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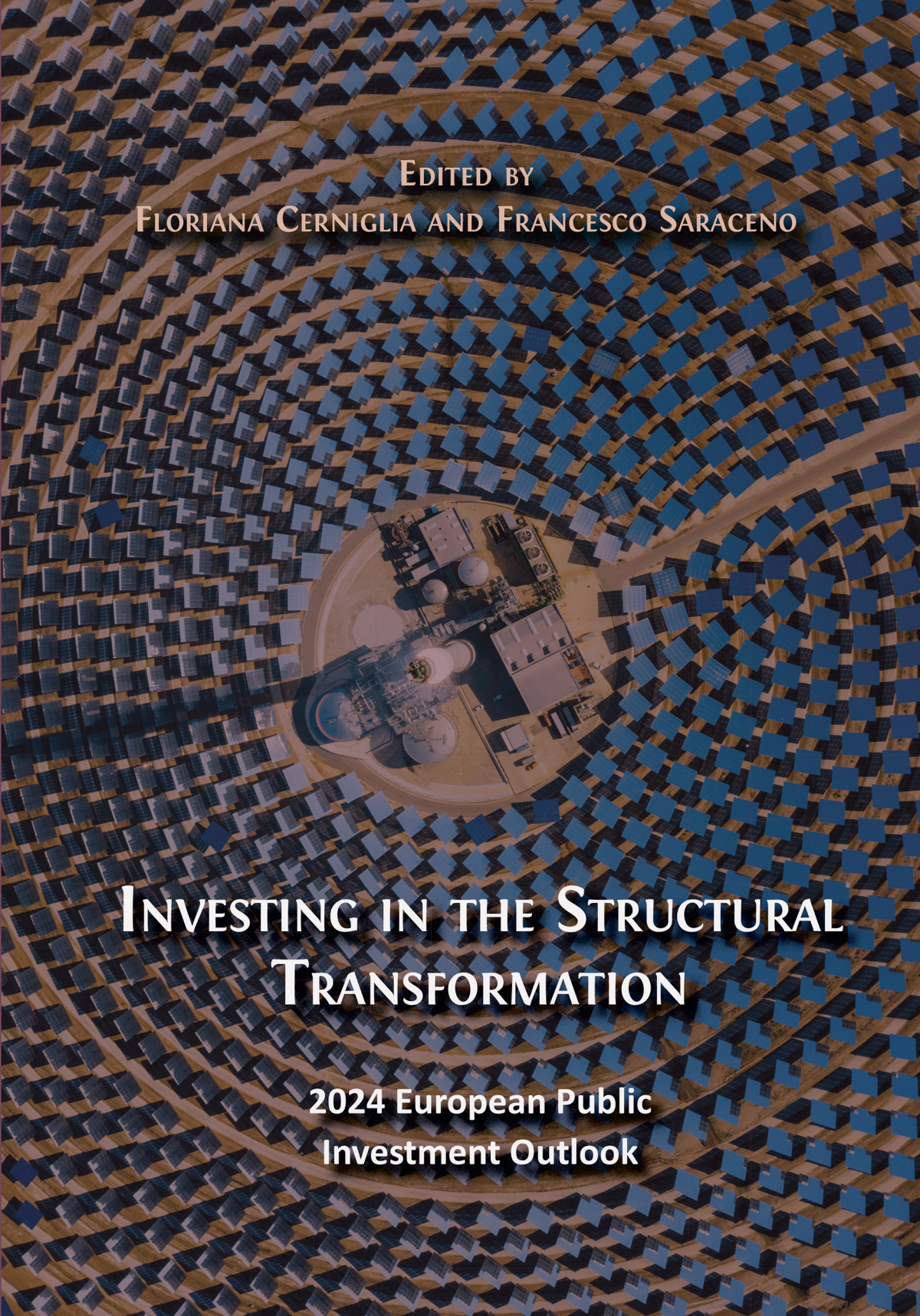

Investing in the Structural Transformation

2024 European Public Investment Outlook

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10. Sustainable Mobility and Industrial Policy

Dario Guarascio[1] *and Annamaria Simonazzi*[2]

Focusing on the automotive industry, this chapter addresses the problem of Europe's vulnerability (e.g., import dependency, technological backwardness in key domains) and the hypothesis of the obsolescence of its growth and production model. First, we analyze the evolution of the Sino-German relationships highlighting the emergence of two divergent trajectories: while a well-tailored combination of industrial and trade policies allowed China to become the leader in electric vehicle (EV) production, the German development model, mostly driven by the choices of key carmakers, slowed innovation, fostered fragmentation within the European Union (EU) and created the conditions for the current vulnerability. Second, we identify the key elements—i.e., increasing demand for affordable EVs, investments in infrastructure for the provision of public goods, building-up a European Directorate for Resource Security—of a European industrial policy for sustainable mobility which may help achieve the multiple goals of decarbonizing the economy, increasing resilience, and reducing inequalities between and within countries.

10.1 Introduction

This chapter addresses the problem of Europe's vulnerability and the hypothesis of the obsolescence of its growth and production model in light of the "twin transition" (i.e., green and digital) taking place in a changing international economic and political order. Technological change is causing major transformations in industries and companies alike, contributing to a reallocation of production between countries, regions and macro-areas. Likewise, growing conflicts and ensuing global shocks are encouraging the adoption of de-risking strategies aimed at reducing dependencies along critical value chains (VCs)

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and eventually resulting in a reshaping of trade/production networks (e.g., reshoring). Yet, the heterogeneous positioning of European Union (EU) Member States concerning their economic and technological capabilities, as well as the key structural characteristics that may affect their degree of resilience/vulnerability (e.g., population aging, skill supply, inequalities), may pave the way for further internal divergence with dangerous implications not only for the periphery but for Europe as a whole.

In this context, a major driver of change that is bound to have a profound impact on the EU and on its internal hierarchies is the acceleration of the green transition, motivated by the twofold need of meeting increasingly ambitious climate targets and reducing the dependency on (fossil) energy imports (Celi et al. 2022). To assess the EU's position and infer its future structural trajectory, it is, first of all, necessary to identify the key peculiarities of the restructuring process brought about by the green transition. The latter differs from the two previous restructuring episodes that shook the European economy in the 1970s and in the first decade of the 2000s. In the 1970s, southern economies (e.g., Italy) were those that paid the highest price as a consequence of the changing composition of demand and of the shock in commodity prices, especially oil. Specialized in more mature products and facing growing competition from newly industrialized nations (NICs), these countries bore the brunt of a deeper change in their productive structure as compared to their northern peers (e.g., Germany). This resulted, in the medium run, in an increasing divide between the core and the periphery of the EU. In the first decade of the 2000s, restructuring was driven by growing competition from China. Again, the burden was asymmetrically distributed with the Southern periphery (SP) bearing the greatest costs. Recently admitted to the World Trade Organization (WTO), China had in fact a medium-tech specialization that, along with comparatively lower labour costs, made it a fearsome competitor for the SP. As Chinese goods flooded European markets, the reorientation of German production chains to Eastern Europe put further pressure on the SP, deepening the core-periphery divide (Celi et al. 2018).

The current situation is rather different, however. The green transition is going to affect the EU's core and periphery in a more symmetric way, as the costs of restructuring depend, among other factors, on two characteristics that the two areas (at least partly) share: relative weight of energy-intensive industries and energy (import) dependency. No less relevant is the fact that today it is above all the core and, in particular, Germany, which is specialized in a technology that we could define as "solid but mature", that is going to suffer the most from Chinese competition. From being a convenient location for foreign direct investments (FDIs) aimed at exploiting low labour costs, China is now becoming a technologically qualified competitor, threatening the EU's core both in its traditional specialization sectors (e.g., automotive and, in particular, the EV segment), as well as in domains where Europe was already lagging behind the US (e.g., digital). In what follows, we analyze the EU's response to these challenges and the potential problems for internal cohesion from the perspective of its core country, Germany, and one of its key industries, the automotive one.

10.2 The Automotive Industry: From Mature, Sleepy Oligopoly to Breakneck Change

The current vicissitudes of the European automotive industry perfectly illustrate the crisis engulfing the German and, hence, the European economy. The sector deserves special attention due to its relevance for the German and European industry: it represents 7% of the European Union's GDP, directly and indirectly employing around 13 million workers, equal to 7% and 11.5% of EU total and manufacturing employment, respectively. It is of crucial relevance to Germany: exports of motor vehicles and parts represent 15–16% of its total exports, with China's share accounting for 12% of exports and 5 to 10% of the total demand of the German automotive industry in 2022.

The car industry is operating on a pan-European value chain and its present structure is the result of two different strategies. The German model specialized in the luxury and sports car segments, whose production in Germany has continued to grow over the years, while production of lower-priced subcompact cars was relocated to the Eastern European countries. The German industry grew closely integrated for inputs or final assembly with the Eastern periphery (EP), where the automotive industry represents from 15% to 23% of manufacturing value added (Pavlinek 2023). At the same time, German companies have also relocated production to China, aiming to seize the economic, technological and cost-related advantages offered by the very rapid expansion of its market. Over the last twenty years, the German automotive companies' presence on the Chinese market has been decisive for their success, with revenues from their Chinese divisions accounting for about 30% of total foreign affiliates (Deutsche Bundesbank 2024: 19, fn. 31). In 2018, Volkswagen built more cars in China than it produced in Germany, making nearly 50% of its profits there. French and Italian companies, on the other hand, have specialized in volume class, medium- and low-quality cars, where for price and cost reasons the "local to local" strategy prevails, i.e. the cars are produced in or close to the final market. The relocation of the entire supply chain to low-cost areas, inside and outside Europe, together with France and Italy's limited presence on the Chinese market, have resulted in the reduction of their production share in the countries of origin (Russo et al. 2023).

Pardi (2022) traces the contrasting fortunes of the German, on the one hand, and of the French and Italian car industries, on the other, linking their divergent trajectories to the peculiar evolution of the EU regulatory framework regarding CO2 emissions (under pressure from the German lobby). The weight-based CO2 standards resulted in a "upmarket regulatory pressure… [that] prevented generalist car manufacturers from going downmarket to meet CO2 targets and to protect their market shares by making more affordable cars" (Pardi 2022: 33). Yet, demand dynamics proved heterogeneous across areas, exacerbating the core-periphery divide: higher prices could be afforded by core countries, where they were countered by generous subsidies, much less so in peripheral ones (Pardi 2022: 47–48). Between 2001 and 2019, the generalist car

manufacturers lost market shares, and had to relocate production to low-cost countries. In the EP, the combination of upmarket drift and low wages led to massive second-hand car imports that killed the market for new cars. The stark contrast in the evolution of the two groups of automakers—Pardi concludes—highlights the considerable economic consequences that upmarket drift has had in terms of restructuring and deindustrialization (Pardi 2022: 44).

However, the new stricter regulatory procedures put forth as a consequence of the Dieselgate scandal left the shift to electric cars—both battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs)—as the only solution. The "new" principles underlying regulation have meant that electrification has simply substituted "dieselization". Without any change in business models and product architectures, "we are electrifying conventional multipurpose vehicles rather than creating new energy vehicles" (Pardi 2022: 55–56). As previously experienced with diesel cars, the entire production of BEVs and PHEVs moved towards an "upward shift", which is documented by the rapid increase in the average weight and price of vehicles: between 2001 and 2020 the average mass of the new European car increased by 15%, engine power by 43% and price by 60%. In 2019, the average BEV sold in Europe was 52% more expensive than in China and 10% more expensive than in the US.

10.3 How Fast It Goes: Innovation and Competition

Two different but somehow connected challenges are transforming the automotive sector, from a relatively mature oligopolistic industry to a new, aggressively competitive tech industry. The so-called CASE disruption (Connected, Autonomous, Shared, and Electrified) is changing the "car" product itself: its quality is based less and less on mechanical characteristics, such as engine power, and more and more on interconnection and infotainment characteristics. Consequently, the entire industry is facing a process of change concerning its technological, organizational and knowledge-related characteristics: the traditional mechanical skills that characterize the vertically integrated supply chain are no longer sufficient to produce a competitive car. In turn, various complementary specializations that belong to different supply chains (vehicles, batteries, autonomous driving, entertainment) are required. New competitors from inside (China) and outside the industry (Big Tech and software startups) are changing the geography of competitive advantages, blurring the boundaries of the sector (Simonazzi et al. 2022). Continuous, fast innovation in products, inputs, and technologies has decreed the end of the incumbents' traditional strategies, forcing them to chase innovation to survive. China is at the forefront of this process. Far from being purely a cheap manufacturing hub, China is more and more important for costs and technological upgrading, especially in the green and digital domains.

Leaping from infant industry to world champion, in just a few years, China has become the world's leading car manufacturer. It has achieved absolute leadership in

electric vehicles thanks to a far-sighted, targeted industrial policy aimed at developing the entire supply chain. Generous subsidies and strictly regulated foreign investments (importing know-how through mandating joint ventures with local companies) have accelerated the learning process; a fully vertically integrated business model, from mining to chip manufacturing to software, has ensured the supply of inputs at stable prices; heavily subsidized consumption has ensured a huge, rapidly expanding market and the achievement of dynamic economies of scale. Unlike Europe, where emissions regulations have pushed the industry towards heavier and more powerful cars, in China, thanks to a different conception of regulation, electrification resulted in BEVs that are significantly cheaper to acquire and to use than equivalent petrol and hybrid vehicles, even without any subsidy. All these factors have given the industry a first-mover advantage, placing competitors at a permanent disadvantage.

Foreign automakers have been eager to gain market access for their "traditional" cars, but have been slow in perceiving the changing context. Tesla stands out as the exception (Hvistendahl et al. 2024). Being the absolute precursor in the EV industry, for Chinese leaders a Tesla factory on domestic soil could bring technology and know-how while serving as a "catfish" that makes other fish swim faster and forcing homegrown brands to innovate. It has also created a huge talent pool which spread to the whole value chain (McMorrow and Li 2024). In exchange, Elon Musk received profuse government subsidies, low-interest loans, cheap and docile labour, and "targeted" new emissions regulations that brought huge profits to the company as Chinese manufacturing took off. Tesla's Shanghai plant became a flagship, accounting for over half of Tesla's global deliveries and the bulk of its profits (McMorrow and Li 2024).

Chinese groups are now moving rapidly into the technologies behind autonomous driving (AD). Tesla is once again leading China's push into the new frontier, partnering with leading Chinese Artificial Intelligence (AI) companies, such as Baidu, and benefiting, once again, from ad-hoc regulations on AD, namely a regulatory approval of data security provisions for more capable autonomous vehicles. EV startups and Big Tech companies such as Xiaomi and Huawei are joining in, developing connected and smart features and AD technology (Li and Campbell 2024). Software developments lead to new sources of revenue, from licensing technologies for enabling digital services to charging infrastructure. Western automakers are scrambling to catch up, partnering with Chinese companies across the entire value chain to access Chinese technology and know-how. Volkswagen's "In China for China" project, which involves massive investments in the industrial centre of Hefei, China's Silicon Valley where companies from various sectors design the "car of the future", is just one (paradigmatic) example.

The change in comparative advantage is starting to show up in trade data. China's share of EV sold in Europe is still quite low, but rising rapidly: formerly 8% in 2022 and is expected to reach 15% in 2025 (De Quant et al. 2024). Until recently, electric car imports from China were dominated by western brands exporting the vehicles from

China to Europe (with Tesla and Renault's Dacia accounting for 50%). But Chinese brands are quickly catching up: Chinese EVs are significantly cheaper, stylish and of high quality. The recent decline in German car exports to China, contrasted by the increase in German luxury car production in China and the reversal of Germany's trade balance with China, suggests that what happened for low-medium quality cars could also occur for the premium segment, where producing locally becomes the only possible strategy.

Yet, success on the Chinese market is no longer guaranteed. The recent decline in the growth rate of Chinese car demand has hit the internal combustion engine (ICE) segment particularly hard (-37% in 2023 compared to 2017), pushing Chinese manufacturers to flood the markets of developing countries with low-cost cars, and thus eroding the market shares of Western competitors (ICE cars still account for 77% of Chinese exports) (White et al. 2024). Despite the shift in demand towards electric cars, the growth rate of this segment has also slowed. Overcapacity across all market segments has sparked a fierce price war that has led to squeezed margins, bankruptcies and industry consolidation.

By relying on a much broader network of local suppliers and benefiting from stable access to low-cost inputs and batteries, vertically integrated Chinese companies can weather the crisis better than foreign manufacturers. Excess capacity and the price war mean that foreign producers, too, could try to export more from their Chinese factories, and thus risk undercutting their own factories in Western markets. If China's price war reverberates in Western markets, warns Stellantis CEO Carlos Tavares, it could end in a bloodbath. In this context, the upmarket regulatory pressure, which prevented the generalist car manufacturers from going downmarket to meet CO2 targets and to protect their market shares by making more affordable cars, leaves the European market for mass EV consumption wide open for Chinese entry.

10.4 The New EU Industrial Policy in Troubled Times

There is no doubt that the EU has drastically revised its position on competition and industrial policy, dropping its long-standing hostility towards public intervention. Bauerle Danzman and Meunier (2024) underline the extent and rapidity of such a policy change, arguing that "the EU has since 2017 created a panoply of innovative policy tools that blend trade and investment with essential security concerns". The deployment of defensive and offensive tools has been made possible "by the confluence of external factors that triggered European leaders' beliefs that change was necessary and internal factors that made such change institutionally and politically possible, a trend reinforced by the pandemic and the Russian invasion of Ukraine". Among these factors, Graf and Schmalz (2023) stress the changed German attitude—including both the government, the BDI, as well as German trade unions—towards selective state intervention and protectionism in the face of the "Chinese threat".

However, assessments of the new EU industrial policy differ concerning its size,

quality and, more importantly, expected effectiveness in countering external and internal challenges (Guarascio et al. 2024). Decarbonization and self-sufficiency (i.e., strategic autonomy) have added complexity to industrial policy, traditionally aimed at pursuing production and employment objectives (Andreoni 2024). The problem is now how to de-risk the European economic model, while simultaneously closing the gap in green and digital technologies as well as preserving growth and cohesion in a fragmented union. The European response is aimed, above all, at the external challenge, but in doing so it risks leaving open, or deepening, internal problems. Its strategy is played out on two levels. Internally, the ideology of the market is put aside by rediscovering industrial policy: it has liberalized state aid and is promoting initiatives aimed at creating alliances between European companies in sectors crucial for the green and digital transition. On the international level, it has abandoned the "dogma of free trade" with the introduction of measures aimed at protecting the internal market against (Chinese) imports or subsidized FDIs. With its "open strategic autonomy" approach, the EU wants to secure supply chains and technological sovereignty in an open economy, trying to strike a fine balance between responding to techno-nationalism and protectionism abroad and keeping markets open. However, Europe's ambitious agenda lacks a strategy to ensure its achievement and to address internal conflicts and latent policy dilemmas.

It is now a common opinion that Chinese imports damage domestic production and employment. As a result, protectionist measures are rampant on both sides of the Atlantic. Protection of the American market diverts Chinese exports to Europe. At the same time, it could benefit the EU's exports to the US. By the same token, US subsidies are likely to attract investment in green technologies from European companies. The extraterritorial reach of US-imposed restrictions, which tell European companies what to do and what not to do in their dealings with China, limits their options if they wish to maintain access to the American market. Yet, for many European/German companies, being on the Chinese market is vital: in the words of Siemens CEO Roland Busch, the company "cannot afford not to be [in China]" (Alim and Jones 2024). The attitude of the German industry is heeded by the German government, which wants to "further expand trade with China, taking into account the need to reduce risks and diversify", as a German government official said during the German Chancellor's visit to China at the head of a business delegation (Alim and Jones 2024). A fairly vague statement. In fact, large German companies have continued to invest in the Chinese market, concluding joint venture agreements with Chinese companies for the production of low-cost cars, possibly to be imported into Europe.

If producing in China becomes more profitable (or deemed indispensable for competitiveness), companies' goals may conflict with broader national economic interests. Offshoring production will affect not only the final stage of production, but the entire value chain, as components and parts suppliers will either have to follow their original equipment manufacturers (OEMs) or downsize. This adds to the

difficulties the value chain already faces with the transition to electric cars due to the much lower number of components required. Large components companies such as Bosch and ZF Friedrichshafen have already announced significant job cuts in Germany. Decisions about which plants to close and which suppliers to penalize can go beyond the corporate sphere: how to reconcile the conflicting interests between the various national industries (and their governments) becomes a thorny political problem. Protecting domestic production could also clash with countries' broader interests: in the case of imposing import duties on Chinese vehicles, the policy put forth by the EC and supported by France was not welcomed by Berlin and its automotive companies, who are fearful of negative repercussions on Sino-German trade relations.

Furthermore, the political choice of leaving the task of financing the transition to the Member States, liberalizing state aid without providing for a common EU fund, and the parallel choice to leave the direction of change to companies correspond to strongly underestimating the risk that the green transition will result in an increase in inequalities between countries and classes (as demonstrated in the case of the upmarket shift experienced by the industry in past years). State aid liberalization means that countries with fewer budget constraints have more resources to attract investments. In this regard, protectionist measures could further distort the functioning of the single market in the very likely case that the inflow of foreign investments to circumvent the protective wall is directed mainly towards low-cost, more generous or politically friendlier countries. Recent information on Chinese investment projects, mostly directed towards Eastern countries, shows that these concerns are not far-fetched. Additionally, preventing or limiting Chinese FDIs for economic or security reasons, as in the case of electronic devices and connected cars, could put the EC 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. In the case of the new Foreign Subsidies Regulation (FSR), operational since July 2023 and already resulting in numerous investigations (Moscoso and Stoyanova 2024), regulatory uncertainty could deter foreign investment and raise the cost of green tech.

The automotive revolution raises serious concerns regarding the core-periphery divide (Celi et al. 2018 2022). Both SP and EP lack national OEMs and Tier1 suppliers. Hence, their industrial fate tends to be decided in the core. Nonetheless, due to their different development paths, the two peripheries differ in the quality of their supplier networks. In the EP, "the low-tier domestic-owned suppliers specialized in ICE-specific manufacturing did not develop enough capabilities and know how to withstand the change and can easily be erased from the market if they fail to adapt and reposition themselves" (Szalavetz 2022). On the other hand, the dependence on the core could shield the EP from the most devastating (short-term) effects of the transition to electromobility. In fact, they will continue to produce internal combustion engine vehicles for a longer time, relying on the competitive advantage resulting from low production costs, especially low labour costs, and from relatively new factories. The division of labour between

the core and its EP can allow OEMs to benefit from the full range of products, from increasingly obsolete ICE technologies in the East to full-scale production in dedicated EV factories in the West (Pavlinek 2023). However, a slower transition to electric vehicles and failure to attract the battery sector could undermine the EP's long-term competitive position. Conversely, the SP still retains a network of capable, state-of-the-art parts and components firms that supply German and French OEMs and their first-tier suppliers. Yet, different factories within the same transnational enterprise compete with each other for investments, products and projects (Pardi 2022: 45) relying on a complex of "attractive factors" (labour and energy costs, government subsidies, innovation clusters), making it difficult to predict how the difference in the quality of domestic suppliers in the two peripheries will play out. The inability to retain assembly, coupled with the poor ability to attract battery plants (as proximity to assembly plants is a major cost driver), the risk of scaling back R&D, the weakness of complementary sectors—such as electronics, high technology, software—cast a shadow on the future of the sector in the SP (but the situation in Spain and Italy could be different). Even if a relevant share of components suppliers is not directly affected by the electrical transformation, the entire value chain is in danger if clusters of innovation and economies of agglomeration lead to the reallocation of production.

Summing up, security and de-industrialization concerns may affect the speed and costs of the green transition. Cheap imports from China could reduce the costs of decarbonization and benefit consumers, but risk undermining the industrial base. On the other hand, protecting "European" industry and jobs could become socially unsustainable and politically incendiary if it results in a highly unbalanced reallocation of the automotive value chain. It could also be self-defeating if companies' strategies are not reoriented towards the production of less expensive and polluting cars.

10.5 Conclusion

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, in accordance with the principle that the best industrial policy is the one that does not exist, could play on the fiction of a neutral and non-discriminating market, whereby unfair results could be attributed to inexorable economic laws, the new industrial policy makes clear the choices made, the privileged interests, and the consequent distribution of costs and benefits.

The current fragmentation risks irremediably 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, to reduce the imbalances between regions, countries, and European citizens. In what follows, we stress three points that may be included in a

strategy aimed at expanding the market (thus sustaining production and employment), securing resources, and promoting decarbonization.

1. Increase demand for affordable EVs. The European premium car market is too small compared to the production capacity of the German industry. Demand can only grow if the supply of affordable EVs increases, encouraging their adoption in poorer countries/or by poorer consumers. Revised emissions regulations (the phasing out of weight-based CO2 standards), targeted subsidies for less expensive EVs, and the threat of Chinese imports of cheaper electric vehicles could encourage a downward drift by generalist manufacturers. This change would accelerate decarbonization, as larger electric vehicles require a larger battery, more critical raw materials, and consume more energy on the road (Pardi 2022). It could also revive production in the SP, although it is doubtful whether local production would be able to withstand Chinese competition without public support.

2. Investments in infrastructure for the provision of public goods. Regulations and subsidies are not enough. The growth of the EV market can only occur if accompanied by an expansion of supporting infrastructures: charging stations, renewable energy networks, software services, connectivity technologies. This requires a common long-term strategy that coordinates various decisions on planning, financing, material procurement and governance, mobilizes and coordinates public and private investments, and avoids harmful internal competition between states. The green transition is an opportunity for growth: the European market is large enough to offer the benefits ensured by scale and dynamics economics, provided that a shared strategy addresses regional inequalities, helping lagging countries to seize the opportunities offered by the transition while avoiding the low road of competition on labour costs. Investments in green energy production in the SP and a European energy grid could activate a multiplicative process while contributing to reducing the energy cost for the entire European economy. The IPCEI program (Important Projects of Common European Interest), if properly managed to avoid being captured by bigger actors, could offer a possibility of inter-country, inter-firms collaboration.

3. A European Directorate for Resource Security. Resource security requires a coordinated foreign policy to secure global supplies and access to CRMs, avoiding the "cacophony" of multiple national initiatives. Fluctuations in demand for EVs, transmitted through the entire supply chain to CRMs, may result in greater fluctuations in mineral prices that damage the producing country's economy, thus discouraging investment. Simply relying on market-driven private investment falls short of China's long-term strategy of supporting and stabilizing production through subsidized inventory buildup. Competition on different grounds, such as a European policy of cooperation with producing countries, the creation of non-exploitative trade relationships, the provision of financing, the guarantee of non-polluting extraction, and a greater appropriation of value by producing countries, could better guarantee the strategic autonomy sought by the EU.

Finally, collaboration with China on green technologies could reduce the costs of decarbonization. Western automakers are already collaborating with Chinese companies in software technology and core components for electric vehicles to produce cheaper and more attractive electric vehicles. If properly managed and monitored, the adoption of these innovations in European manufacturing could benefit workers, consumers and the environment, and help the EU carve out a place for itself in the trade war between the United States and China.

Decarbonizing the economy while maintaining a thriving European automotive industry will require more than just regulations, subsidies and protection. It will require a delicate balance between conflicting objectives and policy measures to ensure technological progress and social cohesion.

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