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Varieties of just transitions in the European car industry

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ABSTRACT

This article examines the responses and strategies developed by business, unions, and governments to the electric turn in the industry in Germany and France, Europe's main car-producing countries. We concentrate on the role of history and institutions in the determination of adjustment paths. Since institutions reflect specific histories, the electric transition in the industry can take on different forms in different countries. In both countries, governments play a supportive role, leading in France, and following in Germany. The strong works councils in German car companies are reluctant to engage in a rapid transition that would devalue the assets of the workforce and endanger past investments in internal combustion-related technology. Trade unions, in contrast, who organise the workforce in the wider industry, are in favour of a faster transition as it will secure future employment. The French EV industry, in contrast, is now a booming sector, after several decades of deep restructuring with massive employment losses. Its key short-term problem is to train enough workers to staff the rapidly expanding car battery industry. Lacking a deeply rooted training system like the German one, the industry has a relatively free hand in selecting and preparing its future workforce.

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1. Introduction

The ban on CO_2-emitting cars over the next decade has made electric vehicles (EVs) one of the logical avenues for the automotive industry. But electrification means deep upheaval in the industry, with potential severe job losses in core occupations and a rapid devaluation of existing skills, almost certainly accompanied by stark economic decline in regions that are dependent on the industry. The standard answer to these pressures has been to organise the transition to electric vehicles in a socially 'just' way – with accompanying measures that mitigate the social shocks while embracing the underlying technological processes. Those are the plans by the European Commission and the Biden administration, and national governments throughout the OECD, which find approval among interest groups (such as Green parties, environmental advocacy groups, the European trade unions and a host of other observers).

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But that approach sidesteps an important fact: not all countries start from the same position, and actors in the transition have different resources to engage in the process. In this paper, we analyse the budding EV transitions in the French and German car industries, through the perspective of recent economic history and existing institutions – building on the influential *Varieties of Capitalism* framework (Hall & Soskice, 2001; Hancké et al. 2007). Facing broadly the same challenges, but from different historical and institutional starting points, the automotive industry in both countries engages the adjustment in very different ways. Most interestingly, perhaps, the way the transition announces itself in the two countries suggests a puzzle.

Only fifteen years ago, the German car industry was seen as a very likely place for a negotiated transition (Mikler, 2009), broadly along the lines of what we would now think of as a 'just' transition. Making cars greener followed the same path of cooperative incremental innovation that had made German cars with internal combustion engines the envy of the world. By early 2023, however, this picture is very different: the most resolute green turn in the industry, toward electric cars, is heavily disputed in German automotive circles, up to the point that industry associations are unable to develop a constructive consensus, and representative bodies of workers (unions and works councils) in the industry find themselves at odds over an electric future. The French car industry, in contrast, was not even part of the conversation in the late 2000s and may have disappeared during the financial and economic crisis without government support. Yet by 2023, the French car industry resolutely adopted extensive plans to turn all production and sales electric, and France has become a prime destination for EV-related investment.

This paper aims to understand these counterintuitive developments. It starts with a review of the debate on technology in the green transition, and why the dominant approaches fall short of explaining the puzzle above. We then use these critiques to develop our argument, building on the need to understand the role of government, institutions and actors under conditions of high uncertainty. Section 2 examines the recent evolution of the sector in both countries in detail, before we conclude.

2. The political economy of electrification

The dominant approach to technological transitions remains anchored in technological determinism: simplifying somewhat, engineers develop better technologies (Griffith, 2022), while economics suggests that adjustments in relative prices will guide the adoption of these new technologies (viz. the preponderance of market-based mechanisms in climate action, for example ETS, CBAM, local fee-based traffic systems, government subsidies to buyers, etc.). Such broadly 'Schumpeterian' ideas do not offer a very good guide to current and future developments, however, especially in the car industry. Essentially, three key conditions for a technology-driven adjustment are not or only partly met. One, first-mover advantages are relatively small in the car industry, which thrives on an oligopoly of established car brands with strengths at the front of the value chain (extensive R&D and production) and at the end (brand management, sales and after-sales). While the new car company Tesla, the poster child for the 'move fast and break things' approach in the industry, is slowly gaining market share, it remains among the smaller car companies and seems to have shifted, at least in part, to a cost-based strategy to improve sales. Meanwhile, established mass brands such as VW and Renault are exploiting

new technologies, their organisational know-how, experience and brand to enter the market in force.

In addition, market failures are likely to occur in the transition. Due to the existence of strong network externalities, some of the necessary conditions for mass adoption such as common industry standards and widely available charging infrastructure, are likely to be underprovided as public goods. Technological uncertainty on vehicle range, battery types (innovation in this area has only just taken off), technical standards for batteries and charging infrastructure, and industrial engineering, in turn, holds back generalised EV production and adoption. Even though EV sales are rising, in most of the advanced capitalist economies they make up only a small share of new registrations: in the EU, battery-powered EVs and plug-in hybrids each accounted for about nine per cent of total new car registrations in 2021 (i.e. less than 20% in total; European Environment Agency, 2022).

Finally, the post-war evolution of the industry in most advanced capitalist economies was built on strong interest organisations and stable institutional frameworks that protect workers, smaller firms and structurally dependent regions, who are unlikely to accept potentially severe negative social effects without struggles and compensation. Simply letting technology shake out the market, in sum, is unlikely to succeed as an industry-wide adjustment strategy.

The key alternative view, which influences the 'Just Transition' approach, is more sensitive to social and political considerations. For the purposes of this paper, we define a Just Transition as a transition to net-zero that includes measures to secure the future life chances of workers, their families, and their communities, based primarily on social dialogue between workers (and unions), employers and government (cf. De Ruyter et al., n.d.: vi). In that view, countries with a strong presence of the workforce in economic and corporate decision-making will not only experience a more successful transition to EVs but also consider the distributive effects of that transition on workers, companies and regions. This prediction builds on the notion that the transition from internal combustion engine vehicles (ICEVs) to EVs will be a matter of gradual technological and organisational adjustment, governed by existing cooperative institutions in training and decision-making, and will further develop sophisticated competencies among the workforce and suppliers. Cooperation is crucial because in cooperative systems, both parties possess 'co-specific' assets: one party is unable to realise its investment in a specific asset without the presence of the other. Sophisticated machines require a workforce with sophisticated skills to produce sophisticated cars (Hall & Soskice, 2001). Inasmuch as a comparative literature has developed on this theme, the countries in north-western Europe, with their deeply embedded workplace representative structures, strong trade unions in the car industry, and sophisticated suppliers are in that perspective best-placed to engage the electric transition (Harrison & Mikler, 2014). A cooperative industrial relations regime of the type we find in northern Europe offers significant benefits, as analyses of successful adjustment processes in the automotive industries since 1980 demonstrate (Streeck, 1989; Turner, 1993). Even today, in the digital transition, cooperative systems seem to outperform more adversarial systems (Van Overbeke, 2023).

The assumption of incremental change on which this argument is based, seems questionable, however. Instead of part of one engineering lineage that started with ICEVs, EVs embody in many ways a significant break with existing technologies and skill profiles.

First, electric cars are considerably simpler than traditional ones, with about two-thirds fewer parts (c. 6,000 instead of c. 20,000 parts, most of which are standardised across EV models). Second, like for like, the skills required for final assembly are not only different but also considerably less technology dependent. Third, many suppliers, especially those that produce parts for the drive train and related functions of ICE vehicles (like cooling, heating and brakes), have deep technology-specific competencies that will lose most of their value for EVs. Finally, producing EVs requires new factories and technology. It is, for reasons related to industrial engineering and supply logistics, difficult and usually quite inefficient to mass produce EVs and traditional cars on the same assembly line. That makes the transition a costly process: companies are forced to simultaneously run down their (still profitable) ICE car plants from 100% of capacity to zero and start up expensive EV plants in an inverse process.

While we borrow from both these broad perspectives, we think neither the technology cum market determinism nor its institutional counterpart, capture the electrification process in the car industry very well. In our view, the key problems in the transition are neither technological in nature nor a matter of social justice after the technological decisions have been made, but essentially political-economic issues. Three factors interact in our reading of the process: (a) the distributive consequences of the electric transition, filtered, as it were, through (b) the industry's recent history, and (c) the institutional canvas against which the shift is taking place. This is hardly a revolutionary insight. Over the past four decades, from Berger (1981) over March & Olson (1989) to *Varieties of Capitalism* (Hall & Soskice, 2001), the idea that institutions and struggles affect the economic outcomes and adjustment paths has shaped many debates in comparative political economy (Hall, 2007).

The twist, however, is that these institutions seem to influence adjustment paths and their outcomes in starkly different and unpredictable ways in the period of high uncertainty that we are traversing today. During stable periods, institutions filter signals and translate them into relatively stable cost-benefits schedules: economic actors know which paths will reward them and which ones will not (Hall & Soskice, 2001). But periods of rapid technological change are likely to produce mixed, incomplete and possibly conflicting signals. The way institutional frameworks mediate problems is less stable as a result, determined by a series of elements that may be influenced by but analytically lie well outside the reach of institutional frameworks: the degree of asset specificity of parts of capital and labour; time-inconsistency problems reflecting different incentives linked to short- and long-term costs and benefits, possibly diverging between existing and new actors; the power resources they control; and possible new cleavages within industries as a result of the new distribution of gains and losses. All of these are affected by rapid technological, policy or political changes and the institutional effects that are easy to understand in periods of stability are likely more intractable, losing much of their predictability in periods of uncertainty.

This brings us to our substantive point, informed by this short theoretical excursus. The electric transition in the German car industry plays out very differently from what modern industrial history would suggest. Because of the post-1989 evolution of the industry and of the incentives undergirding its success and stability, the transition is producing new cleavages *within* sectors (rather than *between* them, as in the past – see, for example, the Hartz reforms or the unions under EMU: Freier, 2022; Hassel, 2014; Hancké, 2013).

Collective interest representation, usually built around coherent intra-industry blocs, becomes more difficult if not outright impossible as a result: the German car industry association VDA and organised labour (the combination of the industry union IG Metall and the works councils in the large companies) face at least two strong, opposing, camps, as we will detail below. Given that German government follows rather than leads in questions of industrial and economic policy, both the industry-specific shifts and the broader green transition in Germany has obtained an ambiguous, stop-go character, and proceeds without a clear plan, involving little more than state subsidies. Industry is too divided, and government is too weak without strategic guidance by social actors – a theme dating back to analyses of neo-corporatism in the 1970s and 80s (Katzenstein, 1989; Lehmbruch & Schmitter, 1982; Offe, 1984). The central strategic problem that emerges for German actors in the transition is, as we will discuss below, identifying a more unified strategy and then negotiate reforms of the institutional framework for industrial adjustment.

In France, in contrast, the state plays a guiding role, and recent economic and industrial history, coupled with new opportunities in electrification, has produced an emerging coalition in favour of the EV transition. The main restructuring of employment and productive assets in the sector took place in the 1980s and 1990s, when several hundreds of thousands of mainly low-skilled jobs disappeared, and many plants were restructured or closed (Hancké, 2002). The electric revolution in the industry offers a restart with high growth potential. The state does not just offer subsidies (which are comparatively low, especially when compared to US President Biden's IRA funding); instead, it offers strategic capacity at central and regional levels in the guise of local development and investment agencies that operate with active support from local social actors (industry associations and some of the trade unions). The strategic problem in France is to govern rapidly rising (EV-related new) and then rapidly falling (old) employment, including in local SMEs that are technologically overspecialised, weak or both. In that new story, old institutional blockages have become opportunities, and the uncertainty opens the door for new coalitions to emerge.

Many of the insights in this paper are based on a combination of accumulated research over the past two decades, desk and archival research since 2020, and a research project involving roundtable discussions in 2021 and 2022 with key stakeholders in two of the main affected highly car industry-dependent regions in France and Germany – northern France (Hauts de France, around the city of Lille) and southwestern Germany (the Stuttgart area). In that project we worked closely with unions, industry representatives and local authorities to evaluate the specific nature of the problems that electrification posed in their region, how key actors responded, how these responses were shaped, positively and negatively, by existing institutions and new policies, and how the different concerns could be combined in regional adjustment plans and policies.

In all, we inventoried and discussed these issues problems in three rounds with about 15 partners in each of the regions. The first was a structured questionnaire where individual participants listed important problems and solutions; the second was a group meeting with participants from each of the stakeholders to clarify and discuss their positions, before moving on, in the third meeting, to a plenary session with all involved parties, which discussed elements of a strategic plan for the region. We drew up briefing notes with questions and possible conclusions for each of the latter two meetings, which

structured the rest of the discussions. For research-ethical reasons, we do not report confidential documents and conversations but rely as much as possible on triangulating the insights gathered in the project through independent public sources (instead of privileged, confidential and unrecorded conversations) that both allow us to verify our findings and allow others to check them.

We continue this paper with a rough sketch of the generic problems that electrification poses before embarking on a comparative discussion of, in that order, developments in Germany and in France. We conclude with a short reflection on our key findings and argument.

3. The electric car revolution in Germany and France

The European car industry – encompassing manufacturers, suppliers, and white-collar employees in R&D, marketing, and sales – has produced plenty of good jobs over the last half century. The industry accounts for more than 6% of total employment in the EU today and for 8.5% of jobs in manufacturing (European Commission, n.d.). High skills and high productivity have led to high wages and extensive schemes for workers' participation and co-determination in many European countries. As the industry evolved over the past 25 years, workers in the industry have developed deep technology- and industry-specific skills, leaving behind the caricature in Chaplin's *Modern Times* that prevailed until the 1980s. Employment effects have made themselves felt outside the factory gates as well: given the often deep regional embeddedness of the industry, with many local subcontractors and first-tier suppliers in just-in-time delivery systems only a short ride from assembly plants, any shock to OEMs or large Tier 1 suppliers has immediate and large effects for local communities (Federal Ministry for Economics and Climate Action, 2019). Battery giga-factories could balance the job losses, but these are often located at the fringes of the existing automotive regions (Transport & Environment, 2021), and often require different skill profiles than car manufacturing.

Owners and investors face a parallel problem. The European car industry is a capital-intensive industry with highly product-specific investments. Gross Fixed Capital Formation in the German automotive industry (GFCF, measured as total investment minus disposals) reached its historically highest level in 2018 (Source: Destatis, n.d.), immediately before the political and industrial attention to EVs mushroomed; most or all of this investment was therefore directly linked to ICEVs. In addition, the industry is also a champion in R&D investment, making up almost a third of the total R&D expenditure in the EU (ACEA, 2021).

Dynamic supply chain effects in the wake of the sector's green shift add an extra layer of complexity: OEMs are consolidating their product portfolio by reducing the number of available configurations within model ranges as a way of reducing costs (Miller, 2022). The changing product architecture – from a relatively wide range of mechanically customisable ICEV models to more standardised, off-the-shelf EVs in which additional software widgets are the main (ex-post) customisation features – will further transfer revenue streams away from small ICEV-oriented suppliers.

This analysis of asset specificities facing labour and capital in the car industry sheds a new, mildly sobering light on the current public optimism surrounding EVs. In addition, the recent industrial history and the specific institutions that govern ownership,

decision-making and training in the sector are shaping the transition in very different ways, as our case studies below suggest.

3.1. Blocked adjustment in Germany

The conventional view of the German industrial system, and especially in strong industries like the automotive industry, is based on a small number of mutually reinforcing stylised facts: strong actors in cooperative industrial relations that speak with authority (Silvia, 2013), highly-skilled workers who obtain their knowledge in highly effective training systems (Streeck, 1989) and progressive trade unions that balance the needs of individual members with those of companies, the industry where they operate, and their macro-economic effects (Thelen, 1991). This package has worked extremely well for German industry, particularly in the automotive sector. The industry weathered the 1980s shocks through negotiated adjustment (Streeck, 1989; Turner, 1993), reinvigorated after the Japanese challenge in the early 1990s, led to export successes and employment growth in the 2000s, and global dominance in high-end luxury cars since then.

Since the cooperative institutions in the industry fostered success in the difficult transitions of the recent past, many predicted (or assumed) that electrification would follow a similar path – long and careful negotiations, followed by the quick implementation of a plan agreed by the key actors (Mikler, 2009). Two largely untested assumptions fed these predictions. One was, as we pointed out earlier, the notion that the transition to EVs is best understood as a form of incremental innovation, in which the electric car remains a self-propelling box on four wheels, assembled on a carefully balanced assembly line by skilled workers. To wit: the early debates around 2010 were not about rising stars like Tesla or production sites in Asia, but about the continuing dominance by Japanese, American and German producers (Aggeri et al., 2009; Roland Berger, 2011; Wells, 2015).

However, as electrification has progressed, precisely that assumption has come under fire. The organisation of EV production is very different from ICEVs, often relying on lower skills, fewer parts and shorter supply chains (PWC, 2019). The successful development of the industry also significantly depends on a series of policy decisions outside the industry that cover broad public goods with network externalities such as battery standards and charging infrastructure, as well as governance mechanisms for access to raw materials and the development of software skills. Put simply, the entire industrial innovation system in the automotive sector, from supplier to car manufacturer, faces disruption, from the individual worker to the upgrade and connection of the road network.

Secondly, the successful transition narratives rest in large part on the much-heralded combination of stability and functional flexibility in the institutional framework. Training programmes, for example, require regular revision, but that can only happen in a framework that promotes and safeguards the earlier investment in skills. Problematically, however, the benign aggregate situation since the 1980s that we sketched above has hidden deep and developing fissures in the institutional system that governs the industry. One key set of new cleavages has emerged between skilled workers in the car companies (or original equipment manufacturers, the OEMs) and other workers in the industry (Briefs, 1982; Müller-Jentsch, 1995). As far back as the early 1980s, Streeck (1984) warned about the danger of what he called 'wildcat cooperativism', referring to the increasing willingness of workplace representatives to conclude local agreements that significantly

deviated from the official trade union line (and sometimes contradicted it). The other, parallel development emerged in the wake of the Japanese shock to the German car industry in the early 1990s and involved the OEMs and their suppliers. Whereas traditionally these relations were close and highly collaborative (Casper, 1995), the sudden competitive pressures on German producers forced many OEMs to prioritise cost in their supplier contracts (Casper, 1995). By the start of the industry's boom in the late 1990s, these more cost-effective workforce and supplier patterns had become embedded in innovations such as escape clauses for collective contracts (Hassel, 1999; Silvia, 2013), decentralised teams (Streeck, 1996), just-in-time delivery systems (Lehndorff, 1996), and a shift from long-term, relatively open-ended and customised relational contracts with suppliers to more standardised, tightly defined contracts (Casper, 1995). While saving the industry, these shifts also had significant negative distributive effects (Hancké, 1997) – but those remained largely hidden under the subsequent success of the German automotive industry, in terms of rising employment, sectoral growth, and innovation.

This potted social and economic history of the sector is the background for the EV transition today. In retrospect, the German car industry weathered the Great Financial Crisis of 2008 quite well. Not only had companies been reluctant to lay off their highly trained workers (Herzog-Stein & Zapf, 2014), by 2015, production and employment surpassed pre-crisis levels (Krzywdzinski, 2021). Few in Germany saw Tesla or its technology as an important competitor, and the prevailing opinion was that any transition in that direction could easily be handled through the existing cooperative arrangements. Many observers in Germany thought of EVs as a luxury phenomenon with limited market appeal, due to the low petrol prices at the time (Pander, 2009). Whatever the future would bring, it looked very bright for the German automotive industry.

That evolution came to an abrupt halt when leading car producers were caught falsifying emission tests in a scandal that became known as *Dieselgate* (Bovens, 2016; EPA, 2015). Beside the reputational damage and financial cost, this scandal also drove a deep wedge through the industry. Independent luxury car producers (Mercedes and BMW) paid their fines and reverted to the production of cleaner ICE cars. Volkswagen, the only remaining German car manufacturer in the mass segment, resolutely turned in the direction of low- and zero-emissions vehicles, with large-scale investment in electromobility (Welch, 2019).

This technological split had important political consequences. Most fundamentally, these technologically divergent trajectories among the leading producers eliminated the economic foundation for the cohesive representation of the car industry's collective interests through the Association of the German Automobile Industry VDA (Santamaria, 2023). The VDA's policies on EVs remained modest as a result, tending towards a lowest common denominator entailing both electric cars and a lifeline for ICEVs through synthetic fuels. The split ultimately led to a situation in which the industry effectively chose to forego agreement on common standards for basic but crucial EV-related functions such as batteries and charging infrastructure – almost certainly a significant own goal, since German standards in this new field would likely have been the basis for global standards, with future benefits even for the initially non-EV oriented car companies.

The labour side in the industry faced a parallel fragmentation. The electrification of the industry has drawn a sharp line between two groups of workers. On one side are the

workers in the OEMs, whose future was directly related to the highly technology- and industry-specific skills of ICEV production, and their colleagues with parallel ICEV-related skills among suppliers in the rest of the industry (essentially all firms producing parts related the drive train). On the other side we find the workforce outside the OEMs or ICEV-related technologies, whose skill profile was more easily adaptable to the EV transition – such as those producing seats and interior, sophisticated electronic steering functions, or adapted brakes, tyres and shock absorbers.

Since the early 1980s (in part because of the OEMs' response to the second oil shock) both these categories of workers had effectively developed different modes of interest representation which reflected in part their different skill profiles. The ICEV-related workforce, especially in the established car manufacturers, was increasingly represented by the company-based works councils, whose role has been to represent and defend workers' interests *in light of* the overall benefit to the company (Dribbusch, 2012). The legal (and de facto) mandate of works councils is to put the future of the company first and defend the workforce within that framework (Silvia, 2013). The skilled workers in these core companies – OEMs and large ICEV-related suppliers – thus found a 'conservative' expression of their interests in the works councils, who relied on their strong institutional position in corporate decision-making to safeguard skills, jobs and wages. While at the strategic level of the corporation, labour representatives in the Supervisory Board may be more in favour of EVs, it has been very difficult to persuade the workforce in the individual plants to embrace EVs (Gersenmann & Vetter, 2021).

The remainder of the labour force in the industry faced a very different constellation, however. While works councils are important in this segment too, due to the more fragmented nature of the supplier networks – from software engineering over machine maintenance to seat manufacturers and interior design, i.e. mostly functions that will easily survive the EV transition (Günther et al., 2015) – the main voice in the industry is through unions, who represent these workers with (relatively) more general, adaptable and portable skills. For those employees, the EV transition offers a series of possible advantages: not only will most new jobs in the industry likely require more general skills (CEDEFOP, 2021), but a potential reconfiguration of companies because of insourcing will also benefit this latter group disproportionately. Under law, companies in restructuring are forced to retrain existing workers before firing them and hiring new ones, and these workers are well positioned to engage that process. Represented by the industry union IG Metall, they favour a fast transition, with deep retraining, to secure competitiveness and high employment (IG Metall, 2023). The benefits that accrue to the union are, in turn, rising or high employment and membership in a promising new part of the industry.

Not unlike capital, therefore, labour has also witnessed a deep split, which pitted company-based works councils against industry-wide unions. The latter are actively campaigning for a future of electric cars, as explained by Pulignano in this special issue, while the works councils are less adamant to go down that road. In parallel to the general conservatism of highly dedicated capital in the OEMs – reluctant to engage in an uncertain future while ICEV production remains profitable – representatives of the core workforce in the industry have also adopted a vision of the future revolving around ICEVs.

Workers outside the OEMs, in contrast, are mobilised by and mobilise the industry trade union to build an (often regionally based) EV industry.

Electrification thus has sharply drawn or accentuated previously latent fault lines in the industry. The business association VDA, and to some extent the union IG Metall, have found themselves mired in ambiguity, unable to embrace a coherent position that reflects their members' interests and which they are able to enforce. In addition, many smaller companies that are closely linked to ICEV technology have no or few plans for the electric transition. As things stand, this complex interest constellation heralds a long and difficult transition to electric vehicles.

Against this background of divergent interests that balance each other out, government finds itself, not surprisingly, immobilised. As many observers have pointed out in the past, in economic policies German governments allow the relevant private actors in industry to hammer out agreements, which they follow (Offe, 1981; Katzenstein, 1989), or provide frameworks that allow private actors to negotiate agreements, which are then ratified by political actors. This is how industrial standards have been set, for example (negotiated by industry associations, experts and companies – Hancké & Soskice, 1996); how training programmes are developed, in which employers, unions and local Chambers of Commerce play central roles (Streeck & Weber, 1987); and how statutory instruments safeguard wages. Investment in industrial strategy, in turn, is usually private as well, though often underwritten by government-backed development banks such as the KfW, local *Landesbanken* and public savings banks (Deeg, 1999). In short, economic and industrial policies in Germany are driven by private actors, who negotiate adjustment paths under the broad aegis of the state.

However, if these private actors fail to negotiate new arrangements – as is the case with electrification – government shies away from committing to a single policy too forcefully and seems to prefer to sit out the process until a consensus emerges. That is exactly what has happened in the debate about alternatives to ICEVs. Instead of unconditionally backing the transition to EVs (and imposing new constraints on the car industry, as many other governments have done), the German government has adopted a policy in which both EVs and 'clean' ICEVs will retain equal status for the time being. This helps understand the sudden about-face at the EU level in late 2022, when the Scholz administration insisted on including synthetic fuels as a low-CO_2 energy source for vehicles.[1]

In conclusion, the historical and institutional strengths of actors in the German car industry now seem to work against the usual, carefully negotiated adjustment path. Business is stuck in a conservative position, eager to amortise its ICEV-related investments, while splits in the industry make unified interest representation difficult. Labour defends two, largely incompatible, types of skilled workers – those in the OEM, whose technology-specific skill profile makes them reluctant to move fast toward EVs, and those in supplier firms (beside drive train technology), for whom the electric transition may yield strong advantages. In both cases, deep technological and economic uncertainty produced the defensive reaction (and the emergence of intra-industry cleavages pitting 'conservative' producer coalitions against pro-EV forces). Government, for its part, seems unable to rise above these contradictions and develop a policy, leading to ambiguity across all actors and policy domains. This set-up and outcome contrast sharply with developments in the French automotive industry.

3.2. France: Asymmetric opportunities for electrification

The traditional view on the French car industry is almost the exact opposite of that on the German system: governed by a deeply conflictual industrial relations system, propelled by divided and (small-c) conservative unions, it follows a centralised (often failing) industrial strategy set in Paris by distant elite-trained government officials. This top-down, directive approach to industrial policy has been at the root of expensive flops in the eyes of many. Since the heyday of French central planning in the 1950s and 60s, many industrial policies that went beyond 'mission-oriented' innovation (Ziegler, 1997) have failed. As one astute observer (Smith, 1998) recognised, France knows how to build space rockets but fails in washing machines. Nuclear power, high-speed trains and space or armaments technologies have thrived because of their reliance on centralised decision-making and coordination, while sophisticated manufacturing of consumer durables has proved difficult because of the need for decentralised decision-making in companies and workplaces. Radically new attempts by French policymakers after the Left's victory in 1981 to decentralise the key levers of economic development – innovation, technology transfer, and training – have run up against these limits, ironically because the state's previous centrality limited the abilities of local actors to occupy the decentralised policy space (Levy, 1999).

The car industry since the second oil shock is a case in point (Freyssenet, 2009; Hancké, 2002). After stellar results in the 1970s, both domestic car manufacturers Renault and Peugeot-Citroën faced existential crises in the 1980s. The subsequent restructuring process started with a combination of mass redundancies among low-skilled workers, hiring higher-skilled technicians, and restructuring supply chains by simultaneously outsourcing more and imposing minimum turnover targets on Tier 1 suppliers (Hancké, 2002, p. 107). Soon after the fall of the Berlin wall, producers looked abroad for assembly and suppliers (Freyssenet, 2009), and by the early 2000s, the restructuring had led to a much-changed French car industry, with fewer plants in France and elsewhere in western Europe, a smaller but better-trained domestic workforce, more sophisticated supplier networks, and generally higher profit margins.

The French car industry digested the economic crisis following the financial turmoil of 2008 very poorly. As in many other countries, government subsidies offered a lifeline, but the 2010s saw a significant reduction of productive capacity and employment: by some estimates over 100,000 jobs were lost since 2010 (Observatoire de la Métallurgie, 2021), and added to the restructuring wave since the mid-1980s, the French car industry, including main suppliers, has lost about half a million jobs. Moreover, since car plants often adopted a highly localised hub-and-spokes model after the lean production revolution of the early 1990s (Hancké, 2002), these job losses, and the concomitant local tax revenue losses, have produced regionally concentrated economic failures. The northern regions of France, particularly those between the Channel and the Belgian border where industrial unemployment tops 10%, have been among the hardest hit because of these job losses.

Against this background, the EV revolution is offering new hope for the industry and the regions that have previously been dependent on it. Not only is it expected to lead to a revival of the core industry, but it will also entail a significant increase in jobs in other sophisticated activities, often with links to R&D facilities. With this objective in

mind, regional actors in northern France put special emphasis on innovation policies which may increase the speed and depth of the industrial transition. Links between university-based and industry-led innovation are, as one of our local interlocutors explained in early 2023, fostered in DAS ('*domaines d'action stratégiques*') offices and innovation parks (Altenburg et al., 2012), while competitiveness clusters that include collaborative innovation projects enable the development of a more integrated advanced supply chain (Röhr, 2019).

Following this approach, a consortium of local business associations, the regional government, and regional development and investment agencies in northern France, with the (often tacit) support of some of the unions has propelled the region into the EV era, attracting (at the time of writing) four large battery factories, setting up training arrangements for over 15,000 workers, and developing links between producers and local innovation centres (Hauts-de-France Enterprises, 2022). As usual in France, the central government is on stage as well with support in many forms, but the initiative is – somewhat surprisingly, given the French historical context with its weak civil society and overbearing state – carried by enthusiastic local actors.

Prima facie, the root of this successful development follows from the energy with which the regional automotive industry and the development agencies have taken matters in hand. But equally important are two crucial institutional and political background conditions. First, with the decimation of the traditional workforce since the late 1980s, the traditional blue-collar unions CGT and FO have lost much of their influence in the industry. In the mid-2010s, for example, the union of middle management and engineers CGC-CFE became the strongest union in local workplace elections in Renault (Eurofound, 2013; Le Figaro, 2019). And the CGC-CFE is by its very nature far more open to technological change – not least because it would involve significant employment gains in the occupational categories the union represents. This evolution of representative organisations effectively eliminated the implicit veto of the previously strong blue-collar unions, with a white-collar union alliance of technicians (organised by the CFDT) and engineers (in the CGC-CFE) taking over.

Secondly, one of the previously weak points in the industry has, somewhat ironically, turned into an important benefit. The lack of a sophisticated training system – of the sort that existed in Germany – has haunted French industry for decades, since it meant that any shopfloor innovation was hampered by weak skill provision (Culpepper, 2001). The essentially unskilled workers of the 1960s and 1970s may have disappeared, but it was not until the shake-out of the 1990s and 2000s that semi-skilled workers were replaced by a combination of robots and more highly skilled technicians. However, the very absence of a deeply institutionalised training system has now opened the door to a rapid organisation of training activities for the new industries.

A comparison with training and its reform in Germany is instructive in this regard. In Germany, adapting existing training depends on a successful renegotiation of jobs with trade unions. The logic is that training follows job and wage negotiations. New training programmes require new detailed job profiles, consisting of specific types and combinations of knowledge, expressed in well-defined tasks and task weights within profiles, and an associated wage scale – all of which have to be agreed before the new training can be developed (Thelen, 2014). This process can easily take several months to a few years – reflecting many different structural variables: the uncertain socio-technical

future the new training is supposed to address, defensive union policies out of a concern about new job design outside the collective bargaining structure, and the incentive for employers to pack many skills into lower job classifications while unions prefer the opposite. Since reform is slow and complex, in a fast-moving, unstable process like the transition to EVs, new training programmes often end up being developed based on job profiles that predate the negotiations by several years. Acquired skills thus take a long time to come online, with a gross time of as much as several years of negotiating and developing, plus the actual training of new recruits or retraining of existing workers (which usually takes between one and three years). Furthermore, because of the delays between the new definition of the new job profile and the agreement and formulation of new training programmes, the new skills also run a significant risk of effectively being at least partly obsolete by the time they are acquired. Aware of the problem, German unions are considering speedier and more flexible arrangements including regulatory 'sandboxes' to experiment with new tasks and jobs before entering formal negotiations. They remain cautious, however, about the possibility of exploitation and insist on the link between wages, jobs and training (IG Metall, 2023).

The absence of such a deeply institutionalised cooperative training system with many veto points, widely seen as a handicap for French industry in the past, has suddenly turned into a significant advantage because of the speed and uncertainty of the transition. While the optimal arrangement for training in the electric car era may well be a combination of deep technological specificity and organisational flexibility in skill acquisition, such a package seems impossible because both poles pull in opposite directions. The preconditions of one (e.g. stable skill and job profiles) are anathema to the preconditions for the other (e.g. uncertainty and volatility in product markets). Lacking a deeply institutionalised system has revealed itself as a benefit, however, as French industry has been able to reinvent training in a highly unstable situation, while German social partners face the rigidity of the system – but this time without the beneficial effects that many observers (e.g. Hall & Soskice, 2001; Streeck, 1992) have ascribed to it. This does not necessarily *preclude* adaptation, however, as we pointed out: German industry and labour are examining transition paths that include more flexibility – but they do so conscious of the limits that the existing system imposes.

Industrial transition processes may be pushed by actors and enabled by institutions but critically depend on the abilities of the weakest links in the process to meet the new standards. While in the past the training system was seen as the soft spot, in today's transition to EVs in the French car industry that place seems to be reserved for suppliers. Their growth in size and increased sophistication over the past 25 years obscured a darker side which was hidden under technological stability. Because of their sustained specialisation, many of the suppliers were among the most cost-competitive in ICEV-related technologies. But many of them, particularly small and medium-sized companies (SMEs), do not (yet) have the electric transition on their horizon. This lack of preparation is further exacerbated by perverse incentives in the transition: until the sale of ICEVs is prohibited (on current calendars in 2035), these cars remain the main cash cow for OEMs, financing (slowly decreasing) R&D in ICEVs and (rapidly increasing) R&D and new plants in EVs. In that transition, however, OEMs hang on to their existing suppliers, and the incentive to produce ICEVs for as long as possible effectively binds

the latter to the old technology (interview with local government official in Hauts de France, February 2023). Since most SMEs are chronically underfunded and lack the resources to finance long-term, low-yield investments, they are deeply unprepared (this quasi-Malthusian characterisation of small firms in France harks back many decades; see Levy, 1999 for a review).

Again, a comparison with developments in Germany is instructive. More than a few German SMEs are just as ill-prepared, and because of their traditional family ownership structures they find it equally difficult to envision a new future outside the comfort of ICEV technology. But most of the powerful suppliers in the industry in southern Germany and elsewhere have the cash and the relations with local banks to finance a move away from obsolete ICEV technology. In France, in contrast, suppliers are left to fend almost entirely for themselves. The government has made available an SME-targeted adjustment fund, but its size – a mere €300 million for the industry in the entire country – hardly matches the scale of the problem (Chodorge, 2021). Bearing in mind the simple economics of electric vehicles with significantly fewer parts, it is hard to avoid the conclusion that the periphery of the French car industry will witness a massive crisis. Only the very largest suppliers, many of whom have grown to include electric functions, appear to have the cash to engage the EV transition (Kanitz & Hancké, 2024).

The adjustment to EV production in France announces itself therefore as extremely complicated. The perennial problems with the training system may have been overcome, but the equally long-standing problems with smaller firms have not disappeared. Even though the EV transition requires new production networks alongside an upgrade of existing ones, regional authorities fear an elephant-like adjustment curve, with a bulge in employment and sectoral activity in the near future, when both ICEVs and EVs are developed and produced, followed by an equally rapid employment deflation when ICEV-related employment and suppliers disappear. These regional effects are likely to be quite dramatic, with EV-related factories potentially becoming 'cathedrals in the desert'.

4. Conclusion

History matters, as do institutions, in the electric transition in the European car industry. This paper examined adjustment strategies in the automotive industries in Germany and France – home to the largest on the continent and among the larger in the world – and identified a series of bottlenecks as well as chances that were shaped by the different histories and institutions of the industry in both countries.

Many observers expect a relatively smooth adjustment in Germany and significant friction in France; our analysis, however, sheds a slightly different light on institutional arguments surrounding the electrification of the industry and a 'just transition'. In a nutshell, the cooperative institutions in Germany, against the background of a supportive framework for training and finance, and a highly successful supplier network, are considered a guarantee for a rapid and just green transition in the industry. Yet, as we discussed, the institutions seem to harbour as many obstacles as they offer opportunities. Rather than simply 'beneficial constraints' (setting clear institutional and legal limits to adjustment, which force business into high value-added segments, cf. Streeck, 1997), the very institutions that shaped successful adjustment in the car industry in the past seem

increasingly 'detrimental obstacles' because of their centrifugal force. While markets would, given the plethora of market failures in the process, certainly not yield faster and better adjustment outcomes, the veto points in the institutions also impose important political-economic obstacles when distributive effects are uncertain (but almost certainly negative for incumbents). Perhaps they will adjust over time again to offer the well-known matrix of opportunities and constraints that guide industrial restructuring – never underestimate the adaptability of institutions, especially not in Germany, where slow starts are often followed by rapid implementation – but for now, the institutions operate as brakes to, and not as engines of, adjustment.

In a parallel way, the French car industry, usually seen as a problem case in processes of industrial restructuring, has been able to manoeuvre within its thin institutions and move rapidly towards electrification (with, thus far, mainly beneficial effects). Unhindered by deep institutions and associated veto points that promote the ICEV-related technology paradigm, it has attracted large battery investments and developed a mass training system for EV production. In the past, deep industrial restructuring faced obstacles from strong and militant blue-collar shopfloor unions; but the gradual occupational shifts in the industry over the past decades have produced a 'progressive' coalition between technology-minded white-collar workers, their unions, and their employers who are keen to capitalise on technological advances.

Institutions and history therefore do not just matter but set important constraints on adjustment paths as well, as the important literature on path-dependent development has taught us (eg. Pierson, 2004). This now commonplace insight gains in importance here because of the historical successful adjustment in Germany and the doomed-to-failure narrative that has surrounded French industry. In a period of rapid technological change and deep economic uncertainty, institutions remain important pools of resources for adjustment, but their effects are harder to predict. History plays a similar ambiguous role in the adjustment process. The success in the recent past in Germany has made industry and parts of labour reluctant to abandon the traditional technology, while industrial restructuring in the recent past offered the socio-economic background against which French actors are now constructing an EV industry.

There is, in other words, not a unique electrification trajectory that presents itself, but several possibilities, deeply influenced by the past – history as a process of struggles, and institutions as the congealed expression of that process. By extension, the central question of a 'just transition', in which the distributive outcomes are mitigated for those who stand to lose, does not have a single answer either. As Tolstoy could have said, abandoning the internal combustion engine is the same everywhere, but all countries engage a just, green transition in their own way.

Note

1. Again, this position is associated with strong path dependencies: for a long time, German car manufacturers were able to exploit loopholes in EU emission regulations, enabling them to produce ever more powerful, heavier and, thus, polluting cars. EU emission targets for individual manufacturers are adjusted for the OEM's average vehicle fleet weight – the heavier the cars in the fleet, the higher the allowed CO_2 emissions (Pardi, 2022). Against this background – and bearing in mind their significant lobbying power and political clout – it is hardly surprising that the majority of German OEMs were late in switching to EVs.

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