuck, 2021). Reskilling and upskilling programmes have gained prominence in recovery plans financed through the EU's Recovery and Resilience Facility. Moreover, recent empirical evidence suggests that countries with stronger adult learning systems were better able to mitigate employment losses and facilitate labour reallocation during the pandemic (Fasani & Mazza, 2020; OECD, 2023). Therefore, migration and education policies should be viewed as complementary rather than substitute instruments.

Another crucial pillar of labour market resilience is the effective integration of migrants into host societies. Research shows that early labour market access, language acquisition and recognition of qualifications can greatly improve migrants' employment prospects and fiscal contributions (Brell et al., 2020; Hainmueller et al., 2016). However, barriers such as bureaucratic delays, limited access

to childcare, housing shortages and discrimination can hinder full economic participation and thereby weaken resilience potential (OECD, 2022). Germany, Scandinavian countries such as Sweden and Denmark, and Poland have shown that comprehensive integration frameworks, including language training, employment counselling, skills validation systems and local-level coordination, can foster labour market participation and social cohesion. Following the activation of temporary protection for displaced persons from Ukraine by the Council of the European Union in 2022, several Member States implemented accelerated integration pathways, highlighting the importance of institutional preparedness and intergovernmental cooperation (EMN, 2023). From a broader theoretical perspective, labour market resilience depends on institutions' capacity to absorb shocks, adapt to structural change and transform in response to new risks (Martin & Sunley, 2020). The pandemic underscored how open economies with diversified labour supply sources, robust welfare systems and strong social dialogue mechanisms were better able to manage the disruption (Béland et al., 2021).

When embedded within inclusive social policies and coordinated labour market governance, migration contributes to adaptive capacity. The resilience of European labour markets ultimately hinges on achieving a sustainable balance between labour mobility, investment in human capital and social solidarity. Overreliance on an external labour supply without adequate integration can lead to labour market segmentation and social tensions, while insufficient openness can exacerbate demographic and skills-related constraints. Therefore, a strategic combination of managed migration, lifelong learning, inclusive welfare institutions and cross-border cooperation is essential. Given the population ageing projected to continue across much of Europe, incorporating economic migration into a comprehensive resilience strategy is likely to remain a central priority of employment and migration policy in the coming decades.

Conclusions

The impact of the pandemic on European labour markets can be seen as akin to a stress test, exposing structural weaknesses while accelerating pre-existing demographic and economic trends. The ongoing labour shortages across sectors and Member States suggest that Europe is grappling with long-term workforce issues rather than short-term post-crisis disruptions. Declining working-age populations, skills mismatches, and changing employment patterns will continue to shape labour market dynamics in the years ahead.

In this context, labour migration has become a key part of Europe's response to workforce shortages. It has helped to maintain economic continuity, support

essential services, and facilitate recovery following the pandemic. However, migration alone cannot guarantee labour market stability. For its positive impact to be realised, effective governance, well-functioning institutions, and complementary policies in education, training, and social integration are required.

Building resilient labour markets, therefore, requires a comprehensive and balanced approach. Investment in human capital, support for lifelong learning, and measures to promote labour market participation among domestic workers must be combined with well-managed, sustainable migration strategies. It is equally important to foster social cohesion by implementing inclusive integration policies that enable migrants to fully participate in economic and social life.

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20. Preliminary research findings on the impact of gender diversity in boards on sustainable development policies

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Abstract: Board gender diversity is investigated as a potential driver of sustainable development policies in enterprises. The chapter combines a review of sustainability, gender equality and corporate-leadership literature with a CAWI study of managers from medium-sized firms in the Wielkopolska region. Companies were compared according to whether at least one woman served on the board or management body. Firms with female board participation reported stronger implementation of social sustainability goals and higher average environmental-sustainability scores, while differences in the economic dimension were small. The chapter links these patterns with broader stakeholder orientation, cooperation, creativity and attention to sustainable alternatives. Because the sample is limited, the evidence remains exploratory. Even so, it suggests that women's presence in top management may strengthen the practical adoption of sustainability policies.

Keywords: gender diversity, women on board, sustainable development, SDG's.

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Introduction

Sustainable development has become an increasingly important element of contemporary business strategies, requiring companies to integrate economic, social, and environmental objectives into their decision-making processes. At the same time, growing attention is being paid to the role of diversity in corporate leadership and its potential influence on organisations' strategic priorities and sustainability practices. In particular, the presence of women on management boards may contribute to broader stakeholder orientation, greater sensitivity to social and environmental issues, and the development of more sustainable approaches to business.

Against this background, the aim of this chapter is to explore the relationship between gender diversity in corporate leadership and the implementation of sustainable development policies. The chapter combines a review of the literature on sustainable development and gender diversity with preliminary empirical findings from medium-sized enterprises in the Wielkopolska region. Particular attention is paid to differences in the social, economic, and environmental dimensions of sustainability between companies with female representation in their management bodies and those without women in top management positions.

20.1. Sustainable development – selected aspects

In the 1980s, the World Commission on Environment and Development defined the concept of sustainable development as meeting the basic needs of the present generation without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). "The 2030 United Nations Agenda," adopted in 2015, assumed that long-term collaborative efforts are essential for sustainable development. These efforts focus on implementing the 17 Sustainable Development Goals, which involve addressing challenges that mitigate the negative effects of human activities (United Nations, 2015). This is a universal set of tasks that UN member states should implement into their national programmes and policies by 2030. Goals 1–6 are a continuation of the Millennium Development Goals, which were set in 2000, while goals 7–17 constitute a new proposal for actions and policies (Hák et al., 2016).

The sustainable development of economic entities requires maintaining a balance between three related areas: environmental, economic and social, in accordance with the Triple Bottom Line (TBL) concept (Elkington, 1994). In the TBL definition, Elkington used three terms – profit, people and planet – because

the concept referred to measuring the results of American corporations. In doing so, it did not limit itself to financial and economic indicators, but verified the company's activities with social and environmental factors, specifically, improving people's lives and the planet's well-being. According to the TBL assumptions, companies operate in a sustainable manner if, in addition to profits reflected in the profit and loss account, they also take people into account in their activities, engage in socially responsible activities, and take the planet into account by undertaking pro-environmental activities. TBL therefore posits that economic and social development must coexist with the preservation and protection of the environment (Goel, 2010).

According to the TBL concept, enterprises that consider how their activities impact on the environment and society should be oriented in two ways – towards the entity's development and towards sustainable development. The economic dimension of TBL refers to how an organisation's business practices impact on the economic system (Elkington & Rowlands, 1999), and developing the organisation while supporting future generations (Spangenberg, 2005). Meanwhile, the social dimension of TBL refers to beneficial and fair business practices towards employees, customers and communities (Elkington & Rowlands, 1999). There is a shift away from prioritising investors or shareholders, shifting attention to stakeholders potentially not financially involved in the company but still closely connected to its activities and results. The environmental dimension of TBL refers to engaging in practices that do not threaten environmental resources for future generations. When analysing the activities of companies in this area, it is important to focus on the options available to the entity. Often, a company must choose between a cheaper option and a more environmentally friendly alternative. Common measures of environmental impact are related to such aspects as reducing greenhouse gas emissions, the amount of waste generated, and the use of energy or fossil fuels (Alhaddi, 2015).

Economic entities often adopt sustainable practices as a result of tightening environmental regulations, which impose numerous restrictions on enterprises and influence their implementation of ecological business methods (Zheng et al., 2019). Coercive pressure plays a key role (Murphy & Gouldson, 2020), because environmental policy is one of the main mechanisms for governments to participate in environmental governance (Wang et al., 2020). The reasons for companies engaging in sustainable development extend beyond compliance. One important factor is financial benefits; an analysis conducted among American companies showed that during the economic downturn, organisations that applied practices focused on environmental protection and improving social well-being, while at the same time maintaining shareholder added value, outperformed other entities (A. T. Kearney, 2009). Moreover, studies show that undertaking actions in

accordance with TBL can foster the emergence of new business opportunities (Wagner, 2010). Increased customer awareness of environmental protection and social well-being encourages companies to focus on sustainable business practices to increase stakeholder trust (Zaman & Shamsuddin, 2017), which affects the creation of corporate value and competitive advantage (Bhaskaran et al., 2020; Qureshi et al., 2019).

The characteristics of the company also matter. Ones with smaller, more independent and gender-diverse boards are more likely to establish trusting and cooperative relationships with stakeholders, thus strengthening their sustainability efforts. Nadeem et al. (2017) argue that it is necessary to consider the characteristics of top managers to understand their strategic choices. Moreover, greater diversity can lead to increased creativity and the creation of new, sustainable alternatives (Torchia et al., 2011).

20.2. The role of women in driving sustainable development

In today's world, sustainable development has become a vital issue that concerns not only the environment but also the social and economic aspects of life. In this context, the role of women cannot be overestimated. As key decision-makers in many communities, women play a fundamental role in shaping the future of sustainable development. The first step in understanding this role is to recognise that women are not only beneficiaries of sustainable development policies, but also active participants and leaders of change. In many countries, women constitute the majority of the agricultural workforce, making them essential to ensuring food security and protecting natural resources. Women's unique perspectives and experiences contribute to innovative solutions for sustainable development, while their involvement in environmental protection and education and in promoting of sustainable lifestyles impacts local and global communities. Therefore, investing in the education of women and girls has a direct impact on sustainable development, as educated women are more likely to take action to protect the environment, health and well-being of communities. In the context of national policies and decisions, women should have equal access to decision-making positions; diversity in governance and decision-making leads to more sustainable and equitable solutions. In short, the role of women in sustainable development is not merely important but crucial. By supporting their actions, we can achieve the Sustainable Development Goals that will benefit all of humanity.

20.2.1. Overview of the importance of gender diversity in corporate leadership

Nowadays, gender diversity in corporate leadership has become a key focus of management discourse. Introducing gender diversity into the highest levels of management brings numerous benefits for both the organisation and for society. First of all, diverse teams of leaders are more innovative and creative, since different perspectives, experiences and approaches to solving problems enable organisations to respond better to changing market conditions. Moreover, empirical research shows that companies with greater gender diversity on the boards achieve superior financial results. Another important aspect is diversity's impact on organisational culture: introducing women to leadership roles promotes equality and fairness, which translates into greater employee satisfaction and engagement. Thus, such balanced gender representation in leadership creates an inclusive environment in which everyone feels appreciated and heard.

Furthermore, the impact on company image is significant. Organisations that actively support gender diversity are perceived as more modern and socially responsible. In this way, they may attract talent seeking jobs where their values are aligned with the employer's. It should also be noted that implementing gender diversity in leadership is not simply a matter of ethics but also of business strategy. Companies that are able to adapt to diverse customer needs gain a competitive advantage. Thus, understanding different demographic groups, including women, is crucial for effective marketing and sales.

In summary, gender diversity in corporate management is far from a passing trend; it is a necessity. Investing in gender diversity yields tangible benefits for companies and for society as a whole. By boosting the representation of women in leadership roles, organisations can safeguard their success in the long term.

The term SDG refers to three main areas of activity for companies, organisations, and investors, within which they should be guided by the principles of sustainable development and apply responsible business practices that respect the broad interests of individual stakeholders. In practice, this means that companies and organisations that implement SDG requirements consider, measure, report on the environmental, social, and governance (Corporate Governance) aspects of their operations. In terms of environmental issues, the presence of women in top management roles is associated with several key indicators, two of which are the development of eco-friendly products and the commitment to resource reduction (Burkhardt et al., 2020). High board gender diversity is associated with lower corporate carbon emissions and higher stock returns to climate activism (Kordsachia et al., 2023).

The influence of women is weaker in firms with a lower environmental performance and in firms with high-growth opportunities because these firms are likely to prioritise their own development. In line with social role theory, this suggests that women also adapt to the role that organisations expect from them. Some scholars argue that women's degree of risk aversion may lessen once they have broken through the glass ceiling and have adapted to a male-dominated culture. Firms with a higher proportion of women in top management positions achieve higher environmental scores. In addition, these firms register a higher product innovation score, reflecting their considerable investment in green technologies, along with a greater capacity to reduce waste and develop new products with extended durability. Companies with greater female representation in top management roles are also more committed to reducing their consumption of natural resources and are less likely to be involved in environmental controversies (Burkhardt et al., 2020; Huluka, 2022). Thus, high board gender diversity is associated with lower corporate carbon, handling of environmental threads is one channel through which gender-diverse boards can create shareholder value. A positive relationship exists between female board members and CSR performance (Bennouri et al., 2018; Kirsch, 2018), because there is a strong association between female board representation and the reduction in residual corporate carbon emissions (Kordsachia et al., 2023). In the case of the CSR dimensions, women valued all the dimensions more than men.

20.3. Gender diversity in boards on sustainable development policies

To assess the level of sustainable development in businesses, a scale measuring corporate social responsibility was employed, which was based on the assumption that each organisation naturally aligns with the 17 Sustainable Development Goals set by the UN. Following Gallardo-Vázquez et al. (2021), it was presumed that corporate social responsibility and sustainable development share certain features and synergies, complementing each other despite originating from different theoretical backgrounds. The implementation of sustainable development in the social, economic and environmental domain was evaluated using a scale of different statements. During interviews, participants were asked to subjectively assess each statement. The authors conducted a qualitative study using a computer-assisted web interview (CAWI). In February 2024, interviews using a Likert scale were conducted with six female managers who were mem-

bers of the boards of medium-sized enterprises from the Wielkopolska region. A comparative sample of six male managers in companies without women on their boards were also interviewed.

To help maintain intergenerational balance, it is important to respect and implement the principles of operation in accordance with the Triple Bottom Line concept (Elkington, 1998). According to TBL assumptions, sustainable development of enterprises is only possible when social, environmental and economic goals are treated as equivalent. Therefore, the interviews touched upon the social, economic and environmental dimensions of sustainable development.

20.3.1. Social dimension

The level of sustainable development in the environmental area was assessed using a scale of 12 statements. The statements measuring the implementation of the environmental aspect of sustainable development included:

1. Support for hiring individuals at risk of social exclusion.
2. Appreciating the contributions of people with disabilities to the business world.
3. Awareness of our employees' quality of life.
4. Employee compensation is tied to their skills and performance.
5. Health and safety standards surpass the legal minimum requirements.
6. We promote and support the career development of our employees.
7. We facilitate the balance between professional and personal lives for our employees.
8. Employee initiatives are considered seriously in management decisions.
9. All employees have equal opportunities.
10. Engagement in activities that benefit the local community.
11. Encourage our employees to volunteer or collaborate with non-governmental organisations.
12. Active communication with our employees.

Companies with at least one female board or management member rated the average implementation of social sustainability goals at 4.5 on a scale of 1 to 5, while those without female members scored an average of 3.32. These results suggest that the presence of women on the board positively influences the implementation of social sustainability principles.

20.3.2. Economic dimension

The level of sustainable development in the environmental area was assessed using a 7-point scale. The statements measuring the implementation of the environmental aspect of sustainable development included:

1. Great emphasis on delivering high-quality products and services to our customers.
2. Products and services adhere to both national and international quality standards.
3. Ensuring consumer rights is a top priority for our management team.
4. To provide our customers with precise and comprehensive information about our products and services.
5. The aim is to build stable relationships with our suppliers, focusing on co-operation and mutual benefits.
6. Cultivate business relationships with other companies within our region.
7. The sustainability of our company is one of the most important goals.

Companies with at least one female member on the management board rated their implementation of sustainable development's economic goals at an average of 4.3 on a 1–5 scale. Those without female members gave a slightly lower average score of 4.25. These findings suggest that adherence to and implementation of the economic principles of sustainable development are not significantly influenced by the presence of women in management.

20.3.3. Environmental dimension

The level of sustainable development in the environmental area was assessed using a scale of 8 statements. The statements measuring the implementation of the environmental aspect of sustainable development included:

1. Being able to minimise our negative impact on the environment.
2. Save energy to improve our efficiency.
3. The use of alternative energy sources is of great importance.
4. Use raw materials and materials for production and service provision that have a low impact on the natural environment.
5. Participation in activities related to the protection and improvement of our natural environment.
6. The importance of planning necessary investments to reduce the company's negative environmental impact.

7. Supporting the reduction of gas emissions and waste production and the use of recycling materials.
8. Willing to use, purchase, or produce environmentally friendly goods.

Companies that declared having at least one female member on the management board or management bodies assessed the average level of implementation of environmentally sustainable development goals at 4.35 on a scale of 1–5. Companies whose management body had no female members received a lower score – 3.7. The results indicate that respect for and implementation of environmentally sustainable development principles are on average higher when there is at least one woman in a company's management body.

Conclusions

The presence of women in top management is associated with several key indicators, including the development of eco-friendly products and commitment to reducing resource use. Some research findings reveal a nuanced relationship between gender diversity and environmental performance: the influence of women is weaker in firms with lower environmental performance and stronger in firms with high-growth opportunities because these firms are likely to prioritise their own development. This highlights the alignment between women's leadership and the prioritisation of sustainable practices in firms focused on driving their own growth and competitiveness in dynamic markets. Women leaders bring unique perspectives and insights that can drive positive change and contribute to the success of organisations committed to sustainable growth and competitiveness in today's global economy.

These results are consistent with several studies that find a positive relationship between female board members and CSR performance (Bennouri et al., 2018; Kirsch, 2018).

The interaction between female board members and sustainable development policies contributes to firm performance. Specifically, the higher the percentage of women on the board or the presence of at least one woman on the board, the stronger the positive association between sustainable development. In other words, gender diversity strengthens the positive effect of sustainable development policies on firm performance.

Our results should be viewed in the light of several limitations. Firstly, our sample is constrained, which limits the generalisability of the study. Secondly, we cannot definitively infer that gender-diverse boards add value to companies' management. The board of directors is responsible for the firms' strategic posi-

tioning along multiple dimensions, and the net effect of board gender diversity on firms' financial performance remains a subject for academic debate (Kord-sachia et al., 2023).

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The concept behind the monograph is firmly rooted in current academic debates. The individual chapters address both institutional and economic resilience, as well as the transformational processes taking place in Europe.

The monograph includes both theoretical and conceptual chapters, as well as empirical studies and analyses of public policies. As a result, the collection is multidimensional and complementary. The individual sections effectively reflect the main areas in which the issue of Europe's resilience is currently manifesting itself, namely strategic security, economic policy coordination, trade cooperation, the energy and climate transition, digitalisation, supply chain resilience, migration and sustainable development.

Prof. Robert Ciborowski

The monograph *Resilient and transforming Europe* addresses the issues of Europe's resilience and transformation in the context of overlapping crises.

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