LUISS

Institute for European
Analysis and Policy

Hub for New Industrial Policy
& Economic Governance

United in diversity?
EU core-periphery divides at the time of the green transition

Dario Guarascio, Jelena Reljic and Annamaria Simonazzi

LUHNIP Working Paper Series 4/2024

November 7, 2024

United in diversity?
EU core-periphery divides at the time of the green transition

Dario Guarascio,[1] Jelena Reljic[2] and Annamaria Simonazzi[3]

Executive Summary

The European Union (EU) is at a crossroads, faced with the pressing need to accelerate the green transition in response to climate change and energy security concerns. Historically, the EU has been plagued by a core-periphery divide, with each economic crisis deepening the gap between the resilient German-centred core and the more vulnerable southern periphery. The core economies have traditionally outperformed the peripheral ones, benefiting from stronger technological capabilities, higher productivity and faster recovery from downturns. The green transition offers an opportunity for innovation and growth, but it also presents complexities that could disrupt this dynamic. Indeed, while core countries are better equipped with resources to manage the transition, their sectoral specialisation and reliance on energy imports could lead to significant restructuring costs. This raises critical questions: will the green transition lead to further divergence within the EU, with the core pulling ahead, or, alternatively, could the core face challenges that will result in downward convergence? And, finally, which policies can reduce the gap by promoting upward convergence?

This working paper addresses these questions through a comprehensive mapping of EU economies, highlighting disparities in industrial structure, energy dependency, green technological capabilities and policy space. Germany, traditionally regarded as Europe's economic powerhouse, lags behind in renewable energy adoption and green capabilities, raising the risk of downward convergence. Additionally, new divides within the 'old' core may become more pronounced as Scandinavian countries push forward. These new asymmetries coexist with the old ones. Core countries still possess greater fiscal capacities, enabling higher investments in green technologies and placing them in a stronger position to support structural upgrading and the green transition. This investment gap between these countries and the SP remains significant, reinforcing existing divides and putting the EU's collective climate goals at risk.

Against this background, we evaluate existing EU policy initiatives aimed at supporting the green transition. The current policy framework, while ambitious, risks falling short in addressing the structural imbalances between Member States. To mitigate these risks, the working paper proposes some targeted interventions, including large-scale EU-funded investment plans focused on key sectors such as public transport, especially in lagging regions. Additionally, the working paper calls for industrial alliances, coordinated by the European Commission, to maximise economies of scale and ensure fair distribution of resources. Furthermore, 'place-based' conditionalities can direct investments towards vulnerable regions, reducing structural inequalities and preventing further economic divergence.

[1] Sapienza University of Rome, dario.guarascio@uniroma1.it
[2] Sapienza University of Rome, jelena.reljic@uniroma1.it
[3] Sapienza University of Rome, Fondazione Giacomo Brodolini, Annamaria.Simonazzi@uniroma1.it

1. Introduction

The growing pressure of climate change has made the targets for phasing out fossil fuels ever more binding. As a result, the shift towards green production, goods and jobs should proceed at a much faster pace, bringing with it relevant challenges in managing the transition, ensuring political acceptability and protecting 'losers' (Veugelers et al., 2024). In this context, the Russo-Ukrainian War has exposed Europe's energy vulnerability, highlighting the urgent need to reduce dependency on foreign suppliers (Guarascio et al., 2024a) and, hence, increase its resilience in the face of future (and not so unlikely) inflationary crises (Stiglitz and Regmi, 2023). Although EU Member States are equally exposed to these challenges, their degrees of vulnerability and resilience, as well as their room for manoeuvre in terms of fiscal and industrial policy, are rather uneven (Guarascio et al., 2024b), therefore resulting in an adverse combination: countries characterised by a large (small) share of energy-intensive industries, facing a strong (low) import dependence and lacking (having) an adequate supply of renewables and related technological capabilities are often those with the smallest fiscal capacity (deepest pockets) to carry out timely and ambitious green industrial policy actions. In other words, the energy transition may reshape internal hierarchies, exacerbating existing divides or giving rise to 'new geographies' within the EU.

So far, the EU has been plagued by a growing core-periphery divide, ballasting its economy in good and in bad times alike (Gräbner et al., 2020; Simonazzi et al., 2013; Celi et al., 2018). Each crisis widened the gap between the German-centred core (Stehrer and Stollinger, 2015), which stood out as the most resilient part of the EU economy, and the southern periphery (SP), worsening its position in terms of technological capabilities, productivity and growth. However, when it comes to the green transition, the core may face similar, if not greater, challenges, as its sectoral specialisation and degree of import dependency are likely to inflate restructuring costs (Celi et al., 2022).[4] On the other hand, the core tends to be better equipped concerning the resources to manage the transition, and this, in turn, may further widen the core-periphery divide. Overall, it is still hard to say what kind of geography will emerge from the green transition – whether it is further divergence, an upward convergence where the periphery moves closer to the core and both promote a fast and socially sustainable green transition, or downward convergence, with the core sliding back toward the periphery.

The green industrial policies put forth at both the EU and national levels will undoubtedly play a key role in shaping such developments. Given the significant heterogeneities in the degree of Member States' vulnerabilities and the EU's renewed industrial policy activism, this working paper sets out two main objectives. First, it maps the distribution of restructuring needs across

[4] It is important to underline that the export-led core is likely to face further challenges related to the protectionist tendencies in the world economy, which risk resizing and, in some cases, disrupting altogether some of the key markets that have driven its post-2008 growth (Guarascio et al., 2024).

countries–along with the associated social and economic costs–and the resources (i.e., productive, technological, knowledge-related and financial resources) necessary to support the transition (Section 2). Second, it evaluates the main EU green industrial policy initiatives and offers specific policy recommendations on how the EU should foster the green transition without further exacerbating the core-periphery divide (Section 3). In so doing, we show how the EU is facing a 'bifurcation'. One path involves pursuing a policy strategy that neglects structural asymmetries, thereby heightening the risk of failure, undermining a just green transition and increasing the structural vulnerability of the entire Union. The other involves a sustainable policy mix, centred on green industrial policy, capable of simultaneously ensuring the greening of the economy while reducing internal divides and inequalities.

2. Mapping EU Member States' capacity to carry out the green transition

This section provides a comprehensive mapping of European economies, highlighting their relative positioning with respect to all relevant factors potentially affecting the green transition. The central hypotheses underpinning the analysis run as follows. Countries with a relatively large share of energy-intensive industries (EII)[5], to which we add automotive, given the massive restructuring it faces, are exposed to higher restructuring costs and, therefore, greater vulnerability (Carfora et al., 2022; Gatto et al., 2024). However, such vulnerability can be counterbalanced by factors that reduce costs and, eventually, enhance the benefits of the transition, such as a higher share of renewable energy, relative specialisation in environmental technologies (measured by the patent-based 'Relative Specialisation Index' as a proxy of green productive-technological capabilities), and state aid[6] directed at environmental protection (as a proxy of Member States political commitment to green industrial policies). Conversely, in countries where a large share of EII is combined with low renewable energy adoption, limited green productive-technological capabilities and less willingness and ability to implement green industrial policy, transition costs may skyrocket.

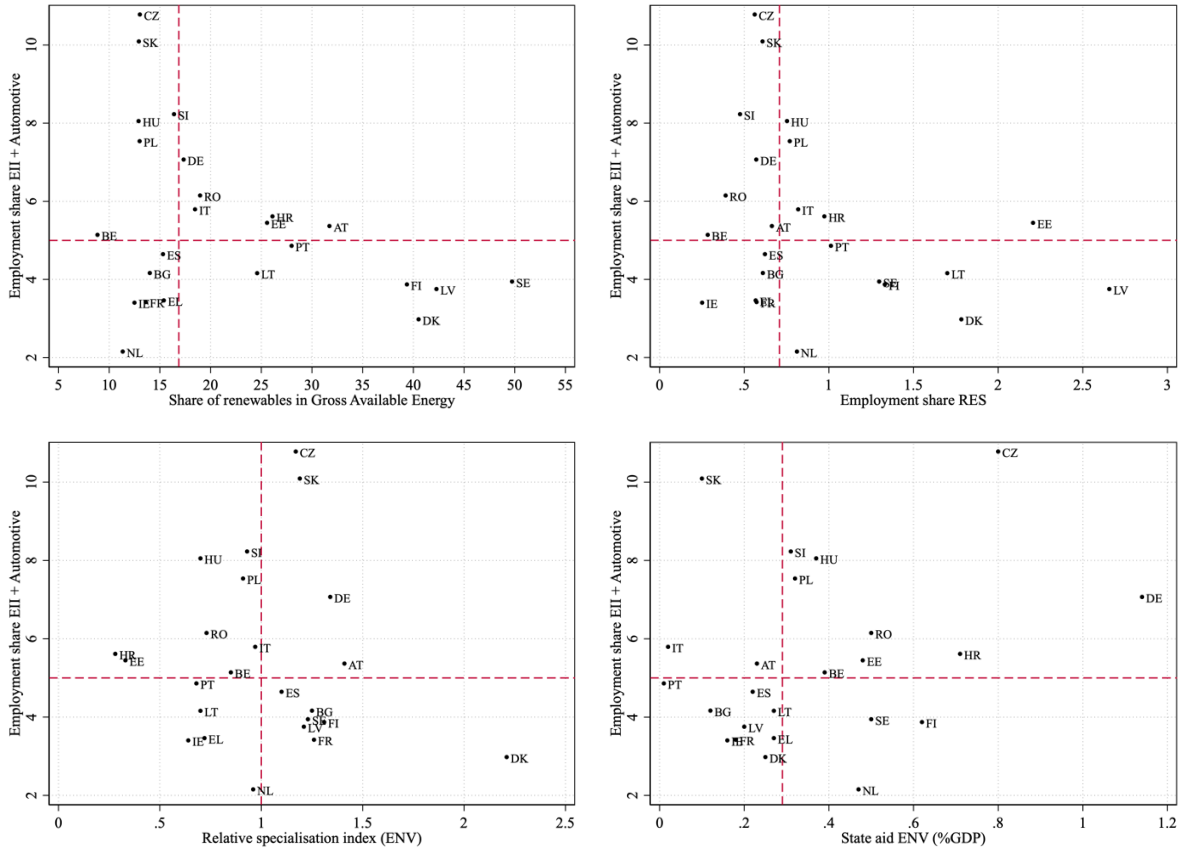
As illustrated in Figure 6.1, the European landscape is highly heterogeneous. The German manufacturing core (GMC) – i.e., Germany and Visegrad countries – exhibits relatively high employment shares in the EII and automotive sector, with Czechia and Slovakia recording 11% and 10% of their total employment, respectively. Despite a lower share in Germany (7%), this represents over 2.6 million workers, exceeding the combined figures for Czechia and Slovakia by four times. This not only highlights the scale of Germany's specialisation in these sectors but

[5] The classification of energy-intensive industries is based on the energy intensity of each sector—i.e., final energy consumption per unit of value added—in the EU in 2019. Those above the median are identified as energy-intensive: non-metallic minerals; iron, steel, and non-ferrous metals; chemical and petrochemical; wood, paper, pulp, and printing.

[6] Here, state aid includes spending on both notified schemes and those under the General Block Exemption Regulation schemes, which allow EU Member States to implement certain aid measures without requesting prior approval from the European Commission, as long as they meet specific criteria.

also hints at the considerable political influence that the German energy-intensive industries and the automotive sector may have exerted over energy policymaking for decades, safeguarding their own interests and resisting the shift towards greener and more sustainable growth models. This may partly explain why the EU, despite ambitious climate objectives, has remained highly dependent on imported fossil fuels (Plehwe, 2022).

Figure 1: Key variables and asymmetries



Source: Own elaboration based on Eurostat, OECD and EurObserv'ER data.

Notes: Specifically, the data on employment, energy balances and state aid in the environment-related (ENV) domain were sourced from Eurostat, while the data on employment in renewable sectors (RES) and the relative specialisation index in ENV technologies were sourced from EurObserv'ER and the OECD, respectively. To define energy-intensive industries, we ranked sectors according to their energy intensity at the EU level in 2019 (i.e., the ratio between the amount of energy used and value added in each sector), classifying those above the median as energy-intensive (including non-metallic minerals; iron, steel, and non-ferrous metals; chemical and petrochemical; wood, paper, pulp, and printing). We then computed the sum of their relative employment share for each EU country in 2021. All variables refer to 2021 or the latest available year.

Remarkably enough, the upper-left panel reveals an inverse relationship, suggesting that countries less specialised in EII tend to have a higher share of renewables in their energy mix. The Nordic countries exemplify this trend, with levels of renewables exceeding 40%, reaching 50% in Sweden. In contrast, many countries still rely primarily on energy from imported fossil fuels. The Visegrad countries (but also Germany) show a pronounced lag in deploying

renewables, which also partly reflects their reliance on domestic solid fuels such as coal, presenting significant challenges in light of decarbonisation targets.

Assessing the landscape of manufacturing and technological capabilities in the green sector is equally relevant, particularly as 'de-risking' strategies aimed at reducing energy-related import dependency became a top priority of EU policymakers (European Commission, 2021). An emblematic case is the production of photovoltaic panels, central to the green transition, yet dominated by China along most of the supply chain (Caravella et al., 2024). Strengthening the EU's domestic production of essential green technologies is imperative not only to reduce risk of shifting dependencies from imported (Russian) fossil fuels to imported (Chinese) green technologies but, more importantly, to boost the fiscal and employment impact of public investments, thereby making the transition more socially sustainable.

The upper-right panel illustrates that in no EU country does the workforce employed directly and indirectly by green sectors surpass that in the energy-intensive and automotive industries, not even in Denmark, despite its status as a global leader in wind technology. Furthermore, only a handful of EU countries have an employment share in renewables exceeding 1%. In this context, harnessing the sector's untapped potential for job creation across the EU could not only ensure a smoother transition with less social backlash but also significantly reduce the economic and social costs associated with restructuring traditional industries. When it comes to green technological capabilities measured by patents in environment-related technologies (bottom-left panel), countries positioned to the right of the vertical line—indicating a relative specialisation index greater than 1—demonstrate a specialisation in these technologies. This means that their share of environment-related patents in total patents (in all technologies) exceeds the world average, reflecting a relative advantage in green innovation. Austria and Germany, despite their high manufacturing specialisation in traditional, mature sectors, could potentially leverage their advanced green comparative advantage to sustain their net-zero transition. In contrast, SP countries, with the exception of Spain, are noticeably lagging behind in this critical area.

The final dimension concerns political commitment to green industrial policies, as proxied by state aid in the environmental protection domain (bottom-right panel). This is crucial, as strengthening green productive and technological capabilities, particularly for countries lagging behind in key areas, requires massive public investments, at both the national and the EU level. According to our working hypotheses, countries allocating a higher proportion of green-related state aid relative to their GDP demonstrate a stronger capacity to manage the green transition, effectively supporting industries and workers during this shift. However, the uneven distribution of state aid reflects enduring economic asymmetries within the EU: Germany stands out with the highest level of state aid per GDP, which showcases its robust fiscal ability and political willingness to sustain the green transition (although some uncertainty

remains about the funding of future green projects due to its debt brake rule).[7] In contrast, SP countries like Italy and Portugal record considerably less state aid, compounding their challenges in achieving climate goals.

Our analysis shows how the interaction between sectoral specialisation in energy-intensive industries and the automotive sector, alongside the deployment of renewables and the distribution of green productive-technological capabilities, allow us to capture the diverse conditions across EU economies (Veugelers et al., 2024). This diversity reveals profound asymmetries, particularly concerning green technological capabilities and national policy capacity, emphasising the need for targeted EU policy interventions. One-size-fits-all solutions are clearly inadequate for addressing these complex and varied challenges within the Union (Többen et al., 2023).

Finally, to provide a more precise mapping of EU economies in the context of the green transition, we carry out a hierarchical cluster analysis[8] to group countries based on multiple dimensions. This helps us identify country-specific trajectories as well as key areas of strength/vulnerability, enabling a clearer identification of where targeted interventions and support are most critically needed.

[7] See "Time for supply-side policy: Thatcher versus Schumpeter", Social Europe, 20 May 2024, available at: https://www.socialeurope.eu/time-for-supply-side-policy-thatcher-versus-schumpeter#

[8] Ward's clustering method was employed to group European countries based on nine variables related to their preparedness for the green transition: share in energy-intensive industries and the automotive sector, share of renewable energy sources, employment share in renewable energy sectors, relative specialisation in environmental technologies, asset finance in solar and wind, public R&D in renewable energy, state aid for environmental protection, public debt, and energy import vulnerability. This method starts with each country as its own cluster and iteratively merges the closest pairs to minimise within-cluster variance. Several statistical tests, including the Calinski-Harabasz Pseudo-F Statistic and the Duda/Hart Je(2)/Je(1) Index, consistently identified four clusters as the most statistically robust and meaningful way to partition the data.

Figure 2: Country clusters

Source: Own elaboration based on cluster analysis

The analysis leads to the identification of four distinct clusters as illustrated in Figure 6.2, reflecting how blurred the core-periphery divide in the context of the green transition has become: *German Manufacturing Core* (*GMC*) (Austria, Germany, Czechia, Hungary, Poland, Slovakia, Slovenia, Bulgaria and Romania), *Green Stragglers* (Italy, Spain, Greece, Portugal, France, Netherlands, Belgium, and Ireland), *Emerging Green Adopters* (Croatia, Estonia, Lithuania and Latvia) and *Green Leaders* (Denmark, Finland, Sweden). As illustrated in Table 6.3, the four clusters differ from each other based on a combination of factors, including: sectoral specialisation, deployment of renewables, green technological and productive capabilities and public expenditure capacity.

Germany and the EU economies more closely linked to its exporting industries emerge as a distinct cluster, in line with the large literature documenting the rise of the *GMC* (see, among others, Stehrer and Stollinger, 2015, Celi et al., 2018). This cluster stands out with its high reliance on EII and the automotive sector, with a relatively low share of renewable energy sources. Their green productive and technological capabilities are moderate, suggesting some progress, but are not sufficient to lead a rapid net-zero transition. However, these countries have a higher fiscal capacity (i.e., lower level of public debt-to-GDP ratio), which can provide significant support for the transition itself.

Green Stragglers have a relatively lower employment share in EII, which potentially reduces the negative impact of transitioning away from fossil fuels. However, on the demand side, there is a considerable lag in renewable energy adoption. Their green productive and technological capabilities are also limited, which, coupled with low state aid in environmental protection, makes a fast green transition hardly achievable. The high debt-to-GDP ratio, with Greece and Italy as prominent examples, further constrains their ability to accelerate their way to a net-zero economy and to mitigate the social cost of restructuring (Heimberger et al., 2024). Nevertheless, some countries, including the Netherlands, Belgium and France, display high public R&D in the renewable energy domain, indicating commitment to green technologies that may materialise in innovation output in the near future. This is not the case in the SP, where public R&D investments remain comparatively low, mirroring the challenges faced by the EP.

Emerging Green Adopters also have moderate employment share in EII, but these countries have a high share of renewables, indicating a strong adoption of green energy. Their green productive and technological capabilities are low, however. Social acceptability is likely higher in these countries as they are less dependent on traditional industries and have relatively high renewable energy adoption. This positioning offers a promising foundation, but the challenge remains in scaling up their technological capabilities.

Green Leaders are distinguished by a low employment share in EII, leading the way in both deployment and production of green technologies. These countries possess strong green technological capabilities, which are supported by substantial public R&D. Additionally, with substantial private investments and a solid fiscal stance, they are likely to experience a fast and socially acceptable transition, making them exemplary models in the EU.

Table 1: Descriptive statistics by country clusters

	German manufacturing core	Green stragglers	Emerging green adopters	Green leaders
Countries	AT, BG, CZ, DE, HU, PL, RO, SI, SK	BE, EL, ES, FR, IE, IT, NL, PT	EE, HR, LT, LV	DK, FI, SE
Employment share EII + Automotive (%)	7,49	4,11	4,74	3,60
Share of RES (%)	16,70	15,43	29,64	43,20
Employment share RES (%)(*)	0,60	0,62	1,88	1,47
Relative specialisation ENV(†)	1,07	0,90	0,63	1,58
Asset finance solar & wind(*)	229,35	594,30	133,41	1283,84
Public R&D RES(*)	5,95	9,68	1,60	36,11
State aid ENV/GDP (%)	0,43	0,22	0,41	0,46
Debt/GDP (%)	56,18	101,50	41,13	45,43
Energy import vulnerability	0,14	0,10	0,12	0,09

Source: Own elaboration based on Eurostat, OECD(†) and Eur'Observer(*) data.

Notes: All variables refer to 2021 or the latest available year, with the exception of public R&D, which refers to the cumulative expenditure per capita over the period 2011-2020. Asset finance in wind and solar PV includes all investments in utility-scale renewable energy projects over 1 MW, based on closed deals in a given year, with financing secured through balance-sheet finance, non-recourse project finance and bonds or other instruments.

Overall, our analysis highlights several risks associated with old and new asymmetries. Germany, traditionally seen as the European economic powerhouse, seems to be lagging behind in renewables adoption and green capabilities, risking downward convergence towards the periphery. The interests of the traditional sectors of German specialisation—such as the automotive and chemical industries—have prevailed over the necessity to mitigate climate change concerns, resisting the green transition and blocking opportunities for diversification into new areas (Guarascio et al., 2024a). Moreover, as Scandinavian countries push forward, new divides within the 'old' core are likely to become even more pronounced.

Nevertheless, these new asymmetries coexist with the old ones. Core countries, particularly Germany, Austria and the Scandinavian countries, still possess greater fiscal capacities compared to the peripheral areas, which enable higher investments in green technologies and place them in a better position to support structural upgrading and the green transition. The fiscal gap between these countries and the SP remains significant, reinforcing old divides and putting the EU's collective achievement of climate objectives at risk. A cohesive EU-level industrial policy is imperative to prevent the EU from falling behind China and the US in the green 'race' as the latter face fewer constraints and rely on more interventionist and protectionist industrial policy strategies (Pisani-Ferry et al., 2024).

3. Conclusions and policy recommendations

As a consequence of the COVID-19 pandemic and the subsequent energy and geopolitical crises, policy instruments that were unthinkable just a few years ago—such as selective public investments, plans for building up productive and technological capabilities in frontier domains (e.g., AI, lithium batteries, solar technologies), support for "European champions" and industrial alliances—are now at the top of the EU's agenda (Di Carlo and Schmitz, 2023). The rediscovery of industrial policy is a substantial turnaround in EU policymaking, and it is a very welcome one given the significant challenges the European economy is facing, from decarbonisation to the reduction of strategic dependencies in key technological domains (Crespi et al., 2021). The decarbonisation process affects all main aspects of economic activity—from energy supply (transitioning from fossil to renewable resources) to the adoption of low-carbon technologies in production, especially in EII, to the reduction of the carbon footprint in consumption (houses, transport, sustainable mobility)—with strong economic, financial and social repercussions.

Indeed, the new European industrial policy must reconcile conflicting objectives and manage multiple diverging interests between and within countries in an EU that remains highly fragmented. While the previous policy of non-interference with the market—based on the principle that the best industrial policy is the one that does not exist—relied on the notion of a neutral and non-discriminating market where unfair outcomes could be attributed to inexorable economic laws, the new industrial policy is explicit about the deliberate choices made, the interests it favours and the consequent distribution of costs and benefits (Guarascio and Simonazzi 2024). Conflicting interests irremediably risk undermining internal cohesion and further slowing down growth. The task, therefore, is to find a shared strategy that enhances the elements of common interest over those of conflict: a policy that aims to leave no one behind and reduce the imbalances between regions, countries and European citizens. In this section, we discuss the new EU green industrial policy and highlight the potential trade-offs in order to understand under what circumstances the goal of decarbonising the economy can favour (or prevent) the narrowing of regional and social divides (Demertzis, 2024).

The new EU industrial policy is based on three pillars: supply diversification, incentives to encourage private investment, Industrial alliances (solar, batteries, hydrogen) and the constant monitoring of areas of critical dependence (Guarascio et al., 2024a). Recent proposals, such as Fit for 55, RepowerEU and the Critical Raw Materials Act, enrich the framework of initiatives for climate neutrality and energy autonomy. However, Europe's ambitious agenda still lacks a comprehensive strategy to ensure its achievement and to address internal conflicts and latent policy dilemmas. Below, we briefly consider some of these issues.

In the absence of an adequate federal budget, the EU's green industrial policy is still predominantly delegated to the Member States (Pianta and Lucchese, 2020).[9] Leaving the management and costs of the transition to individual countries increases the risk of polarisation. The ability to attract new investments varies enormously between different areas due to the relevance of agglomeration economies, particularly in the green and digital sectors, and the differing capacities of member countries to subsidise investments. In regions where green productive and technological capabilities need to be created from scratch, knowledge, skills and supporting activities are likely to be scarce or non-existent, creating an environment that is not conducive to attracting investments due to high uncertainty and unfavourable macroeconomic conditions. Moreover, the asymmetric distribution of fiscal capacity, combined with state aid liberalisation, means that countries with fewer budget constraints have more resources to subsidise and attract investments (Heimberger et al., 2024), potentially exacerbating regional divergences. Indeed, the IMF New Industrial Policy Observatory data (Evenett et al., 2024) suggest that in 2023 Germany implemented or announced interventions in the field of low-carbon technology totalling almost 84 billion USD, 85% of total interventions in the GMC cluster and 55% of all interventions in the EU, while the countries that we defined "green stragglers" significantly lagged behind. How to reconcile the conflicting interests between the various national industries (and their governments) thus becomes a thorny political problem.

If the existence of dynamic and scale economies makes the concentration of green investments more efficient, there could be a serious trade-off between overall efficiency and a more egalitarian distribution of development opportunities between countries. The US Inflation Reduction Act (IRA) is an example of how to reconcile the twin goals of stimulating a domestic green industry and reducing regional imbalances. On the one hand, firms receiving IRA-based incentives commit to purchasing intermediate inputs from local suppliers[10] so as to strengthen national and regional supply chains and maximise the impact on employment.[11] Similarly, eligibility for consumer tax credits for electric cars requires final assembly in North America (Kleimann et al., 2023). On the other hand, greater incentives are provided for companies that invest in regions considered to be more 'in need': tax credits under the IRA can be increased by 10% if a project is located in "energy communities", defined as brownfield sites, areas with significant fossil fuel production and higher-than-average unemployment or areas with closed coal mines or coal-fired plants (Church et al., 2023).

[9] Although quantitatively relevant, regional and cohesion policies are inadequate to address the economic and social costs incurred by the regions more seriously affected by structural change and deindustrialisation related to the green transition, as illustrated in Section 2.

[10] Indeed, this is similar to the 'Buy American' clause that was included in the public investment programme put forth by the Obama administration after the 2008 crisis (Crespi and Guarascio, 2019).

[11] Renewable energy producers can receive a 10% subsidy if the steel and iron used in their facility are entirely produced in the US and if their products meet a minimum local content requirement.

Conditionalities similar to the ones included in the IRA are starting to be applied also in the EU, at least at a national level (see, for example, the French policy of subsidising the purchase of electric cars, provided that the components are produced in the EU). Conversely, conditionality policies aimed at encouraging the localisation of investments in less developed areas or areas at greater risk of deindustrialisation—such as the countries and regions included among the 'green stragglers' in the previous Section—are still essentially absent. One of the main reasons is the relatively small size of the EU common budget compared to the US federal budget, along with the poor coordination of European industrial policy. Even setting aside the limited scale of the EU budget, the importance of a comprehensive green policy—a 'vision' capable of unifying the multiple aspects of the green transition, from resource production to consumption models—cannot be underestimated. What is needed is a holistic plan that includes a common policy to ensure the supply of critical raw materials (CRMs), the production of renewable energy (where even the periphery can assert its comparative advantages), the coordination of essential infrastructures (such as pan-European grids) and the promotion of institutions for the creation of knowledge and skills (including universities, research centres, technological institutes and training centres). State-owned enterprises, public-private joint ventures and public procurement could contribute to the creation of innovation clusters. Although conditionalities must be adequately designed to balance the trade-off between equality and overall efficiency, "place-based" conditionalities, when included in a holistic programme, reduce the risk of increasing regional inequalities while multiplying the overall expansive effect of green investments across the EU as a whole (Di Tommaso et al., 2020).

Companies' objectives can also conflict with broader national economic interests, so green policy must be able to guide corporate strategies toward economically and socially sustainable production and consumption models. The car industry is a case in point: in the transition to electric vehicles (EVs), European regulations aimed at promoting decarbonisation have supported (if not encouraged) the strategy of European car manufacturers to favour the production of premium cars, more powerful and expensive, which are also much more profitable. This strategy has disadvantaged them in competition with cheaper Chinese cars and has limited the growth in demand for EVs. Revised emissions regulations and subsidies targeting less expensive EVs could encourage the production of affordable EVs, fostering their adoption also in poorer countries or by poorer consumers and, in turn, helping to counter the threat from cheaper Chinese imports. Such changes would accelerate decarbonisation, as larger electric vehicles require bigger batteries, more CRMs and consume more energy on the road (Pardi 2022). This approach could also encourage production by generalist manufacturers in the SP (Guarascio and Simonazzi 2024).

Offshoring production to low-cost locations and relying on low-cost imported inputs may not only undermine national production, technological capabilities and employment (Cimoli et al. 2008), but also raise national security concerns. These issues of deindustrialisation and security

could, in turn, affect the speed and costs of the green transition. The EU faces significant import dependency in green production and technology sectors such as lithium batteries, solar panels and semiconductors. While cheap imports from China could lower the costs of decarbonisation and benefit consumers, they risk undermining the industrial base and nipping in the bud the growth opportunities offered by the transition. Conversely, protecting "European" industry and jobs could become socially unsustainable and politically contentious if it results in excessively high costs for consumers and/or leads to significant imbalances in the reallocation of supply chains. It could also be self-defeating if corporate strategies are not aligned with public policies. Moreover, restricting Chinese foreign direct investments for economic or security reasons, as in the case of electronic devices and connected cars, could put the European Commission at odds with Member States keen to attract investment and know-how at lower costs, in order to counteract their disadvantage in the race to attract or retain production and plants. Securing global supplies and access to CRMs requires a coordinated foreign policy, avoiding the 'cacophony' of multiple national initiatives. A balanced approach of containment and collaboration with China on green technologies could help reduce the costs of decarbonisation.

Finally, a socially sustainable European green industrial policy requires action aimed at shaping consumer habits and preferences. To this end, regulations and subsidies are not enough; investments in public goods are also necessary. For instance, the growth of the EV market can only occur if accompanied by an expansion of supporting infrastructure: charging stations, renewable energy networks, software services and connectivity technologies. In addition, a large-scale EU-funded investment plan, coordinated with national and regional governments, could promote sustainable mobility by strengthening public transport (e-buses, trains). Combining public procurement to sustain demand, labour market policies (re-skilling and dedicated training programmes) to ensure a supply of green skills and a reasonable policy of protection from unfair foreign competition could enhance the impact on domestic production and employment, reducing uncertainty and boosting private investment and production in the transportation sector. Such a coordinated scheme can be replicated in other relevant green sectoral domains, such as the development of EU-wide solar panel or wind turbines industries.

The green transition presents a significant growth opportunity for the EU. The European market is large enough to deliver the benefits given its scale and dynamic economy, provided that a shared strategy addresses regional inequalities, helping lagging countries seize the opportunities offered by the transition without resorting to low road of labour-cost competition. While the EU has made an important U-turn in its policymaking, bold commitments must be complemented by a systematic approach that ensures no country or region is left behind. This requires a common long-term strategy that coordinates various decisions on planning, financing, material procurement and governance. It should mobilise and coordinate public and private investments, while avoiding harmful competition between states. Achieving this is more feasible within a supportive macroeconomic framework that encourages investment and

reduces internal competition between countries and regions. As documented by vast empirical literature (see, among others, Deleidi and Mazzucato, 2021), favourable macroeconomic conditions are necessary for attracting private investments. However, fiscal austerity measures, as foreseen in the new EU fiscal framework (Heimberger et al., 2024), could pose a serious obstacle to achieving industrial policy objectives, particularly in regions where they are most needed. Without targeted interventions that account for the cross-country heterogeneous capabilities and vulnerabilities, there is the risk of exacerbating existing core-periphery divides, which could jeopardise the EU's collective climate goals. The EU's ability to achieve a just green transition will thus depend on its capacity to foster collaboration, equitable resource distribution and policy coordination within the Union.

References

Bofinger, P. (2024), "Time for supply-side policy: Thatcher versus Schumpeter", Social Europe, available at: https://www.socialeurope.eu/time-for-supply-side-policy-thatcher-versus-schumpeter#

Caravella, S., Crespi, F., Cucignatto, G., & Guarascio, D. (2024). *Technological sovereignty and strategic dependencies: The case of the photovoltaic supply chain. Journal of Cleaner Production*, 434, 140222.

Carfora, A., Pansini, R. V., & Scandurra, G. (2022). *Energy dependence, renewable energy generation and import demand: Are EU countries resilient? Renewable Energy*, 195, 1262–1274.

Celi, G., Ginzburg, A., Guarascio, D., and Simonazzi, A. (2018). *Crisis in the European monetary union. A core-periphery perspective.* Routledge.

Celi, G., Guarascio, D., Reljic, J., Simonazzi, A., & Zezza, F. (2022). *The asymmetric impact of war: Resilience, vulnerability and implications for EU policy. Intereconomics*, 57(3), 141-147.

Cimoli, M., Dosi, G., & Stiglitz, J. E. (2008). *The political economy of capabilities accumulation: The past and future of policies for industrial development* (No. 2008/15). LEM Working Paper Series.

Crespi, F., & Guarascio, D. (2019). *The demand-pull effect of public procurement on innovation and industrial renewal. Industrial and Corporate Change*, 28(4), 793–815.

Crespi, F., Caravella, S., Menghini, M., & Salvatori, C. (2021). *European technological sovereignty: an emerging framework for policy strategy. Intereconomics*, 56(6), 348-354.

Church, S., Laske, N., Leschiner, D., Simmons, N., Verhalen, S., & Willis, M. (2023). *The Impact of the US Inflation Reduction Act on Global Clean Energy Supply Chains.* https://media.journoportfolio.com/users/37537/uploads/4731e77b-1493-404b-9512-477240181b5a.pdf

Deleidi, M., & Mazzucato, M. (2021). *Directed innovation policies and the supermultiplier: An empirical assessment of mission-oriented policies in the US economy. Research Policy*, 50(2), 104151.

Demertzis, M. (2024). *What about the EU's cohesion?* Bruegel Opinion piece, available at: https://www.bruegel.org/opinion-piece/what-about-eus-cohesion

Di Carlo, D., & Schmitz, L. (2023). *Europe first? The rise of EU industrial policy promoting and protecting the single market. Journal of European Public Policy*, 30(10), 2063-2096.

Di Tommaso, M. R., Tassinari, M., Barbieri, E., & Marozzi, M. (2020). *Selective industrial policy and 'sustainable' structural change. Discussing the political economy of sectoral priorities in the US. Structural change and economic dynamics*, 54, 309-323.

European Commission (2021). *Strategic dependencies and capacities* (Commission Staff Working Document).

Evenett, S., Jakubik, A., Martín, F., & Ruta, M. (2024). *The Return of Industrial Policy in Data. The World Economy,* 47(7).

Gatto, A., Mattera, R., & Panarello, D. (2024). *For whom the bell tolls. A spatial analysis of the renewable energy transition determinants in Europe in light of the Russia-Ukraine war. Journal of Environmental Management*, 352, 119833.

Gräbner, C., Heimberger, P., & Kapeller, J. (2020). *Pandemic pushes polarisation: the Corona crisis and macroeconomic divergence in the Eurozone. Journal of Industrial and Business Economics*, 47(3), 425–438.

Guarascio, D., Reljic, J., Cucignatto, G., Celi, G., & Simonazzi, A. (2024a). *Between Scylla and Charybdis: Long-term drivers of the EU structural vulnerability. Review Of Keynesian Economics*, 12(4).

Guarascio, D., Reljic, J., & Zezza, F. (2024b) *Assessing EU energy resilience and vulnerabilities: Concepts, empirical evidence and policy strategies*, ÖFSE Working Paper Series.

Guarascio, D., & Simonazzi, A. (2024) *Sustainable mobility and industrial policy, European Investment Outlook,* forthcoming.

Heimberger, P., Welslau, L., Schütz, B., Gechert, S., Guarascio, D. & Zezza, F. (2024). *Debt sustainability analysis in reformed EU fiscal rules: an assessment of how fiscal consolidation affects growth and public debt ratios, Intereconomics*, forthcoming.

Kleimann, D., Poitiers, N., Sapir, A., Tagliapietra, S., Véron, N., Veugelers, R., & Zettelmeyer, J. (2023). *Green tech race? The US inflation reduction act and the EU Net zero industry act. The World Economy*, 46(12), 3420-3434.

Pardi, T. (2022), *Heavier, Faster and Less Affordable cars: The Consequence of EU Regulations for Car Emissions*. ETUI Research Paper-Report.

Pianta, M., & Lucchese, M. (2020). *Rethinking the European Green Deal: An industrial policy for a just transition in Europe. Review of Radical Political Economics*, *52*(4), 633-641.

Pisani-Ferry, J., di Mauro, B. W., & Zettelmeyer, J. (2024). *How to de-risk: European economic security in a world of interdependence*. Breugel policy brief.

Plehwe, D. (2022). *Reluctant transformers or reconsidering opposition to climate change mitigation? German think tanks between environmentalism and neoliberalism. Globalizations*, 1-19.

Simonazzi, A., Ginzburg, A., & Nocella, G. (2013). *Economic relations between Germany and Southern Europe. Cambridge Journal of Economics*, 37(3), 653-675.

Stehrer, R., & Stöllinger, R. (2015). *The Central European Manufacturing Core: What is Driving Regional Production Sharing?* (No. 2014/15-02). FIW-Research Reports.

Stiglitz, J. E., & Regmi, I. (2023). *The causes of and responses to today's inflation. Industrial and Corporate Change*, 32(2), 336-385.

Többen, J., Banning, M., Hembach-Stunden, K., Stöver, B., Ulrich, P., & Schwab, T. (2023). *Energising EU Cohesion: Powering up lagging regions in the renewable energy transition.* MPRA Paper 119374.

Veugelers, R., Tagliapietra, S., & Trasi, C. (2024). Green Industrial Policy in Europe: Past, Present, and Prospects. *Journal of Industry, Competition and Trade*, 24(1), 4.