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A green but also just transition? Variations in social and industrial policy responses to industrial decarbonisation in EU member states

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Abstract

The EU aims for net carbon neutrality by 2050. Since industry contributes substantially to carbon emissions, reforms to decarbonise industry are necessary to achieve this goal. However, these reforms may entail labour market costs in the form of unemployment, which may necessitate social policies to mitigate them. Our article provides a novel contribution to the existing literature by developing a framework to classify how these policy responses may vary across EU Member States and it also suggests sources for these variations. We analyse the planned social policy responses of four countries – Denmark, Germany, Spain and Poland – by comparing the emphasis on social investment relative to compensation; the emphasis on social relative to industrial policy; and the

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extent to which social policy is targeted. Our findings suggest that Danish plans will rely primarily on social investment, whereas Poland will rely on compensation. In Germany, there is a greater emphasis on industrial policy, and Spain's planned responses differ between policies targeted at coal miners and policies for other workers.

Keywords

Decarbonisation, eco-social policies, EU, green transition, industrial policy, industry, just transition, social policy

Introduction

To tackle the climate emergency, policymakers will need to decarbonise their economies. While the focus so far has been on harnessing clean energy, some 'hard to abate' industries like cement, chemicals and metal production remain significant polluters even after adjusting for cleaner energy usage (Paltsev et al., 2021). To achieve carbon neutrality, policymakers will also need to introduce policies to decarbonise these 'brown' carbon-polluting industries. Solutions could range from subsidising these industries to deploy (currently) costly options like carbon capture and storage or adopting (costly) technologies that are untried in a large enough scale (Paltsev et al., 2021), imposing carbon emission trading schemes and caps or regulations, to rolling back production in their countries.

In all scenarios, there are short-term costs imposed on firms. Where rising costs cannot be offset by lower wages, firms may find cost savings through downsizing their workforce (see Babiker and Eckaus, 2007). In turn, some individual workers, households, communities and places that are reliant on these industries would be adversely affected by job losses (see Caldecott et al., 2017; Gambhir et al., 2018). Thus, a key challenge of the Green Transition is to ensure that neither the benefits nor costs are borne solely by specific individuals or communities but distributed in a fair and equal manner to avoid deleterious political consequences like political discontent and distrust (Bolet et al., 2023; Im et al., 2023).

To this end, a growing literature on eco-social policies, namely policies that concurrently pursue environmental and social goals to realise a Just Transition, has emerged (Gough, 2016; Hiilamo, 2022; Hirvilammi and Koch, 2020; Koch, 2018). As policymakers often face a dilemma between environmental and social goals, this literature introduces novel and innovative policy suggestions to overcome this dilemma such as a participatory income, universal basic income, or universal basic services. However, recent studies underscore that this literature remains largely prescriptive (Gugushvili and Otto, 2023; Mandelli, 2022; Zimmermann and Graziano, 2020). More crucially, this literature theorises less about the types of social policies and also the mix of social policies that policymakers are *likely* to adopt to pursue a Just Transition. Thus, we attempt to fill this gap by focusing on variations in (planned) social policies that governments are *likely* to pursue to complement their ecological and social objectives given the institutional contexts in which they operate.

In line with this Special Issue, we focus on EU Member States. We argue that Member States' social policy responses to labour market challenges from the Green Transition – especially unemployment caused by industrial decarbonisation reforms (Babiker and

Eckaus, 2007; Caldecott et al., 2017) – will vary depending on several pre-existing features of their political economies. We focus on the role of institutional features because policymaking often operates within – and is thus constrained by – institutional contexts in the short term (see Finnegan et al., 2023; Gugushvili and Otto, 2023: 4). We focus on three forms of variation. First, we expect variation in relative emphasis on social investment (e.g. upskilling and reskilling programmes) to compensation (e.g. cash transfers and forms of income replacement) in Member States’ social policy responses (e.g. Bonoli, 2011; Cantillon, 2011). Member States use both types of policies, but often emphasise one more than the other depending on their welfare state model (Hemerijck, 2017). Leveraging a rich welfare state literature on institutional ‘stickiness’ (e.g. Pierson, 1996), we argue that Member States’ relative emphasis in their social policy responses will mirror the current configuration of their social policy institutions. Thus, Member States which currently emphasise social investment relative to compensation are likely to do the same in their social policy response, and vice versa (see Im et al., 2023). Second, we expect variation in the relative emphasis given to social policy in relation to industrial policy. Here, industrial policies refer to government actions to ‘alter the structure of an economy, encouraging resources to move into particular sectors that are perceived as desirable for future development’ (Altenburg and Rodrik, 2017: 2; see also Hanson, 2023). We suggest that there will be greater emphasis given to social policy when there is an expectation of sizable unemployment from decarbonising industries. Third, we expect variation in how targeted Member States’ social policy responses are (see Bolet et al., 2023). Here, targeting refers to the degree to which social policies are targeted at specific groups of workers. We suggest that social policies would be more targeted when policymakers expect unemployment from these reforms to be concentrated in few specific industries.

We conduct our empirical analyses on four cases – Denmark, Germany, Spain and Poland. In addition to representing different welfare regime types, each varies in their current emphasis on social investment relative to compensations, scale and scope of industrial decarbonisation reforms (Im et al., 2023), and linkages between the targeted brown industry(ies) and other industries and local economies. As social policy responses to assist workers adversely affected by industrial decarbonisation reforms are still nascent, we focus instead on how national governments *intend* to address potential unemployment from these reforms. Although such plans are not equivalent to actual social policies, they nevertheless reflect the overall orientation of national government’s social policy responses. Therefore, they offer some tentative evidence of potential variation in Member States’ plans to tackle these labour market challenges. Our analysis is based on publicly accessible primary and secondary data.

In the next section, we present our theoretical framework. Thereafter, we describe our analytical strategy before elaborating on our four country cases. The penultimate section discusses the findings from these country cases before concluding.

Member states’ responses to the climate emergency

In response to the Climate Emergency, the EU’s formal legal competence to address climate issues has increased in recent years (de la Porte and Stiller, 2020). It has also

launched the European Green Deal (European Commission, 2019) which aims to achieve net zero emissions of greenhouse gases by 2050 and attain economic growth that is decoupled from resource use (i.e. relative decoupling; see Gough and Meadowcroft, 2011; Hickel and Kallis, 2020). In the parlance of the environmental sustainability literature, the European Green Deal represents a *green growth* strategy which aims to sustain economic growth through innovation and technological progress and to decouple it from its ecological impact (Dryzek, 2013 [2005]; Mandelli, 2022: 5). Given that the EU increasingly operates by setting the political agenda for Member States, this development implies that Member States are expected to pursue a path of green growth, which may entail costs.

Concurrently, the EU acknowledges that these reforms to decarbonise industry will have an uneven impact across communities, persons or places. For instance, workers employed in carbon-polluting brown industries or communities and places reliant on such industries may be adversely affected by reforms related to the Green Transition (see Hanson, 2023). Therefore, the EU has emphasised the need to ensure that the transition to a carbon-neutral economy would be fair and does not leave specific persons, communities or places behind (European Commission, 2021).¹

When both points are taken together, it implies that EU Member States are expected to meet the EU's targets on net zero carbon emissions which may necessitate policies to decarbonise industries and concurrently account for the uneven distribution of these policies' socioeconomic costs. However, as the EU often sets the political agenda but leaves Member States with the autonomy to pursue this agenda, Member States can vary in how they intend to attain green growth, decarbonise industries and cope with the labour market consequences from them. The crucial takeaway here, which is hardly surprising to EU scholars (e.g. Falkner et al., 2005; Pircher et al., 2024), is that Member States will first vary in how they intend to decarbonise industries, and second in the social policies they intend to apply to mitigate its associated unemployment.

Sources of variations in social policy responses

Building on existing welfare state literature, we distinguish between two types of social policies: social investment and compensatory policies (e.g. Bonoli, 2011; Cantillon, 2011; Hemerijck, 2017). Social investment policies typically seek to improve individuals' human capital (e.g. skills) to improve their long-term labour market outcomes such as employability and wages. They include training programmes to reskill or upskill and job search support. By contrast, compensatory policies are often designed to have a more immediate impact by offsetting the economic costs of current labour market disadvantage. They include unemployment benefits and early retirement schemes. We expect Member States to use a combination of social investment and compensation but with varying emphasis to support and assist workers who have become unemployed due to reforms to decarbonise industry (Im et al., 2023).²

To explain this variation in Member States' social policy responses, we argue that existing configurations of social policy institutions are relevant. An abundant literature has demonstrated that welfare state institutions are often 'sticky' and resistant to change (e.g. Bonoli and Palier, 2000; Huber and Stephens, 2001; Pierson, 1996). This

institutional stickiness arises for various reasons, most notably the build-up of interest groups supporting specific policies once they have been implemented (Huber and Stephens, 2001) and the entrenchment of administrative structures. For instance, policymakers in Member States which have emphasised compensation more than social investment may encounter political resistance from beneficiaries of such compensation – such as well-organised employers or trade union members – if they seek to reallocate public spending from compensation to social investment. In the short run, Member States will find it difficult to radically reorient their existing social policy institutions and adopt social policy responses that differ substantially from their current social policy approaches (see also Finnegan et al., 2023).³ Hence, Member States which have currently prioritised compensation over social investment are likely to do the same in their responses to workers who have become unemployed by reforms to decarbonise industry, and vice versa.

In addition, Member States' relative emphasis on social policy vis-à-vis industrial policies may vary. Following Altenburg and Rodrik (2017), we take an encompassing view of industrial policies which rests on the premise that 'market prices are not always the best guide to allocating investments' (p. 2). Industrial policies include traditional policies focused on productivity enhancement as well as policies where 'industrial policy agencies undertake measures to influence structural change such that regional disparities are reduced, labour-intensive industries or small enterprises are encouraged and/or the economy becomes environmentally more sustainable' (Altenburg and Rodrik, 2017: 2; see also Altenburg and Lütkenhorst, 2015). Examples include (co)subsidising the development of new green products and services to repurpose existing carbon-polluting industries, (co)subsidising the introduction of new (if available) green technologies or work practices to offset carbon pollution from brown industries, or investing in new green industries in regions where brown industries had dominated. Thus, Hanson (2023) describes industrial policies as those that help to 'develop a new export base and to replace the well-paying jobs that have been lost' (p. 5).

Arguably, a combination of both industrial and social policies is needed to ensure a just Green Transition. This also explains why the EU considers it necessary to create new jobs while pursuing the Green Transition (European Commission, 2021). The creation of jobs is primarily within the domain of industrial policy through supporting businesses. By contrast, addressing unemployment from decarbonising industries – through compensation or reskilling – is primarily in the domain of social policy. When faced with the pressure of fiscal austerity, policymakers may be compelled to find their preferred balance between industrial and social policies as both are expensive to finance. Under austerity where policymakers have to reduce public expenditure, they may prioritise some policies over others. Regarding the Green Transition, we expect that policymakers will focus on industrial policies due to unavoidable structural industrial transformation processes (Altenburg and Rodrik, 2017). However, whether policymakers would devote as much attention to social policies depends on their expectations about the extent of unemployment. As Im et al. (2023) suggest, industrial decarbonisation does not necessitate elevated unemployment. We thus posit that policymakers are compelled to give less attention to social policies relative to industrial policies, if they do not expect sizable unemployment from reforms to decarbonise industries. By contrast, if sizable unemployment is expected from these reforms, they may give as much emphasis to social policies

to smooth out the immediate labour market costs generated from these reforms. Among other factors, we expect the scale of reforms to decarbonise industry to influence policymakers' anticipation of the extent of unemployment. By scale, we refer to whether industrial decarbonisation is piecemeal (e.g. improving energy efficiency) or comprehensive (winding down of brown industries) (see Im et al., 2023). The more comprehensive reforms to decarbonise are, the greater the likelihood of sizable unemployment.

Furthermore, Member States' social policy responses may vary in how targeted they are. Even if reforms to decarbonise industry are focused on specific sectors, there may still be spill-over effects onto other linked sectors. For instance, decarbonising steel production through adopting new technologies may increase the cost of its production, which may in turn raise the production costs of sectors reliant on steel as an input. Alternatively, winding down steel production may harm firms and services in a region where steel production is the dominant employer (see Gazmararian and Tingely, 2023; Hanson, 2023). This may lead to knock-on unemployment in local firms and services within this region (see Caldecott et al., 2017; Hanson, 2023). If policymakers do not anticipate sizable spill-over unemployment to other industries not directly affected by the reforms, we expect their social policy response to be targeted at the industries that are subjected to decarbonisation reforms. By contrast, if policymakers anticipate sizable spill-over unemployment, we expect their social policy response to be broad-based. Among others, we expect policymakers' anticipation of the extent of spill-over to be influenced by the scope of reforms (focused on a few industries or aimed at a broad range of industries), and the extent of linkage between the industry subjected to reform and other industries and/or the local economies reliant on this industry. Specifically, a wider scope of reform raises the possibility of more widespread unemployment. It is worth pointing out that we are ambivalent about the specific means by which these links are induced – Bolet et al. (2023) suggest that policymakers may react to electoral demand, and Finnegan et al. (2023) suggest the influence of organised actors. Instead, the crux of our current argument is an exploratory examination of the variety of governmental responses to the labour market challenges from the Green Transition.

Analytic strategy

Since reforms to decarbonise industry are only emerging, it is likely that social policy responses to unemployment from these reforms are nascent and not yet definitive or implemented. Thus, any study of the variety of actual social policy responses undertaken by Member States is a limited exercise at this moment. However, most Member States have provided some limited plans that give indications about how they intend to tackle such unemployment. Our analysis is therefore confined solely to Member States' intended social policy responses. Despite the limitation that a planned response may not be implemented, our analyses still provide a glimpse into how different Member States vary in their social policy approaches to unemployment from reforms to decarbonise industry.

We tap into recent but limited data from primary sources and then supplement them with data from secondary sources for our analysis. We restricted data collection to 2021 to 2023. 2021 was when the EU's sizable Recovery and Resilience Facility (RRF) was

launched and to which all Member States had to submit their national RRF plans. The EU mandated that at least 37% of the proposed budget had to be earmarked for the Green Transition. As such, the RRF is useful because it offers a single and common timepoint to compare Member States' responses. We examine planned social policy responses contained within and – where relevant – outside national RRF plans. Primary sources of data include national RRF plans and official national government documents. Secondary sources include newspaper and media reports, communiqués from national social partners (employers' associations and trade unions), analyses and reports by the European Commission (e.g. Joint Research Centre) and reports by think tanks (e.g. Bruegel). These data are selected based on their relevance to discussions about national social policy responses to the Green Transition such as elaborations on the plan themselves, and also evaluations and analyses of the plans. The years 2021 to 2023 provided us with a sample of primary and secondary data on Member States' planned social policy responses and also analyses of these responses. For each country case, we used a variety of these data sources to triangulate Member State's planned social policy responses (see Supplementary Material for all consulted documents and their breakdown). Primary sources provide us with an understanding of the planned social policy responses of Member States. Secondary sources enrich this understanding by qualifying and evaluating their strengths and weaknesses. Some secondary sources also provide contextualisation for some of these responses.

We analysed the plans of four Member States – Denmark, Germany, Spain and Poland – which represent different welfare state regimes (e.g. Esping-Andersen, 1990). As summarised in Table 1, they vary on four dimensions which we expect to yield variations in their planned social policy responses. Germany and especially Denmark are cases of high existing commitment to social investment. Spain has a growing commitment to social investment as it has improved social investment policies like training and public employment services in the last decade. Poland continues to express a fairly low commitment to social investment (Szelewa and Polakowski, 2022). These countries also vary in the scale of their reforms to decarbonise industries. Denmark, Germany and Spain have committed themselves to comprehensive reforms to decarbonise industries (Im et al., 2023), whereas Poland has not done so to the same degree. Denmark, Germany and Spain have passed laws that make explicit commitments to decarbonise their economies (including industry). Spain created new instruments to follow through these commitments such as the National Integrated Energy and Climate Plan (PNIEC) and the Climate Change and Energy Transition Law. Germany has passed a 'Coal Exit Act' in 2020 supplemented by further legislation to support affected regions (Bundesministerium für Wirtschaft und Klimaschutz (BMWK), 2020; Bundesregierung, 2021). In addition, the four countries also differ in their scope of reforms to decarbonise industry. Germany and especially Denmark take a broad approach that all industries ought to decarbonise. By contrast, Spain and Poland focus primarily on the coal industry. Finally, they also differ in terms of how linked the industry which is targeted for decarbonisation reforms is to other downstream industries and local economies. As Denmark and Spain do not rely heavily on carbon-polluting industries (Im et al., 2023), this link may be weak. By contrast, Germany and especially Poland rely substantially on these industries, and thus, this link may be stronger. Although we do not cover all Member States or a full range of permutations on

Table 1. Sources of variation in countries' social policy responses.

		Countries			
		Denmark	Germany	Spain	Poland
Potential sources of variation in social policy responses	Prior emphasis on social investment relative to compensation	Very high existing commitment to social investment	High existing commitment to social investment	Growing commitment to social investment	Low commitment to social investment
	Scale of reforms to decarbonise industry	Very comprehensive	Comprehensive	Comprehensive	Moderately comprehensive
	Scope of reforms to decarbonise industry	Very broad	Broad	Limited	Limited
	Linkage of targeted industry(ies) to other industries and local economies	Low	High	Low	High

these dimensions, the variation across our four country cases still allows us to examine if there are cross-national differences in their planned social policy responses based on primary data sources and supported by secondary data sources. This, in turn, showcases the possible degree of variation across EU countries in their social policy responses. In short, we attempt to shed light on how planned social policy responses vary across different institutional contexts (see also Schoyen et al., 2022).⁴

Country analyses

Denmark

Among our cases, Denmark is most advanced in addressing the Green Transition. Denmark is a first mover in constitutionalising CO₂ neutrality by 2050, including an interim target to reach a 70% reduction by 2030. The purpose of this constitutionalisation in the 'Climate Act' is to tie successive governments to this goal, which requires reforms across various sectors, ranging from agriculture to industry (Ministry of Climate, Energy and Utilities, 2020). Since the adoption of the act by the minority social-democratic government in 2020, various major reforms have been adopted, including levying a CO₂ tax in agriculture. These reforms so far have been broad-based, involving all (or almost all) political parties behind every major deal. New jobs may also be created when these reforms are pursued (see Rebouh and Keiding, 2022).

To this end, the unions – in particular the one representing blue-collar workers (3F) – is preparing for new types of jobs, mainly through social investment (Rebouh and Keiding, 2022). Furthermore, as the Danish pension system has been reformed incrementally, the availability of early retirement has been reduced, and this reform makes it only available for those in need for health reasons (Von Nordheim and Kvist, 2022).

Therefore, this makes social investment – especially retraining – the key pathway to address unemployment from reforms to decarbonise industry in Denmark.

As mentioned, the Climate Act ties present and future governments to these benchmarks and requires fundamental changes in some industries to achieve the aims. Denmark has a relatively low reliance on carbon-polluting industries, with only a small proportion of the economy depending on manufacturing. Yet, there are some challenges, for instance the cement producer Aalborg Portland is the largest single carbon emitter in Denmark (4% of total carbon emissions). The company has agreed to reduce its carbon emissions by one-third by 2023 through investments in a new form of cement which is less carbon polluting, but costly to produce. Yet, an exemption to a new national tariff on carbon emissions was granted when the climate law was introduced. The arguments were that the provisions in the climate law would make it difficult for firms in brown industries (e.g. Aalborg Portland) to compete internationally. Aalborg Portland for example stated that 350 jobs could be lost (Politiken, 2022). This symbolic case shows that the costs for industry and for workers are relevant considerations even in Denmark.

The Danish RRF was submitted by the then minority social-democratic government. Sixty-nine percent of the funds of the Danish RRF are devoted to the Green Transition, including energy efficiency renovations, carbon capture technologies, proposals for a green tax, as well as funding for research on the Green Transition (Ministry of Finance, 2021). There was thus not a specific focus on social policies to support the Green Transition. Part of this reason is because there is already extensive job training and active labour market policies (ALMP) prior to the RRF in Denmark. Another reason is because social and labour market policies are primarily the responsibility of unions and employers in the Danish collective bargaining model.

In this regard, unions and employers are already proactively preparing for the Green Transition. The union which represents blue-collar workers, 3F, reported the results of a recently conducted survey by *Analyze Denmark* among 996 representatively selected members of 3F which asked whether workers feared job losses or whether they saw the Green Transition as an opportunity. Sixty percent viewed it as embodying new possibilities for their jobs, while only 14% assessed it as a threat to their current job.⁵ Conversely, analysis by *Concito*, a think-tank promoting carbon neutrality, showed that there is a high demand for skilled and unskilled labour. Likewise, the engineers' association also sees the Green Transition as an opportunity for the development of jobs (Rebouh and Keiding, 2022).

Despite this positive approach among most workers, the head of 3F recognises that the transition away from jobs in carbon-polluting industries requires investments. More specifically, he requested the government to be prepared to invest massively in education and reskilling for the workers that are vulnerable due to job losses. This vulnerability is echoed by some Danish workers (as reported in the aforementioned survey) who fear that phasing out carbon-polluting industries would entail a risk that such production would be offshored to other countries which may mean a loss of jobs (3F 2022).

Overall, the Danish government has mentioned the need to reskill but has not addressed the possible scenario of potential unemployment from decarbonising industry. This could be because there are few jobs actually in CO₂-polluting industries. It could also be because in the Danish labour market model, unions and employers are responsible for proposing

policies in line with the tradition of strong collective bargaining where they continuously address labour market issues such as wage development as well as upskilling and reskilling. Thus, it appears that the dominant response which is taking shape – through the unions and employers – is one that focuses on retraining and education. This approach makes sense given that it leverages the strong social investment institutions that Denmark already possesses. Denmark is considered a leader in active labour market policies, and its labour market is very flexible, enabling a fast adaptation to industrial restructuring. This may explain why there is currently no new specific compensatory policies for workers affected by decarbonisation of industry. Per the Danish flexicurity system, unemployment benefit reciprocity is strongly tied to participation in active labour market programmes including social investment policies like training and reskilling. Thus, while some jobs are likely to be lost, there is a belief that the ‘flexicurity’ features of the labour market will decrease the social costs and enable Denmark to meet its aims in the Green Transition. In short, Denmark is likely to reskill workers who have become redundant, which in turn also helps industry to adapt to the demands of the Green Economy. In contrast to social policies, industrial policies appear to receive less attention.

Germany

Germany relies on carbon-polluting industries to a moderate extent for employment (Im et al., 2023). Carbon-polluting industries already faced a raft of decarbonisation reforms to meet Germany’s aim of a 65% greenhouse gas reduction by 2030. For instance, the then Grand Coalition government consisting of the Christian Democrats and Social Democrats decided in August 2020 to incrementally phase out coal by 2038. There is broad support for the Green Transition across parties, social partners, environmental groups as well as affected regions. Only the anti-establishment Alternative for Germany party denies climate change and thus opposes the decarbonisation plans (Schoyen et al., 2022). An official expert report concluded that the economic impact of structural change could be effectively mitigated. For instance, case studies show significant employment potentials for lignite regions in the renewable energy sector (Umweltbundesamt, 2018). Various funding packages made over €40 billion available for investment in former coal production regions to support research, transport infrastructure and job creation programmes (Im et al., 2023). In addition, the German government committed to setting up a financial compensation scheme to ease the transition of former coal miners into early retirement, a scheme that is supposed to help around 20,000 coal industry workers (Deutsche Rentenversicherung, n.d.).

However, potential job losses due to the Green Transition do not feature centrally for the German government and there is a greater concern about broader skill and labour shortages. Besides unemployment in (former) coal-mining regions which is mentioned in Germany’s latest National Reform Programme (NRP) submitted by the Social Democratic/Green/Liberal government as part of the European Semester process in 2022, there is no mention of unemployment from reforms to decarbonise industry in this plan. It also does not feature in the national RRF plan, despite the substantial funds (around €25 billion) Germany will receive to fund this plan through the EU’s RRF (BMWK, 2022). Part of the explanation could be that two-thirds of workers in the

lignite industry are over 45 years old and are expected to retire around 2030 (Schoyen et al., 2022).

If there is any concern about unemployment from such reforms, it is viewed in conjunction with other structural changes to the German economy and society such as demographic ageing, digitalisation, and the pandemic. As such, social investment policies are not targeted or designed to address potential unemployment from reforms to decarbonise industry per se. This is reflected in how the NRP designates €2.4 billion of funds from the REACT-EU instrument. This sum will be used to strengthen the resilience of the education and health infrastructure, green and digital investments in small and medium-sized enterprises (SMES), and for measures to protect jobs through life-long learning and further education initiatives. Likewise, the RRF focuses on financing policies to address long-standing societal issues such as long-term unemployment, disadvantaged young adults (notably refugees and those with a migration background – namely second- or third-generation migrants – or a disability) and supporting the financial sustainability of the German social security systems. Some of these policies include strengthening investment in early years and in education (which is also partly motivated by learning losses during the pandemic). In addition, the German government also intends to introduce a ‘part-time’ further education initiative based on an existing Austrian model that allows employees to take time off work for training and upskilling (BMWK, 2022). Overall, there is a further strengthening of social investment policies which has already taken root in Germany (Manow, 2020; Seeleib-Kaiser, 2002), but this strengthening is mainly driven by concerns about future skill shortages and not the decarbonisation of industry per se. The main trade union confederation criticised that the German RRP missed an opportunity to invest more into education and further education for skills development (DGB, 2021, 2023).

If there are any new policies aimed at addressing labour market challenges from the Green Transition, they tend to be industrial policies that are targeted at regions or businesses. For instance, support from the European Social Funds and European Regional Development Fund will be made available at local level for regions affected by structural change due to decarbonisation. Likewise, some funds from the REACT-EU and RRF are dedicated to helping businesses adjust to the challenges that they may face.

Spain

Spain is not overly reliant on carbon-polluting industries for employment (Im et al., 2023), and its Green Transition strategy seems to centre around the Energy Transition rather than decarbonising industry. The exception is the coal industry. The Spanish government which was then helmed by the Socialist Party, in cooperation with business organisations and trade unions, has put in place social policies to support the economic transition of coal-mining regions and the phase out of coal plants (CCOO-USO-Carbounion, 2018). By contrast, there is no explicit reform for other brown industries like cement, metal and the automotive industries due to their resistance. In fact, an industry alliance – ‘La Alianza por la Competitividad de la Industria Española’ – which comprises of industries from carbon-polluting sectors, including the ones above, advocated

for compensations for carbon emission charges and tax reductions instead (Alianza por la competitividad de la Industria Español, 2020; Villar, 2020).

As such, the Spanish social policy response is primarily targeted at unemployment in the coal industry. To this end, the left-wing government led by Pedro Sánchez of the Spanish Socialist Workers' Party (2020–2023) has dedicated sizable funds to social policies for this industry, including from the RRF (Government of Spain, 2021). The government's 13 Just Transition Agreements (JTAs) (Government of Spain, 2022) – which are new instruments developed at the territorial level and involves the participation of public actors at different levels, social partners, stakeholder organisations and citizens (Heilmann et al., 2021) – provide for several supporting measures for affected workers, such as plans for vocational training and the establishment of 'job banks', in order to guarantee their employability in new activities including those related to the environmental restoration of degraded mining areas, but also compensatory policies. These policies reflect an intention to upskill and reskill affected workers (European Commission, 2021). For the 2019–2022 period, the government committed a larger part of the financial resources to the latter – 166 million euro for voluntary redundancies and early retirement schemes. By contrast, less was committed to employment services and for retraining schemes – 1.9 million euros and 20 million euros, respectively (Government of Spain, 2022).

Despite the Spanish government's greater emphasis on compensation, it has arguably launched new types of social investment policies ('job banks') and expanded current ones (vocational training). From a starting point of lower spending and emphasis on social investment, the Spanish government's approach may be considered an attempt to embed and build up social investment in the country.

In addition, it has earmarked resources to relaunch the economic development of coal-mining regions, including grants for small business, programmes for social and cultural projects in affected municipalities and investments in environmental restoration and digital and physical infrastructures. In short, the Spanish response emphasises industrial policy as much as social policy. For instance, the Strategic Projects for Economic Recovery and Transformation (PERTE) instrument for supporting renewable energy, green hydrogen and storage, which are funded by the Spanish RRF, prioritises projects located in coal-mining regions (Government of Spain, 2023).

In sum, the Spanish policy response – industrial and social – is highly targeted at the coal industry because its reforms are primarily targeted at this industry but not at other brown sectors. Its response contains both industrial and social policies. In other words, both industrial and social policies are important to the Spanish government's response to labour market challenges from such reforms. Of its social policies, greater resources are provided to compensation. Nevertheless, the intention to implement new and expand existing social investment policies financed through the RRF may provide Spain with the resources to strengthen its social investment institution which it might have lacked during the Great Financial Crisis.

Poland

Poland is the member state with one of the highest shares of workers employed in brown carbon-polluting industries (16%) (Vandeplass et al., 2022). It also has the second highest

number of coal power plants in the EU (37) (JRC, 2018) and 72% of its energy mix is based on coal. The coal-mining sector was part of the transformation process to a market-economy that included privatisation of state-owned companies, closing plants and factories, thus causing mass redundancies. Since then, a third of jobs in heavy industry (including 300,000 jobs in coal mining) were shut down (Antosiewicz et al., 2021). At the moment, the main reform to decarbonise industry focuses on the coal industry. The government has scheduled to close coal mines only by 2049 despite the European Green Deal targets that have to be met by 2030. However, the Polish government has historically prioritised the interests of coal industry employees. Consecutive governments did not set any ambitious goals for decarbonisation due to a long tradition of protests and strikes organised by coal mining trade unions. These protests and strikes repeatedly included demands for extension of state aid and longer time horizons for full decarbonisation as well as for generous compensatory measures (Antosiewicz et al., 2021). Recently, the miners protested also against decarbonisation goals, and in favour of a more moderate employment reduction in 2022 (Interia Biznes, 2022).

Even though the then right-wing populist (Law and Justice) government's plan to decarbonise coal has a long-time horizon and may be lukewarm, it recognises the labour market challenges from these reforms. Namely, it considers the challenge of achieving climate neutrality, both in terms of financial outlay and 'social costs' which refer to negative socioeconomic effects associated with a decline in the number of jobs in the mining sector (Ministerstwo Funduszy i Polityki Regionalnej, 2022). The Polish government's social policy response will probably be weighted towards compensation. Previously, when unemployment levels increased dramatically such as when a third of the jobs in heavy industry were lost, the government responded with expanding compensatory policies like early retirement schemes, severance pay or even transferring workers into disability payment schemes. In fact, disability payment schemes became easily available for even small disabilities (Żukowski, 2011). In addition, there has been a demand by trade unions for generous compensatory measures from the coal industry. However, it is worth pointing out that spending on both compensatory and social investment policies is relatively low and amounts to 0.45% of GDP for active labour market policies and 0.25% of GDP for passive labour market policies in 2019 (OECD data).

The regional scope of these potential social costs is evidenced by the example of the Silesian Voivodship where coal mining (not the entire coal industry) accounts for 7.5% of total employment in the region in 2021 (Vandeplas et al., 2022). A social agreement on the transformation of the coal-mining sector and selected transformation processes in the Silesian Voivodeship was signed by the regional administration representatives and the government in 2021 (Government of Poland, 2021). This agreement emphasises the 'evolutionary' character of the planned changes and proposes to create a special development fund under a dedicated law to strengthen the region's economic potential. Apart from the schedule to close the mining plants by 2049, the agreement lists the forms of support for the region with regard to miners' employment such as employment guarantees and relocation between the plants. Although retraining is also offered, a separate chapter listing various social security measures for the miners stresses the importance of compensation rather than social investment measures including paid miners' leave and flat-rate miner's severance pay. The leave pay is increased from 75% (currently) to 80%

of the miner's salary while the flat-rate payment would be equal to 120,000 PLN (around 27,700 EUR). All of this is built on top of the early retirement package made available to Polish miners at the age of 50 or 55 (Baran et al., 2018), which is often used for workers in collective dismissals that are less than 3 years away from their pensionable age (Vandeplas et al., 2022: 17). Taken together, the additional reason (besides a weak orientation towards social investment) as to why compensation plays a big role is because of a sizable proportion of workers in the coal industry in Poland who are older than 50 years (Vandeplas et al., 2022: 17). Overall, the government is planning to mobilise over €3 billion to cover the costs of decarbonisation in lower Silesia, which also include infrastructural costs.

Finally, the invasion in Ukraine provided yet another context for policy priorities especially in the energy sector. For example, the Trade Union of Hard Coal Processing Workers (under the umbrella of All-Poland Alliance of Trade Unions, OPZZ, the largest nationwide umbrella confederation) issued a petition to the government with the postulates to depart from decarbonisation and strengthen the national reliance on coal due to deficiencies in energy caused by the war. Notably, it also included demands to lower the retirement age or increase employment security and the working conditions in general (Trade Union of Hard Coal Processing Workers, 2022). Such communication may strengthen a smaller emphasis on social investment in response to labour market challenges from the Green Transition. In short, there is a combination of both industrial and social policy, but social policy appears to have greater emphasis than (localised) industrial policy. And within social policy, the government emphasises compensation more than social investment.

Discussion

These four country cases vary in their planned social policy responses in terms of relative emphasis on social investment to compensation, relative emphasis on social to industrial policy and extent of targeted social policy. In all countries, there are attempts to reform carbon-polluting industries by winding them down. However, these reforms are more targeted in Spain and Poland, and more diffused across different industries in Denmark and Germany.

Our findings suggest variation in *relative emphasis on social investment to compensation*. Social policies designed to offset labour market challenges from reforms to decarbonise industry are geared more towards social investment than compensation in Denmark but less so in Poland. The German and Spanish cases are slightly more nuanced. The broader social policy strategy in these two countries is one of social investment – especially training and education. However, the specific social policy strategy for coal miners is compensation through early retirement in Germany, and more compensation than social investment in Spain. For Germany, it is possible to explain this observation based on the older average age of employees in this specific sector and the German government's expectation that such reforms are unlikely to lead to sizable unemployment through targeted industrial policies in these regions. Thus, they seem to view little need for a tailored social investment strategy for coal industry workers. Hence, the broader German social policy response remains weighted towards social investment. For Spain,

a similar reasoning underlies their social policy strategy in relation to the coal industry. Putting aside the response to the coal industry, however, Spain's social investment strategy reflects an intention to pursue new programmes like 'job banks' as well as strengthening existing ones like education. Overall, the social policy responses of the four country cases in terms of emphasis on social investment relative to compensation mirror the orientation of their existing social policy institutions. Member States with greater emphasis on social investment have social policy responses that weigh on social investment, and vice versa.

We also observe variation in *relative emphasis* on social policy vis-à-vis industrial policy across these countries' responses. Our findings show that all countries intend to apply a mix of both social and industrial policies, but the relative weight varies. Poland and Denmark emphasise social policy more than industrial policy, while Germany emphasises industrial policy more than social policy. Spain occupies a position in between these two poles. The variation in expected extent of unemployment may partly explain such variations in emphasis. In Poland, where a sizable share of the workforce is employed in the coal industry, the expected unemployment is high and thus there would be a greater need to alleviate the social costs from winding down the coal industry. By contrast, the German government does not expect much unemployment from its reforms and may feel less impetus to commit as strongly to social policy as to industrial policy. The explanation for Denmark is a little more nuanced. In Denmark, there is a recognition that there will be unemployment, even if not to the same degree as Poland. With growing understanding that offshoring carbon-polluting parts of the production process is no longer a viable option, Danish industries have sought to innovate and implement new carbon-reducing technologies with larger players being able to make such investments. In turn, Danish trade unions expect some degree of unemployment and have called for social policy responses to help vulnerable workers adapt to the new demands that firms have. Through collective bargaining, these unions are expected to play a pivotal role in reskilling, while the unemployment benefit system enables workers to have compensation during reskilling. Put differently, compensation is temporary and intended to support successful participation in active labour market policies to enable re-employment. However, the dominant policy response to changes to the economy has been to reskill workers to adapt to the new demands that firms have. Therefore, social policy (specifically social investment and flexicurity) appears to receive greater attention than industrial policy from unions and employers' associations, even if the scale of unemployment is unlikely to be as great as in Poland. Overall, the scale of expected unemployment – which may not always correspond with the scale of reforms to decarbonise industry – appears to inform the relative emphasis on social policy vis-à-vis industrial policy in Member States' planned responses.

Finally, we observe some variation in the extent of *targeting* in these countries' social policy responses. Regarding social investment, Germany, Denmark and Poland do not target specific workers or industries for varying reasons. For Germany and Denmark, social investment policies are intended for future workers as well as current workers whose jobs are at risk of becoming redundant. Germany, unlike the Danish trade unions and employers' associations, does not expect substantial unemployment due to labour shortages in the economy as a whole. By contrast, it seems that there are some concerns

in Denmark about unemployment in carbon-polluting industries as well as spill-over unemployment either in downstream industries or local economies. The German response seems to be motivated by other reasons, namely the intention to expand social investment to ensure the financial sustainability of the social security system and to integrate the long-term unemployed, young people with a migration background and other disadvantaged groups into the labour market. For Poland, social investment is not a key part of its social policy response and therefore it is not targeted. However, Poland employs social investment for other purposes such as activating persons in underemployment (parents, senior employees, youth, migrants) and to regularise the situation of migrants coming from outside of the EU (i.e. mostly Ukrainian workers). For Spain, its social investment appears to consist of two types. One set applies to the broader population, whereas the other is targeted at the coal industry. However, its intention to apply social investment policies to train workers outside of the coal industry in skills demanded by the green economy suggests that its social investment policies are overall not targeted. This may arise from a concern of future unemployment in other carbon-polluting industries which have not yet been marked for reforms like the steel and automotive industry, unlike the coal industry.

Regarding compensation, all countries' compensation schemes – primarily through early retirement – are highly targeted at workers in the coal industries. The exception is Denmark where the coal industry is not dominant, where early retirement is no longer a possibility, and where compensation is strongly tied to participation in social investment due to its dominant flexicurity model – unemployment compensation is available for a maximum of 2 years during reskilling. Overall, compensation appears highly targeted at the group of workers or communities (regions) which are expected to be hit hardest and most directly by reforms. By contrast, social investment appears to be less targeted. In countries like Denmark, it accompanies compensation. In other countries, it is used to address a broad range of labour market challenges that do not arise solely from reforms to decarbonise industry. Therefore, compensation is used as a very targeted response, whereas social investment acts a broad brush to pick up other workers including those who are indirectly affected from decarbonising industry.

Conclusion

The burgeoning literature on eco-social policies predominantly studies innovative social policies that support degrowth or post-growth, especially in countries belonging to the Global North. This focus is partly motivated by the Global Social Justice argument which posits especially that high-income and high-emission countries have responsibility to decarbonise (Koch, 2018: 36). Hence, one key contribution of this literature is innovating social policies to fulfil these countries' decarbonisation responsibility through degrowth and post-growth. However, when governments continue to prioritise economic growth, it is uncertain if countries in the Global North like EU Member States will pursue these innovative eco-social policies in the short run. In this regard, this literature focuses less on the *likely* types of social policies that governments will enact to address the labour market challenges from reforms to decarbonise industry. We contribute by filling this gap through a first explorative attempt to systematically compare *likely* social

policy responses that EU Member States may adopt. Leveraging the literature on institutional ‘stickiness’ (e.g. Pierson, 1996), we suggest variations in the relative emphasis on social investment and compensation, the relative emphasis on social policy and industrial policy, and the extent of targeted social policy.

In addition, we offer some explanations for variations on these three dimensions. Through the four country cases of Denmark, Germany, Spain and Poland, we find that countries’ emphasis on social investment in their social policy response mirrors their current emphasis on social investment relative to compensation. The more countries are currently oriented towards social investment, the more likely they would give weight to social investment in their social policy response. We also suggest that the relative emphasis given to social policy vis-à-vis industrial policy depends on the extent of expected unemployment. If sizable unemployment is expected, social policies become especially essential to smooth out labour market costs that industrial policies cannot prevent or reduce in the short term. Finally, we suggest that the degree to which social policy responses are targeted at specific groups of workers – social investment in particular – may partly depend on the extent of spill-over unemployment in downstream industries and/or the local economy.

We suggest three future research agendas. First, our study relies on (limited) empirical data EU Member States’ *planned* social policy responses rather than adopted policies as this is still a nascent domain which governments are trying to grapple with. One limitation is that some planned policies may not be adopted. Future studies could compare planned and eventual adopted policies, but with a particular focus on the role of political parties. Political parties may prioritise some planned policies over others based on their ideological stripes and the demands of their electorate. Whereas institutional contexts often yield continuity in the short term by constraining policymaking in the short term (which informs our focus here on institutional constraints), political parties may generate change in the medium term (see also Finnegan et al., 2023). Second, our theoretical framework sketches possible sources of variation in social policy responses to the Green Transition. Future studies could examine which of these sources are most relevant and important explanations for this variation. Future studies could also examine non-institutional explanations that may complement or compete with our theoretical framework which we were unable to address in this study. One, which was surfaced in our German case, was the average age of workers in affected industries. Another could be the structure of policymaking and governance (see Gazmararian and Tingley, 2023), and the role of corporate interests (Mildenberger, 2020). Finally, our focus here has been on EU Member States within the Global North. However, we suggest that the analytical framework is still relevant for countries outside of Europe even in middle-income countries which are also confronted by their own economic, labour market and social policy legacies. If the Green Transition is embedded within these institutional legacies, variations in social policy responses can be expected among the latter countries. Future studies can thus explore if the analytical framework applies to countries beyond the Global North.

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Supplemental material

Supplemental material for this article is available online.

Notes

1. One of the EU's initiatives is the Just Transition Fund. However, the focus here is on national strategies to address the labour market impact from decarbonising industries.
2. See also Gazmararian and Tingley (2023) and Hanson (2023) for the United States.
3. This point also applies to why some eco-social policies proposed by the literature such as universal basic income or participatory income are unlikely to be implemented or to be implemented in a comprehensive fashion in the short run.
4. We note that there are few works to date which attempt to carefully peruse how institutions may influence countries' social policy responses to the challenges of the Green Transition. One notable exception is Schoyen et al. (2022).
5. 3F has many workers in CO₂-polluting jobs, including in industry, but such blue-collared workers are also engaged in some of the least carbon-polluting jobs, including production of windmills and solar panels, and energy renovations. Link to the reporting of the survey results can be found here – Rebouh and Keiding (2022).

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