The London School of Economics and Political Science

Structural change, institutional adaptation, and regional polarisation: some lessons from Germany

Frieder Mitsch

February 2023

A thesis submitted to the Department of Government of the London School of Economics and Political Science for the degree of Doctor of Philosophy

Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

I warrant that this authorisation does not, to the best of my belief, infringe the rights of any third party.

I declare that my thesis consists of 48,762 words.

Statement of co-authored work

Paper 1
I confirm that Paper 1 was jointly co-authored with Prof David Soskice and I am the lead author. It is fair to say they each made a similar contribution to the analytic argument and wrote equal shares of the paper.

Paper 3
I confirm that Paper 3 was jointly co-authored with Andrew McNeil and I am the lead author. It is fair to say that we each made a similar contribution to the final analytic argument and wrote equal shares of the paper.

Paper 4
I confirm that Paper 4 was jointly co-authored with Prof. Neil Lee and Dr.Elizabeth Ralph-Morrow and I am the lead author. It is fair to say that I made major contributions to the analytic argument and wrote equal shares of the paper.

Abstract

The transition to the knowledge economy in advanced democracies such as Germany has seen technological, structural, and institutional changes. These changes have not resulted in a common pattern of development within advanced societies but instead separated them in many ways between increasingly prosperous and marginalised regions. This collection of loosely linked papers explores aspects of these changes and resulting regional polarisation with a focus on Germany.

The first paper argues that the transition to the knowledge economy in Germany has led to a more decentralised, flexible institutional landscape, which in turn has resulted in increasing regional divergence. The second paper looks more closely at the political consequences of technological change and shows that young individuals with a lower educational background and in occupations with high automation risk are more likely to vote for the AfD compared to their older or more educated younger peers. The third paper shifts the attention to the redistributive consequences of structural change by examining the political consequences of the green transition with a case study of wind and solar farm expansion plans in Baden-Württemberg. The results show that local authorities with areas designated as potential sites for future wind turbines or solar farms tend to vote less for the Green Party. Furthermore, it is existing Green Party supporters who are significantly more likely to desert the Green Party than their non-affected peers. The fourth paper explores the increasing trends of regionalisation beyond Germany by investigating the growing urban-rural polarisation in political trust in Europe and finds that rural areas are losing faith in national government because they perceive their socio-economic infrastructure to be worse than core areas.

Acknowledgements

I would like to start by thanking my two supervisors David Soskice and Neil Lee. Little did I know when I returned to the LSE in 2017 to start working as part of the university administration that I would start a PhD the following year. Without David I would have never even considered pursuing a PhD and his enthusiasm for my ideas and research was a major factor for me to start and endure this journey. While I was getting lost in blue sky thinking with David, Neil has always been there to pull me back to the ground and translate my ideas into actual research papers. They both have always been in reach to give me support and made sure I would stay on track. From teaching me on how to navigate the publishing process jungle to challenging my ideas and arguments, they have not just made me a better researcher, but have also been true mentors in- and outside of academia.

I am indebted to many friends and fellow researchers who supported me throughout the project. I am particularly grateful to my PhD colleagues and friends Andrew McNeil and Sarah Jewett. Andrew has not just given me invaluable feedback and advice but is also co-author of one of the papers of the thesis. Both have always been around for a chat and have become dear friends.

I must also thank my parents for their interest in the thesis and assistance in collecting and sharing countless regional and local newspaper articles, even though they are probably still not entirely certain what I have been doing.

Most importantly, I would not have been able to complete the PhD without Cécile. She has undoubtedly been my biggest source of support for this thesis and beyond.

Table of Contents

List of Tables

List of Supplementary Tables

List of Figures

List of Supplementary Figures

1 Introduction

Germany's economic model is hailed by many and some countries even tried to copy parts of it, be it labour market policies or the vocational system (The Economist, 2019a). However, the German model is also facing challenges with the rise of the knowledge economy and technological change, and some are even asking if Germany's 'golden decade' might be coming to an end (The Economist, 2019b). The Knowledge Economy describes the set of economic activities that depend on non-fordist technical abilities, and intellectual creativity, which have become the main driver of economic development in advanced societies over the last decades, thus putting pressure on the workforce (Iversen & Soskice, 2019; Hope & Martelli, 2019). Globalisation over the same period of time has increasingly connected advanced societies via flows of goods, services, information and capital.

The magnitude of improvements in information and communication technology (ICT) and falling transportation costs led some authors to declare the 'end of geography' (O'Brien, 1992) or to describe this new world as 'flat' (Friedman, 2005). This line of thinking suggests that globalisation has eroded differences between places, eliminating any particular characteristics and undermining local actors' ability to influence regional destinies. Therefore, economic development should occur everywhere, and the processes should ultimately lead to economic convergence across regions and countries.

However, these predictions are not supported by empirical evidence. Instead, the economic geography literature has emphasised that the rise of the knowledge economy and globalisation are increasing the role played by local and regional actors and circumstances (Amin and Thrift, 1994; Storper, 1995, 1997; Rodríguez-Pose & Crescenzi, 2008). The processes have not resulted in a common pattern of development within advanced societies but instead separated them between increasingly prosperous regions on the one hand and marginalised regions on the other across most of the western world (Carlino et al., 2001; Crescenzi et al., 2007; Storper, 2018). Concentrated economic power in certain areas has led to geographical divides between and within regions themselves. The resulting geographical segregation is not just limited to income or skill but is also political and cultural. In fact, advanced economies have become increasingly culturally, educationally, politically and residentially segregated (Rodríguez-Pose, 2018; Storper, 2013, 2018). Moretti (2012) argues that the geographical dimension is the

most striking aspect of this divergence and indeed, the segregation can also be present within regions or even neighbourhoods of cities.

The increasing economic importance of subnational units is to a large extent due to the economics of concentration of highly skilled people and firms, and the networks of innovators who drive the knowledge economy. This shift of economic activity towards regions poses essential problems for national policymakers, as well as social scientists trying to better understand the underlying processes. Regions are embedded in different institutional frameworks, for example, labour markets. In addition, these institutions vary between and within countries and have a profound impact on firm-behaviour shaping economic activities (Hall & Soskice, 2001; Rodríguez-Pose, 2013).

Yet, in the comparative political economy literature there is little exploration of regional institutional arrangements. Instead, most of the literature has and continues to describe and analyse the recent developments and their consequences by focusing on the nation-state as the main unit of comparison (for Germany see e.g. Thelen, 2019 and edited volumes by Hassel & Palier, 2021, and Baccaro, Blyth & Pontusson, 2022). The collection of papers in this PhD thesis are trying to bring insights from economic geography into the comparative political economy debate. This interdisciplinary approach brings up new questions and answers to the question of how the structural and technological changes of recent decades have affected advanced societies and Germany in particular.

The changes to the nature of work tasks due to technological advances is resulting in the demand for more knowledge work, which is challenging for the relatively less-skilled. Thus, these developments can also have a profound impact on especially relatively less-skilled populations resulting in reduced social mobility (Chetty et al., 2016). Arguably, the segregating effects that come with structural changes should be playing a role in the political landscape as well. The recent literature on the political consequences of technological change show that there is a connection between those groups negatively affected by technological change and their probability to vote for anti-establishment parties (Kurer & Galego, 2022). However, there are differences between the negatively affected and not all respond in the same fashion. While older affected workers are often ‘holding on until retirement’ (Kurer & Gallego, 2019) younger workers do not have that option. In other words, it is still an open questions how different demographic and socio-economic characteristics influence an individual’s response to the

effects of technological change, as well what role institutions play in mediating the effects of technological change in different contexts.

The spatial concentration of knowledge economic activity also means that not all places are going to be winners of this process. Rodríguez-Pose (2018) argued that it is the places lagging behind and people's ties to them which can explain the recent rise of anti-establishment parties. However, these changes are not limited to the emergence of populist nationalist movements and parties across advanced societies (Hobolt, 2016; see also Hobolt et al., 2018), but can also play a role in electoral support for specific structural policies. An example is the case of environmentally friendly policies as part of an effort for the green transition as a response to climate change. Within countries the 'cost' of reaching 'net-zero' is not distributed equally. The burden often falls on lower socio-economic groups, more deprived areas, and smaller towns and villages (Arndt et al., 2022; Frondel et al., 2015; Markkanen & Anger-Kraavi, 2019). Especially rural areas suffer with the transition to green technologies given the lack of access to public transport and the high initial costs involved in the transformation. The 2018 'Gilets Jaunes' (Yellow Vests) protests highlights the potential for a mass response when a part of the electorate perceives a disproportionate burden from the green transition (Mehleb et al., 2021). However, the nature of the redistributive and political consequences of these policies is not clear.

The four papers of this PhD thesis explore different aspects of these developments with a particular emphasis on Germany.

The first paper assesses how the rise of the knowledge economy has affected the coordinated nature of the German Political economy. The paper contributes to the emerging literature on the effects of the rise of the knowledge economy in Germany (Thelen, 2019; Diessner et al., 2022) and suggests that with the transition Germany no longer has the same high level of coordination between market actors as in the past and that more attention should be paid to the increasing regional diversity of regions and their institutions within countries. Germany is becoming increasingly regionally unequal, despite in the literature still described as a CME with institutional features that should lead to relative regional equality. The solution to this puzzle is that the rise of the knowledge economy has caused the partial breakdown of previous national cooperative institutions underlying the German political economy. The coordination between different actors has been declining and the institutional arrangements have become

more decentralised and increasingly determined at the regional level which in turn has allowed for differentiation and resulted in more regional divergence. Competition geared towards knowledge and innovation is further disincentivising companies from cooperating with each other relative to previous cooperation levels, and Länder and regional policies in education and industrial policy play a more prominent role which is further fuelling regional differentiation. Firms have been able to capitalise on the changes in the southern German Länder but not to the same extent in other parts of Germany. As a result, the Southern German economies show a stronger focus on knowledge intensive activities which is increasing the economic performance gap between them and the rest of the republic. Especially large research-oriented firms are drivers of the increasing regional divergence. These companies are driving the adjustment towards innovation driven competition and are aided by their Länder via educational or industrial policies. These efforts can lead to evolving innovation ecosystems that have positive spill over effects for the rest of the economy including SMEs.

Technological innovations are not just the increasing competitive focus for market actors in the knowledge economy but are also contributing to many of the observed polarising processes. Not everyone especially in the case of labour market participants is affected equally by the introduction of new technologies. The second paper looks more closely at the political consequences of technological change in Germany and finds a generational and educational divide among the affected groups. So far, the focus in the literature has been on the political response to automation risks by older workers, largely ignoring younger cohorts, and the question if institutional mediation of technological change could be affecting political behaviour. The career trajectories of younger individuals with a lower educational background and now in occupations with higher automation risk could be particularly affected. While many of these occupations had guaranteed a decent standard of living and prospects of upward mobility in the past (Nachtwey, 2016), the susceptibility to automation by new technology is undermining this positive outlook (Kurer, 2020). In addition, German labour security laws do not just reward the length an employee has been staying with their employer but make it generally harder to make older employees redundant due to their personal circumstances. This means that it is younger generations in the workforce who are likely to be more vulnerable compared to their older counterparts. However, younger individuals on the labour market are obviously not a homogenous group. A university graduate might start in a low paid temporary contract in an occupation consisting of a high share of routine tasks, but this individual will still have a higher likelihood of finding a new job compared to a traditional apprentice with a

specific skillset who might be find themselves in a declining sector and career path under threat of future unemployment. The analysis shows that young individuals with a lower educational background, employed in occupations with higher automation risk are more likely to vote for the right-wing populist AfD compared to their older or more educated younger peers. As a result, a young individual with a lower education background, facing lower job security and uncertainty about their occupational future is likely to experience status anxiety and consequently become more likely to vote for the AfD.

Policies that accompany or try to bring about structural changes can also contribute to regional polarisation. The third paper shifts the attention to the redistributive consequences of structural change by examining the political consequences of the green transition with a case study of wind and solar farm expansion plans in the German state of Baden-Württemberg. Within countries the 'cost' of the green transition and the associated journey to 'net zero' are not distributed equally. We know from a variety of literatures that this can often result in a 'Not in my back yard' (NIMBY) response. For those that live in cities, there are limited prospects of being directly impacted by environmental infrastructure in one's backyard. It is both inefficient and impractical to place renewable energy sources in the city because they require more space due to their lower energy density. On the contrary, rural areas suffer with the transition to green technologies given the lack of access to public transport and the high initial costs involved in the transformation. The paper uses a difference-in-difference design based on whether one's area is designated for potential future infrastructure. The study results show that when a local authority includes a significant area that is designated as a potential site for future wind turbines or solar farms, those local authorities tend to vote less for the Green Party. Furthermore, it is existing Green Party supporters who are significantly more likely to desert the Green Party than their non-affected peers. This indicates a trap for the Green Party in Germany. Their core reason for being is 'green' policy. However, some of those voters, who are presumably attracted by this message, turn away when such a policy is implemented. The paper contributes to a small but growing literature illustrating the effects of environmental infrastructure on political attitudes. While the majority of the literature has been looking at wind turbines this paper shows that the effects are broader and apply equally to solar farms. The study also nuances previous findings by showing that it is existing Green Party supporters who are the most likely to remove their support. More generally, the results show that forming political coalitions for the green transition will be tough without compensating the groups who bear the cost.

The fourth paper explores the increasing trends of regionalisation beyond Germany by investigating the growing urban-rural polarisation in political trust in Europe. There is growing concern about political polarisation in Europe between urban and rural areas (Jennings & Stoker, 2019; Stein et al., 2019). One explanation for this crisis of trust is economic failure, with lower incomes in the periphery shaping the perceptions of rural-dwellers who no longer feel the system 'works for them'. An alternative explanation is that the divide is cultural, with rural residents made anxious by urban government which they perceive as having different values to them. The uneven geography of political trust represents a potentially important problem for European countries. Political trust is seen as underpinning the democratic process by ensuring citizens feel the government is likely to act fairly (Boyer, 1992; Levi & Stoker, 2000; Citrin & Stoker, 2018). The apparent divergence of political trust between urban and rural areas may therefore have important consequences for democracy. Yet, few studies have considered differences in trust in urban and rural Europe. This paper addresses this gap and contributes to the growing literature on trust in Europe, complementing national level studies (Stein et al., 2019). The analysis shows that the declining trust in politicians across Europe has been driven by residents in rural areas and towns. Even with controls for individual demographics, economic outcomes, and values, the residents of rural areas are more likely to have lower trust in government. Secondly, there has been divergence over time. Before the financial crisis, there was no difference in political trust between urban and rural Europe. Since then, levels of political trust have diverged significantly. The study argues that much of this divergence is explained by differences in perceptions of local economies, education, and healthcare. Rural areas are losing faith in national government because they perceive their socio-economic infrastructure to be worse than core areas. The uneven geography of political trust represents a potentially important problem for European countries, as political trust is seen as underpinning the democratic process.

2 The Rise of the Knowledge Economy and Regional Divergence in Germany

Co-author: David Soskice[1]

Abstract

This paper investigates the causes of the increasing regional economic divergence in Germany. It shows that the transition to the knowledge economy in Germany has caused the partial breakdown of previous national cooperative institutions which in turn has led to a more decentralised, flexible institutional landscape resulting in increasing regional divergence between the Länder. With the rise of the knowledge economy, competition geared towards knowledge and innovation has changed the ways firms operate and has put pressure on the main pillars of the German institutional framework, further disincentivising companies from cooperating with each other relative to previous cooperation levels. The three main institutional pillars – corporate finance, industrial relations, and education and training – have become more decentralised, and Länder policies play a more prominent role now. The result is increasing regional divergence. Especially large research-oriented firms are driving the adjustment towards innovation driven competition and are aided by the Länder via educational or industrial policies. While firms in the Southern-German Länder have been able to capitalise on the changes, other regions are increasingly falling behind. The paper suggests that more attention should be paid to the increasing regional diversity of institutional arrangements within countries.

2.1 Introduction

Over recent decades Germany – like many other western European countries – has seen the rise of the knowledge economy, which describes the set of economic activities that depend on non-Fordist technical abilities, and intellectual creativity, which have become the main driver of economic development in advanced societies. This transition has been driven and accompanied by three massive shocks: the ICT revolution; globalisation; and substantial acceptance of the neo-liberal framework. The literature on economic geography has highlighted that instead of making the world flatter, i.e. increase convergence, these processes

[1] Professor Emeritus, Department of Government, London School of Economics and Political Science, d.w.soskice@lse.ac.uk

have led to a more spikey world (Storper, 1997; 2018). In other words, while some regions have been able to capitalise on the developments and thus seen economic growth, others are in decline.

In the VoC literature, Germany was the emblematic Coordinated Market Economy (CME) with industry-based coordination, social partnership, and corporatism (Hall & Soskice, 2001; Streeck, 1997). While the literature has shown that the German institutional framework has undergone incremental changes over the last decades (Thelen & Palier, 2010; Thelen, 2014), the consequences of the transition towards the knowledge economy remains largely understudied[2]. The typical CME institutional features should in theory reduce inequalities (Hall, forthcoming; Estévez-Abe, Iversen, & Soskice, 2001). However, over the last two decades Germany has been experiencing growing regional inequality. While the economy as a whole has performed well since 2000, we also see increasing divergence between the economic performance of different regions. Baden-Württemberg (BW) and Bavaria (BY) have been outpacing other states in terms of economic and productivity growth. From 2000 to 2019 the two Länder's share of the national Gross Domestic Product (GDP) has increased by 0.4% (BW) and 1.6% (BY) respectively, whereas North-Rhine-Westphalia's (NRW) share has decreased by 1.4% (Arbeitskreis VGR der Länder, 2022). Equally the two southern German states' GDP grew on average by 1.6% in BW and 2% in BY per annum between 2000-19 compared to NRW with only 1% growth.

Germany is becoming increasingly regionally unequal, despite in the literature still described as a CME with institutional features that should lead to relative regional equality. In this paper we argue that the solution to this puzzle is that the rise of the knowledge economy has caused the partial breakdown of previous national cooperative institutions underlying the German political economy. The coordination between different actors has been declining and the institutional arrangements have become more decentralised and increasingly determined at the regional level which in turn has allowed for differentiation and resulted in more regional divergence. As a response to the changing institutional requirements of firms the German political institutional framework is now less coordinated and has also become increasingly decentralised along its main pillars: education/training, corporate finance, and industrial relations. This has resulted in increasing regional divergence. Firms have been able to

[2] Notable exceptions are Thelen (2019) and Diessner, Durazzi & Hope (2022).

capitalise on the changes in the southern German Länder but not to the same extent in other parts of Germany. As a result, the Southern German economies show a stronger focus on knowledge intensive activities which is increasing the economic performance gap between them and the rest of the republic. Especially large research-oriented firms are drivers of the increasing regional divergence. These companies are driving the adjustment towards innovation driven competition and are aided by their Länder via educational or industrial policies. These efforts can lead to evolving innovation ecosystems that have positive spill over effects for the rest of the economy including SMEs.

The paper contributes to the emerging literature on the effects of the rise of the knowledge economy in Germany (see e.g. Thelen, 2019; Diessner, Durazzi & Hope, 2022) and suggests that Germany no longer has the same high level coordination between economic actors as in the past. The main contribution of this paper is to suggest that with the transition to the knowledge economy more attention should be paid to the increasing regional diversity of regions and their institutions within countries. Recent major works in the political economy literature continue to limit themselves to the nation-state as the main unit of comparison (see e.g. contributions in Hassel & Palier, 2021, and Baccaro, Blyth & Pontusson, 2022). As this paper shows regional arrangements play a large role in the diverging paths that different regions find themselves on, which ultimately determines the national picture.

The paper is structured as follows: first, we describe how the rise of the knowledge economy has changed the way firms operate and compete, which in turn has given rise to new institutional requirements. Then we discuss how these knowledge economy pressures have led to adjustments in the old German Model – that is in corporate finance, training, and industrial relations – creating a less coordinated and more decentralised political economic system. Given the more regional arrangements we will describe the increasing regional differences that are emerging. Afterwards we take a closer look at Baden-Württemberg and the Ruhr area in North-Rhine Westphalia to explore the role of firms in conjunction with state policies as drivers behind the different levels of success.

2.2 Changes to the German institutional framework

In this section we will show that the rise of the knowledge economy characterised by the three shocks has led to a partial breakdown of previous national cooperative institutions which in

turn has led to a more decentralised, flexible institutional landscape allowing for the described growing regional divergence. We first look at firms who are major drivers of these changes as they have new and different needs in a world of innovation driven competition. Knowledge based competition is disincentivising companies from cooperating with each other relative to previous cooperation levels, and they have an increasing demand for high skilled, often university educated employees. Afterwards we turn to the consequences these developments have had for some of the main coordinating institutions of the old German model.

2.2.1 Firms' adjustment to the knowledge economy

The new innovation driven competition has arguably changed the way firms cooperate with each other, not just in Germany but worldwide. To be competitive in the knowledge economy requires firms to focus more on research and development to continuously innovate processes and products. In other words, the innovative strength of a company is becoming increasingly important for the survival of companies as they face global competition, digitisation, and the need to transition to more sustainable production methods. For example, in the automotive industry this is characterised by the increasing importance of electric mobility, autonomous driving, and software development. Tackling these challenges applies to firms of all sizes and functions. An Original Equipment Manufacturer (OEM)-supplier relationship based around prices has arguably become unsustainable due to increasing global competitive pressures. Instead, suppliers needed to shift from mere process innovation towards closer links with their buyers and become part of the product development process in order to remain relevant and competitive (Krzywdzinski, 2019). Schwarz-Kocher et al. (2019) argue that this has led to a specific innovation type becoming more and more characteristic of the automotive supply industry: production knowledge-based product innovation. There are several reasons for this. First, innovation often focuses on product ideas that are developed directly, based on suppliers' manufacturing experience. Second, many innovation processes involve the successful integration of production knowledge into product development. This evolution in the role of suppliers is particularly evident for large firms such as Bosch which is now first in the *top50* table of patent registrars in Germany (DPMA, 2021).

As a result of this shift of focus towards innovation, there is a general trend for competitors to engage in 'coopetition' (cooperation and competition). Firms will engage in early cooperative behaviour, mostly for input activities (e.g. promotion of standards, early R&D activities), but

once a market is defined and enough certainty around standards established they will start competing with each other. The cooperation is increasingly fraught with the risk of opportunism and knowledge leakage which has become strategically more important for firms to remain competitive (Bouncken et al., 2015). Hence, it is not surprising that German firms who engage in R&D cooperation with competitors – but not universities or research institutes - are significantly more likely to face imitation than their peers (Veer, Lorenz & Blind, 2016). As a result, firms are forced to constantly weigh up the risk and benefits of R&D cooperation, as both the innovative benefits and costs of R&D collaboration are well documented.

However, the benefits of collaboration are decreasing with rising intensity and can even have negative returns on product innovation, showing an inverted U-shape curve in terms of benefits (Hottenrott & Lopes-Bento, 2016). In addition, the threshold or turning point is much lower for larger firms with higher collaboration complexities. The recent end of a short-lived collaboration on autonomous driving between the Mercedes Benz and BMW exemplifies this dynamic. The cooperation which had only started in 2019 ended just a year later and instead, the firms are now pursuing their own strategies, each with a coalition of competing suppliers. While Mercedes is teaming up with Nvidia and Bosch, BMW chose Intel and Magna to make progress in autonomous driving development (Bloomberg, 2017; 2020). The increasing wariness of larger firms to share their knowledge and increase restrictions to access for others including suppliers is causing tensions in the previous collaborative relationships. This is also forcing suppliers to re-orient themselves entirely towards new sectors (see for example EBM Papst, Handelsblatt 2022).

Other signs that indicate a shift in cooperation dynamics was the end of the so-called ‘Autokartell’ between Mercedes, VW and BMW (Der Spiegel, 2017). The cartel which existed since the 1990s is most well known for their agreements leading to the Diesel-scandal. Daimler and VW both turned to the authorities in the early 2010s to become the major crown witness against the other companies. This might be indicative of a shift in the companies’ strategic approach towards collaboration and competition. In fact, each company is pursuing very different approaches as part of the worldwide effort to reach net-zero (Süddeutsche Zeitung, 2021). Daimler is trying to move from the premium to the luxury segment and as a result does not want to stop producing combustion engine cars as they remain very profitable and robust. BMW’s approach can be summarised as technologically flexible and open by pursuing a multi-track strategy: combustion engines (incl. bio-fuel which is very popular in South America),

fuel cell/hydrogen, and electric (incl. a new production platform and car class). On the contrary, Audi turned their focus entirely on electric cars with very little investment on hybrid, or synthetic fuels.

While the automotive companies are emphasising different technologies for the coming years, they - as well as many other manufacturing businesses - have all been undergoing a different type of transformation over the last decades. In order to remain competitive industrial actors have been undergoing an increasing service orientation. This transformation has been called servitisation, which is the coupling of service offering with products (Neely, 2014). These services can be focused on Business-to-Business (B2B), as well as Business-to Customer (B2C). For example, it is increasingly common to bundle a product with service maintenance in order to move away from a one-time purchase to a long contractual relationship. Services can involve general product condition monitoring and repair, to overhaul and remanufacturing to address desired specifications for business customers. Leasing models based on usage, as well as an increasing subscription software offering as part of products are other examples of servitisation.

The rationale behind these developments is largely due to remaining economically competitive by finding new innovative solutions with the aim of locking in customer relationship or loyalty to avoid increasingly global (low cost) competition. The price competition affects the capital goods industries in particular. These products have very long life-cycles and Germany is among the leading locations for these industries (Neely, 2014). This allows companies to provide additional after-sales services such as support and maintenance through the product life. The servitisation of their products offers a big market opportunity for many manufacturers. In addition, there is increasing customer demand for these services. Paying for use only schemes, as well as increasing mini-services e.g. in car-entertainment. As with many technological innovations – the mere existence of the technology means that people will seek to exploit it. Increasing data gathering and availability allow for more finetuning and cost-reduction, e.g. predictive analytical models.

Unsurprisingly, these new services, their development and delivery require a reconfiguration of a firm’s workforce and governance practices. High-skilled employees proficient in software development, data analysts, as well as sales and marketing are increasingly in demand to sustain a competitive position in the market, while automation and digitization will transform

previous jobs or make them redundant (Frey & Osborne, 2017; Kurer & Galego, 2019; Battisti, Dustmann & Schönberg, 2022; Krzywdzinski, 2021; Herrigel, 2015).

As a result, the need for guaranteeing a skilled workforce has become even more crucial for firms. While the increasing need for graduates is undermining the associational influence (Hope et al. 2022), the new competitive environment has meant that works councils are aiming for guarantees of continuous learning and upskilling. In addition, graduates feel that they have more freedom and flexibility in terms of their career opportunities, increasing the pressure on firms to offer them an environment to stay. A cooperative highly skilled workforce is paramount for firms to achieve their goals. The way firms structure employee representation and cooperation is very flexible however and does not necessarily require a formal works council.

Unsurprisingly, not all firms are managing to adjust to the new realities of competition as a result of the described changes. Some decided to focus on a more short-term price cutting strategy to remain competitive, which is increasingly challenging to maintain (Krzywdzinski, 2019). Other companies did not read the signs of where markets were going and missed to invest in product developments to future proof themselves and are now struggling to keep up.

The described changes in firm needs had important consequences for the old institutions underpinning the German political economy. To remain competitive in the knowledge economy, firms now have a higher demand for highly skilled workers which likely affects the educational and training landscape. With firms increasingly disincentivised to engage in inter-firm cooperation we should also expect changes in the role associations and unions play, as well as in the way corporations are governing themselves. In the next section we will take a closer look at how 1) education and training, 2) the role of unions and associations, and 3) corporate finance have changed.

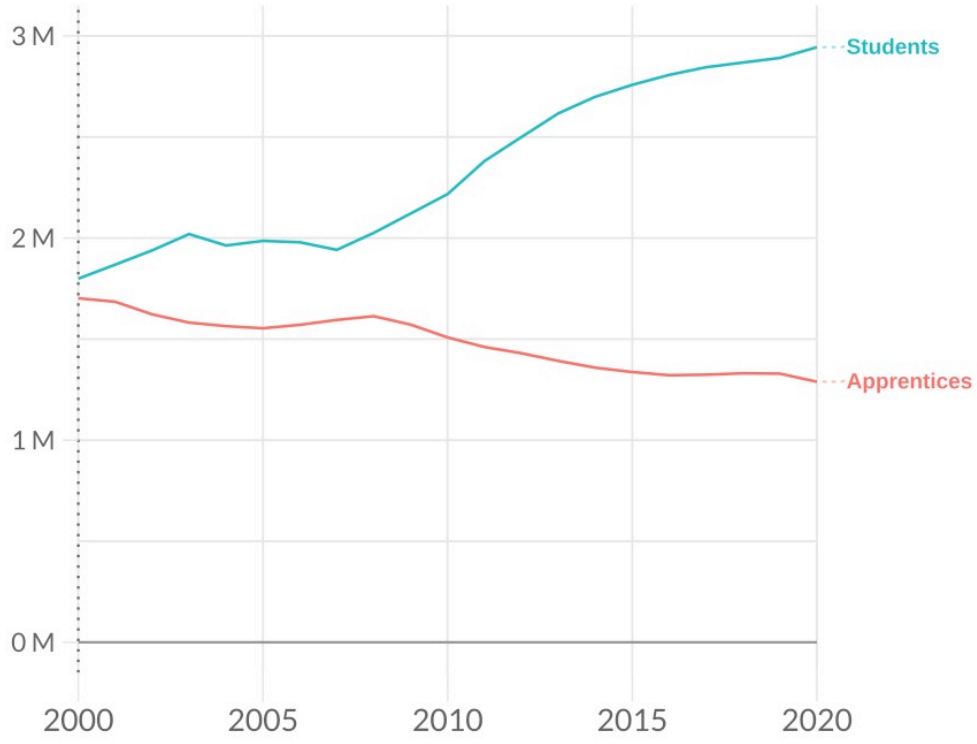
2.2.2 The German Political Economy has become more decentralised

2.2.2.1 Education and training – dethroning of the apprenticeship and increasing regional approaches to tertiary education

Thelen (2004; 2014; 2019) argues that regardless of major external shocks core ideas around the German vocational training regime have survived throughout the 20th century. Entering

the 21st century, Germany experienced a massive expansion of tertiary education challenging vocational training and its ideas. Many authors in the literature tend to underplay the extent of this expansion as they try and compare these numbers with other countries which often leads to misleading conclusions. One of the main issues when comparing German higher education participation rates with other countries is that due to the high number of occupations that do not require 'tertiary' education in Germany but receive 'academic' training in other countries (e.g. nurses), they are not counted according to the same standard which makes most direct comparisons problematic. As a result, in direct comparison the German higher education participation rate appears below that of most other advanced democracies, however when studying the evolution of tertiary education it should be fairly obvious that there has been an equally dramatic increase in university style education in Germany since the 2000s (see figure 2.1). At the same time, apprenticeship numbers have started falling over the last decades and while many apprenticeships remain 'intact', an increasing number are slowly falling victim to 'academisation' (*Akademisierung*) i.e. more occupations that previously only required an apprenticeship style training are transitioning to university qualifications and training (e.g. jobs in the care sector).

Figure 2.1 Number of Students and Apprentices 2000-2020



Source: Auhor's calculations from BMBF (2021) data: Tabelle 1.9.6

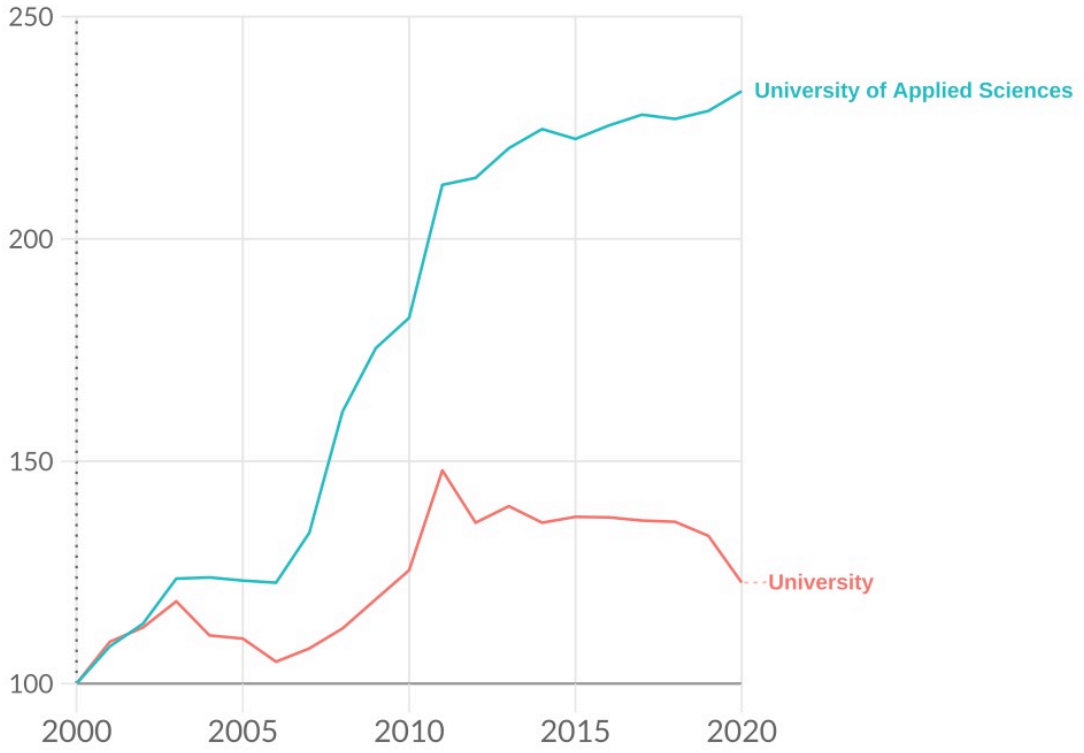
Grunddaten zum Bildungswesen (Bildungsbeteiligung in nationaler Abgrenzung), *https://www.datenportal.bmbf.de/portal/de/Tabelle-1.9.6.html*

The German tertiary expansion is evolving quite differently compared to other countries (with some exceptions such as Austria). Namely, a large part of the expansion is driven by increasing numbers of young people enrolling at universities of applied science (UAS) or dual universities instead of traditional universities (see figure 2.2). Some authors (e.g. Durazzi & Benassi, 2018; Graf, 2018; Thelen, 2019) have pointed out that specific forms of university education in Germany are following the previous vocational approach, in particular the dual studies programmes. These programmes are essentially offering the same structure as dual apprenticeships do, with the difference in theoretical courses being offered by universities or equivalent higher education institutions, as well as leading to an accredited bachelor's degree (post-graduate dual programmes also exist but remain relatively rare). Thus, making this a case for what is called institutional layering (Streek & Thelen, 2005). While some of the authors are aware of the small number of current dual university students, the literature seems optimistic around the future role of dual university studies. As a proportion of the entire student population of 2.89 million in 2019, dual studies students made up less than 4% of the student body.[3] It is true that the evolution of this type of study is quite impressive with the number of dual studies students increasing from ca. 40,000 dual students in 2004 to roughly 108,000 in 2019 or a ca. 170% increase compared to 'just' a 68% increase of all students during the same period.

What is equally noteworthy about these programmes is the increasing influence firms receive in shaping the theoretical training students receive compared to the apprenticeship system (Durazzi & Benassi, 2018; Graf, 2018). Especially large firms are in a position that allows them to define entire courses for their own purposes together with the university, excluding unions and associations all together. Given the possibility of firm specific training, it is also often UAS that are offering dual study programmes (with the exception of some Länder that have separate dual universities e.g. Baden-Württemberg or Saxony). UAS have an implicit mandate to engage with and support the regional economy. This means that often UAS are in fact geared towards their regional economy in terms of programmes on offer and research conducted.

[3] In that year they made up less than 1% of students at universities and only around 13% of students at universities of applied sciences

Figure 2.2 Relative Intake of 1st Year Students by University Type (2000 = 100) 2000-2020



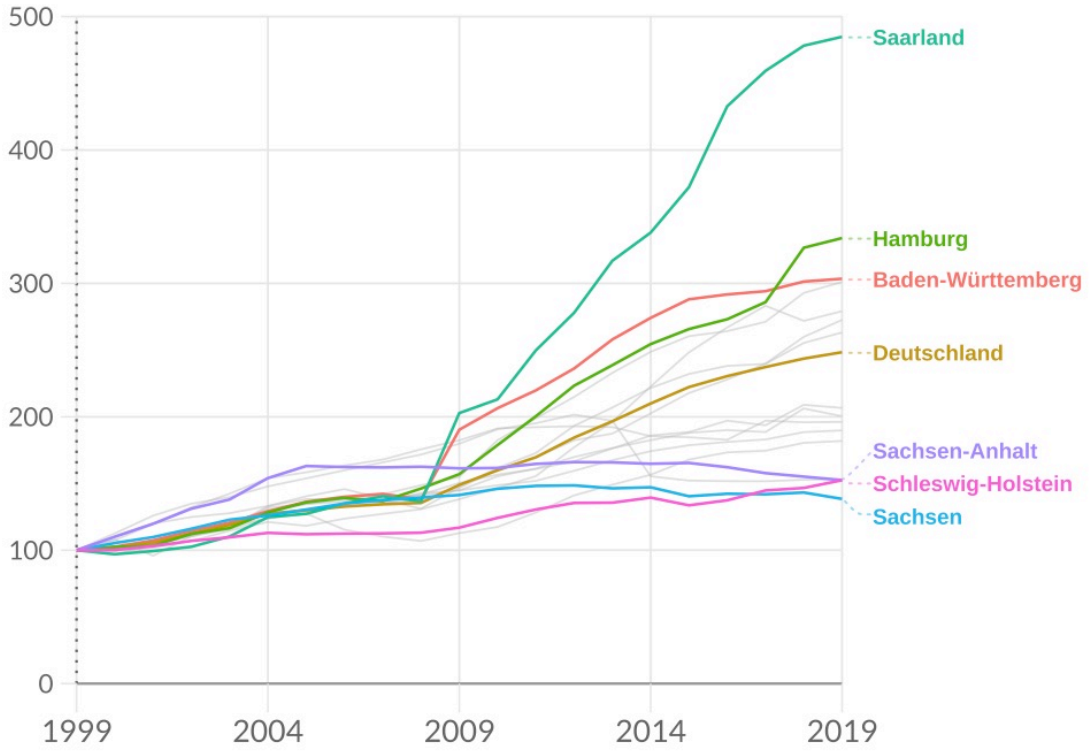
Source:Author's calculations from BMBF (2020) data: Tabelle 2.5.4 Studienanfänger/-innen im 1. Hochschulsemester nach Hochschularten, https://www.datenportal.bmbf.de/portal/de/Tabelle-2.5.4.html

The story of the rise of UAS and the dual university programmes stands also for a more regional approach in practical as well as legislative terms. Education is one of the last legislative strongholds of the Länder, even though there has always been a lot of cooperation amongst them over the years. However, there remains a lot of variation among the Länder in their higher education strategies. The presence of dual university programmes and student numbers enrolled in them, as well as UAS enrolment shows stark differences across the German Länder not to mention the differences between dual study programme participation[4]. Durazzi and Benassi (2018) argue that these programmes are mostly used by multinationals to select and train future leadership, which might be the case in some regions but is less likely in other cases such as in BW where 14.3% of first year students were opting for a dual university programme in 2017 (compared with 5.31% in all of Germany).

[4] In some Länder, dual study programmes are only offered by UAS, whereas in e.g. BW or Saxony only one dual university with several campuses exists (e.g. DHBW).

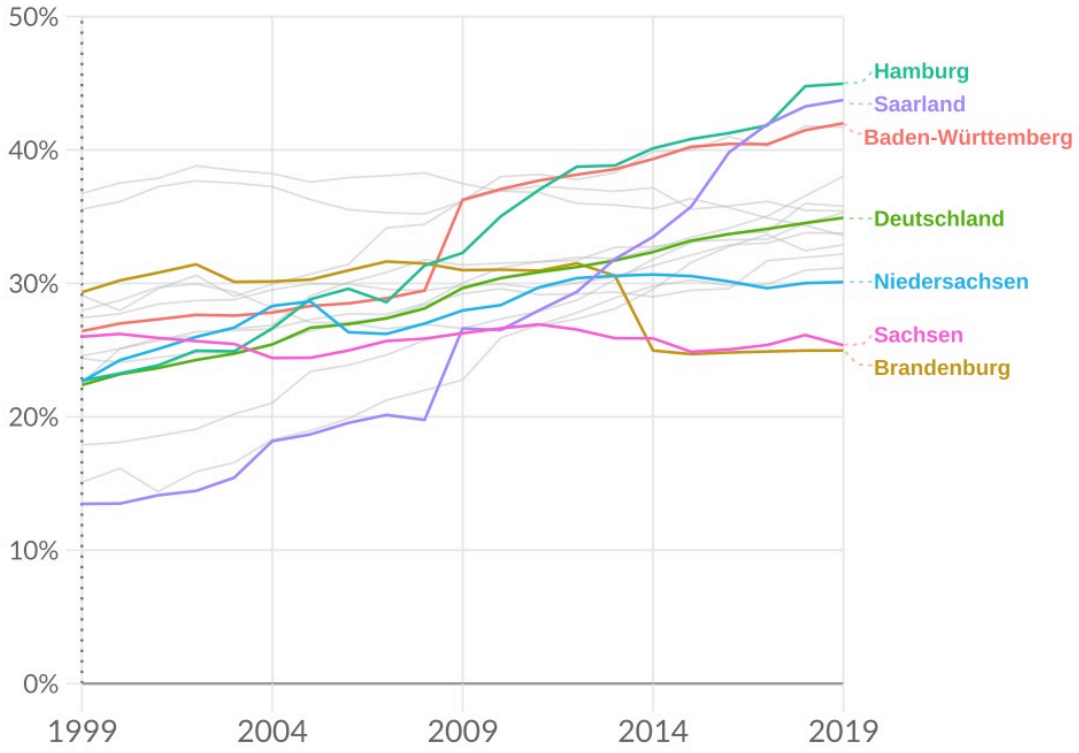
The federalism reforms of 2006 strengthened the individual states' independence in questions of (higher) education and studies have confirmed that there are significant differences between the Länder systems and policies (Kamm, 2014). This can be seen in the differences in numbers of University of Applied Science students that are emerging between the states. As can be seen in figures 2.3 and 2.4, while the number of UAS students has increased in all the Bundesländer in Germany there is an increasing divergence between them. The Saarland and Baden-Württemberg, together with the two city-states, Hamburg and Berlin experienced the largest increase in numbers, while Schleswig-Holstein, together with East-German states Saxony, Saxony-Anhalt, and Brandenburg saw the smallest growth in UAS student numbers in between 1999 and 2019.

Figure 2.3 Growth in number of University of Applied Science students by Bundesland (1999=100) 1999-2019



Note: German Average and Top and Bottom three highlighted. Source: Author's calculations from BMBF (2020) data: Tabelle 2.5.1 Hochschulen nach Hochschularten und Ländern, https://www.datenportal.bmbf.de/portal/de/Tabelle-2.5.1.html

Figure 2.4 Share of University of Applied Science students by Bundesland 1999-2019 (%)



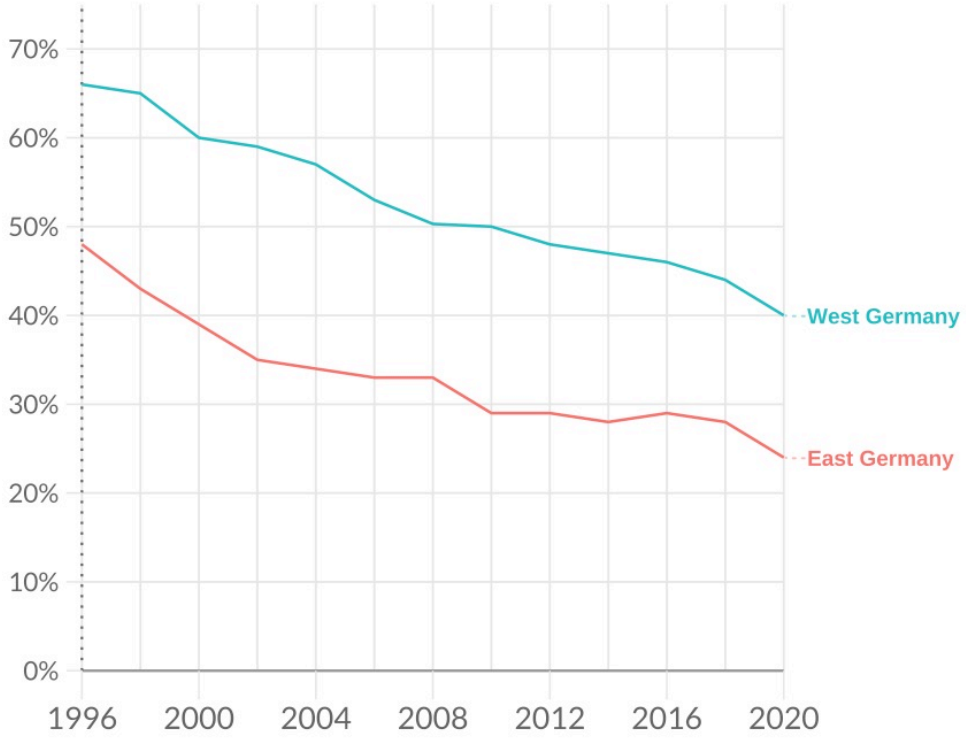
Note: German average and selected Länder highlighted. Source: Author's calculations from BMBF (2020) data: Tabelle 2.5.1 Hochschulen nach Hochschularten und Ländern, https://www.datenportal.bmbf.de/portal/de/Tabelle-2.5.1.html

The developments in the training and education sector show the diminishing relevance of apprenticeships and the rise of university training, which is fuelling decentralisation – legislatively, as well as by the type of university training offered. Next, we will look at the changes in the industrial relations and corporate governance, which has also seen a reorientation towards firms.

2.2.2.2 *Industrial relations & corporate governance – shift from unions to works councils*

Over the last decades, the old associational social partnership model has slowly been eroding and as a result weakening the unions and business associations. Hassel (1999) attributes this decline to an increase of new companies which did not join employer associations, and a shift to export-oriented high skill industries and low-cost services. There is no doubt that collective agreements and the unions still have influence on labour relations and working conditions, however they have been in decline for the past decades and seem to continue with this downward trend with overall union density in Germany hitting a new all-time low with 14% in 2021 (Greef, 2022).

Figure 2.5 Share of employees in private sector firms with collective agreement 1996-2020 (%)



Note: Private sector excludes agriculture and non-profit organisations. Source: Author's calculations from IAB-Betriebspanel (2022) data: Tabelle 5: Beschäftigte in Betrieben mit Branchentarifvertrag, 1996–2021, http://doku.iab.de/arbeitsmarktdaten/Daten_zur_Tarifbindung.xlsx

2.2.2.2.1 Macro Developments

Industrial relations in Germany rest on two pillars: on the 'macro' side collective agreements between the social partners (unions and business associations) for wage coordination, and on the 'micro' side co-determination[5] inside firms concerned mostly with working conditions (*Betriebsrat*), and management supervision (*Aufsichtsrat*). Both institutions have lost in terms of participating firms and share of employees over the last decades. However, in total works councils have gained relative strength and have started to stabilise in number over the last years.

Since the mid 1990s collective agreement coverage in West Germany has declined by more than 20% in the private sector (from 65% in 1998 to 40% in 2021; see figure 2.5), while the number of firms with a works council have decreased by 10% (Ellguth & Kohaut, 2022). In West Germany 73% of firms are not part of a collective agreement and only 46% of employees

[5] I am focusing on operational co-determination via a works council [*Betriebsrat*] and corporate codetermination via supervisory boards [*Aufsichtsrat*]

are still covered as of 2021 (Ellguth & Kohaut, 2022). However, the majority (59%) of large companies (501+ employees) are still part of a collective agreement while 23% of them have a *Haustarif*. Looking at collective agreement coverage by economic sector shows that only 25% of manufacturing firms are still part of collective coverage or a *Haustarif*; a much lower proportion than the most covered construction sector (49%). This translates into 58% of employees in manufacturing in West Germany still covered which puts the sector only in 5th place. The share of firms with a works council (*Betriebsrat*) in West Germany has also decreased from 10% in 1998 to 8% in 2021. This translates into a decrease of the share of employees working in a firm with a works council from 50% in 1998 to 39% in 2021. However, the number of large enterprises (501+ employees) with a works council is still high at 81%. At the sectoral level, manufacturing shows the second highest share of firms with a works council with 66% after the finance and insurance services industries (70%). In West German manufacturing 58% of employees are covered by a collective agreement (or *Haustarif*) and 66% work in a company with a works council in 2021 (Kohaut & Ellguth, 2022). There is some overlap, with 51% of employees in manufacturing being covered (either collective agreement or *Haustarif*) as well as having a works council.

Like the unions, business associations have also been struggling with membership over the past decades (Schroeder & Greef, 2020). For SMEs membership has become the exception and is not the rule anymore. For example, West German membership in *Gesamtmetall* fell from 43% in 1991 to 24% in 2004. One of the main obstacles business associations are facing is the increasing dissonance between suppliers and OEMs in terms of their needs. Business associations pursued a double strategy to remain relevant. They pursued a stronger flexibility and decentralisation of tariff regulations away from collective agreements. While also opening up membership without forcing firms to subscribe to *Tarifbindung* (need to follow collective agreement). This new type of membership has been popular with firms. From 2005 to 2017 the number of west German companies entering *Gesamtmetall* without the *Tarifbindung* increased from 1432 to 3591, while the number of members with *Tarifbindung* declined from 4189 to 3202. In addition, the decline in the use of statutory extensions of multi-employer collective agreements to non-organised firms is ongoing (Paster, Nijhuis & Kiecker, 2020; Günther & Höpner, 2022).

The overarching picture of diminishing participation in collective bargaining and co-determination institutions is evident in the data except for large firms, especially in the core

industries.[6] This segmentalism has been described before (Thelen, 2014; Marsden, 2015). However, even within the industrial core the situation is changing, and sectoral associations and unions are both increasingly under pressure. At the same time the number of businesses with works councils seem to have stabilised in recent years and might even be on an upward trend (Ellguth & Kohaut, 2019).

2.2.2.2.2 Micro Developments

Given the macro developments works council are becoming relatively more important as institutions for worker representation. This development is also aided by a recent law change in 2021 to ease the creation of works councils in smaller companies and to increase the influence of works councils in important decisions such as training and technological change (*Betriebsrätemodernisierungsgesetz*). However, the effects of this law remain to be seen. What is clear, is that there is a trend towards more decentralised worker representation.

The two pillars, sectoral bargaining and co-determination have always had tight interlinkages. Unions who would bargain at the sectoral level would also be the main voice in works councils. Communication and coordination between 'the two' pillars gave more weight to workers voices. However, this relationship between unions and works councils is also changing and poses new challenges to unions and unity in works councils.

The main industrial union, IG Metall, is playing an increasing role as educator and information sharing platform for works councils to retain some influence in decision making at the firm level (Haipeter, 2020). While unions are still dominating most works councils, the number of union members in works councils is decreasing and at least 28% of works council members do not have a union affiliation compared to just 16% in the 1990s (Greifenstein et al., 2017). This is problematic for the union's coordination efforts, but also for their own recruitment, as works councils are traditionally involved in recruiting new union members (Keller, 2022). In addition, there is a general trend towards less single union influence as the workforce is becoming more white-collar. The works council elections 2022 show that automobile location branches with low worker/blue collar share are much less likely to vote for an IG Metall candidate with the

[6] For large multinational companies there is an additional layer of complexity due to different co-determination laws in different countries. This tends to further diminish unions' influence (Herrigel et al., 2017).

union losing its absolute majority at the Porsche HQ (43,5%) and Mercedes HQ (IG Metall ~46%).

The increasing share of graduates in larger firms is a general challenge to unions, and IG Metall in particular, as these groups tend to be less likely to join or support a union (Artus et al., 2019; Funder, 2018). Especially those firms with a high share of highly skilled employees tend to be detached from unions, as they do not identify themselves as union clientele. An example of this would be recent works council elections at one of Porsche's main R&D locations in Weissach where for the last few elections five different lists existed. The increasing size and importance of highly qualified employees can lead to a cleavage in the workforce within some firms. In other words, works councils are increasingly fractioned along (non-)union membership lines (Astor et al., 2019; see also Hocke, 2012). This crude line correlates with other fault lines such as high or low skilled, differences in educational attainment and employer or employee oriented works council member, with the high skilled less likely to be union members, more educated and more management/employer friendly. In fact, for graduates or highly skilled employees the works council's function is often seen as an institution to ensure transparency or as an information channel rather than a space to confront management (Hocke, 2012: 273-4). However, works councils are still largely a black box with many question marks behind the nature of the internal relationships within the councils themselves (Kotthoff, 2016: 145).

As a consequence of the increasing share of high skilled employees, IG Metall is trying to branch out and win over students and engineers as new members. As part of this effort, IG Metall bargained for the coverage of semester costs for dual university students during the latest collective wage bargaining round in 2022. However, the efforts over the last 10 years do not seem to work as well as they had hoped for with their membership numbers decreasing quite substantially by 20% since 2000[7]. Beyond the decreasing new membership numbers, the union is also faced with the effects of demographic change and as a result an increasing number of retired members, with the share of pensioners rising from 16.5% in 1989 to 22.8% in 2008 (compared with 21% of all DGB unions in 2009) (Schroeder et al., 2010)[8], this number is likely to be even higher now with the baby boomer generation entering into retirement

[7] after a relatively stable spell between 2010-2018 membership numbers continued to decline since the start of the Covid-19 pandemic (Handelsblatt, 2021)
[8] the remaining members are either working or non-working but not retired.

(according to Handelsblatt in 2017 the share of pensioners at IG Metall had risen to at least 30%).

The decentralisation has shifted worker representation increasingly to works councils and the social partnership at the firm level is still very much intact. Accordingly, the literature has increasingly pointed to works councils' role in co-management (Müller-Jentsch, 2013; Kotthoff, 2013). Some authors (e.g. Dörre et al., 2013) see their role as more of a junior partner, as works council are rarely in a position to initiate demands, instead they tend to be more responsive and any demand is conditional on concessions or given as performance rewards. However, the interaction between management and works councils still has modernising and innovative power. The focus of works councils in the last decades and especially now in an era of transformation is more focused on employment retention (Baccaro & Howell, 2017; for examples of large firm agreements see Schroeder & Hassel, 2021). This motivation remains a positive driver for initiatives or programmes for more worker qualifications and training and are more likely to occur in companies with a works council (Lehmann, 2011).

2.2.2.2.3 Corporate codetermination

While works councils are becoming more prominent, corporate codetermination [*Aufsichtsrat*] is under threat as well. In 2002 out of approximately 1000 companies with more than 2000 employees there were around 767 companies that were following the corporate co-determination act and had parity on their supervisory boards, that is half of the members are employee representatives. By 2015 that number had shrunk to 635. Sick (2020) suspects that around 2 million employees who should be are not under parity cover. These trends are ongoing and the reasons behind the erosion according to Sick (2022), lie in companies' ability to bypass laws and regulations by adopting EU and foreign legal entities, deficits in the German regulations themselves, as well as the complete ignorance of the laws by a number of companies. It is in fact one of the weak points of the German corporate co-determination laws that they are mostly targeting listed companies. However, there are other company structures that large companies can use to minimize workers' and employees' influence on management and strategic decision making, which have been on the rise while the AGs are in decline.

The majority of cases of 'avoidance', especially corporate codetermination in abandoning the AG, have to do with the possibilities of choosing EU or foreign legal entities, especially the

2004 introduced *Societas Europaea* (SE), a European wide public company form. The issue of SEs for German companies is that the level of co-determination is being frozen when the company becomes an SE. For example, if a company chooses to become a SE before its workforce reaches 500 or 2000 employees, this company's workforce could grow even beyond these numbers but would not need to follow the usual German codetermination laws. While some companies are only above the German thresholds when moving to the SE form and thus remain in line with the envisioned co-determination, others are pre-emptively taking on the SE form while they are still relatively small. Examples include LEG Immobilien, Vonovia or Zalando.

The use of the SE as a form also includes more complicated company group arrangements that can reduce the need for codetermination in higher management levels. One of the most prominent examples is the Porsche Automobil Holding SE, which holds around 53.3% of voting rights of the VW Group. The Porsche Holding has less than 2000 employees, even though critics argue that its subsidiaries most notably the VW group should be counted and thus there should be worker representatives on its supervisory board. The holding came instead to an agreement with their subsidiary company works councils in 2017 that no codetermination would be necessary in the future. The main argument was that operative decision making would still follow codetermination rules in each of the subsidiary companies (incl. VW AG, Audi AG, Porsche AG). This arrangement has been criticised as it withholds worker representatives from influencing strategic decision making such as the recent decision to publicly list the Porsche AG (previously a 100% subsidiary of the VW AG) and increasingly separating it from the VW AG (Handelsblatt, 2018). [9]

There are other company structures besides AG or SE that large companies can use to minimize worker and employee influence in decision making. The *Drittelbeteiligungsgesetz* (2004; formerly *Betriebsverfassungsgesetz* from 1952) requires all companies with more than 500 employees but less than 2000 employees (and all stock market companies up to 2000 employees) to have supervisory boards that are made up of at least 1/3 of employees. However, there are gaps in the regulations. The very popular legal entity of GmbH & Co. KG is exempt from this regulation. Even if a company falls under the regulation, it has ways to avoid

[9] The Porsche Automobile Holding SE is led by the Porsche & Piech families. See also Wolfgang Porsche's critical stance on co-determination (Manager Magazin, 2019) as well as the families' strategic influence (Manager Magazin, 2021).

implementing it. This can be exemplified with the case of Wirecard, which had around 1900 employees in Germany before its collapse. Yet, the company group was made up of subsidiary firms and each did not exceed the 500 employee mark. The individual firm employee numbers were not considered together because the company group did not have a control agreement with each of its subsidiary companies. As a result, the number of employees was not summed up leaving the company outside of the regulation. This strategy is followed by a number of firms across Germany. Another strategy to avoid the *Drittbeteiligungsgesetz* is to adopt an entirely foreign legal entity. An example is the Holding of the meat producer Tönnies which is a Danish ApS & Co. KG. The ApS is the Danish equivalent of the German GmbH with one crucial difference namely that management is exempt from codetermination.

It is also not a coincidence that the number of trusts and foundation controlled companies has been rising, as this form of corporate governance enables firms to make adjustments without too much internal resistance. These so called *Stiftungsunternehmen*, i.e. foundation controlled companies, are an often overlooked form of corporate governance that has always played an important role in Germany and is gaining increasing popularity (Hosseini-Görge, 2018). Legally, foundations are institutions without shareholders or owners. However, studying these types of organisations is very difficult for a variety of reasons not least because there is not a lot of transparency about their activities and foundational structures. In addition, most of the regulations concerned with foundations are the responsibility of the Länder which makes generalisations for the entire country difficult.[10] This type of corporate governance model is still mostly unknown outside of the D-A-CH region and Scandinavia. The *Bundesverband Deutscher Stiftungen* is aware of 1482 foundations with links to firms in Germany as of end of 2016, even though the actual number is thought to be much higher and in recent years the number of foundation controlled companies has increased markedly (Achleitner, Block & Strachwitz, 2018). Well known examples include: Aldi, Bertelsmann, Bosch, Lidl, Mahle, Würth or Zeiss[11].

[10] However, recently the federal government passed a new law in June 2021 which will come into effect in 2023 which will harmonise more aspects across the Länder and for the first time an official register will be compiled which is to be published in 2026.

[11] These company controlling foundations should not be confused with foundations such as the VolkswagenStiftung or Siemens Stiftung which have no affiliation with the management of their respective name giving companies.

Foundation controlled corporate governance structures differ in their setup and often lead to further independence in strategic decision making from a firm's workforce. For example, in the case of a *Doppelstiftung* (double foundation), two or more legally separate foundations are used as owners of the firm. In general, the charitable, tax-privileged foundation holds most of the capital shares of the company, but only a very small proportion of the voting rights. A private (often family) foundation holds only a small percentage of the capital shares, but instead holds the majority of the voting rights (Kögel and Berg, 2011). The Robert Bosch GmbH and Mahle GmbH are well-known examples of the *Doppelstiftung* model. What this organisational form means for the industrial relations can be illustrated with the case of Bosch, where a second decision making body (Robert Bosch Industriettreuhand KG) finds itself outside the corporate codetermination regulations diminishing worker and employee representation in the strategic decision-making process (Scheytt & Quadrino, 2009). Another example would be the Stiftung & Co. KG corporate governance arrangement, which is a limited partnership with a foundation as general partner that acts as the management of the firm and is exempt from the *Mitbestimmungsgesetz* (codetermination act of 1976) (Hosseini-Görge, 2018). Well-known examples are the Diehl Stiftung & Co. KG or the Lidl Stiftung & Co. KG.

The increasing number of firms who show signs of unwillingness to include their workforce in strategic decision making via different organisational arrangements is striking. The picture that emerges re-confirms the dualization in industrial relations within the German economy. While many aspects remain intact for the large companies of the industrial core, an increasing role when it comes to questions of modernisation is played by their works councils. However, there are signs that some companies are moving away from regulated co-determination practices by using regulatory loopholes such as other forms of corporate governance models.

Moreover, the recent developments have had another important side-effect. Associations used to play an integral part in coordinating innovation activities between companies within the same sector. However, as discussed above, innovation-oriented companies are now not just less likely to be organised in associations, but also increasingly disincentivised to share information with each other as competition is increasingly knowledge and innovation driven.

Next, we will look at how the financial linkages between the biggest German companies have been disintegrating, further undermining coordination and cooperation amongst German economic actors.

2.2.2.3 Corporate finance and ownership changes – the end of the Deutschland AG

According to Ringe: "*The old 'Deutschland AG', a nationwide network of firms, banks, and directors, is eroding, ownership is diffusing, and the shareholder body is becoming more international than ever."* (2015, p. 493). In his influential article Ringe (2015) shows how German banks divested their equity stakes mainly as a consequence of increased international competition, and how corporate taxation reforms by the federal government accelerated that process in the 1990s and 2000s. In other words, the German corporate ownership structures are currently changing due to an increasing dispersion of share ownership and an increasing internationalisation of ownership.

The traditional view of the German system of corporate ownership is built on the presumption of it being a so called blockholder system, that is the prevalence of powerful shareholders who de facto control the major German corporations and their dependent companies. Traditionally the country's major blockholders were German banks, but also industrial companies who engage in cross-holding of shares. More generally speaking blockholders tend to be families, banks, insurance companies and the state. In contrast to another prominent case of cross-shareholding, that of the Japanese web of individually intertwined small groups (keiretsu), the German system is more like one big web of cross-participations (Höpner & Krempel, 2004). However, this landscape is undergoing changes most likely due to the pressures of globalization and linked increased international competition (Ringe, 2015: 521). The most salient development is the increase in equity dispersion, in particular bank ownership of non-financial equity stakes is on the decline. There has been a constant increase of equity shareholdings in German companies held by institutional investors (Ringe, 2022). Among them, investment fund management companies and insurance companies have the largest ownership stake. In addition to the dispersion, corporate ownership in Germany is becoming more international (Kalemli-Özcan et al., 2013). The presence of foreign investors is even more salient in DAX companies; meaning the German companies with the largest market capitalisation. Among the Top 15 DAX investors, the 'Big Three' have now achieved a very prominent position (i.e. in 2021 #1 Blackrock (10%)[12], #2 Vanguard (5.4%), #6 State Street (2.8%)), overtaking German banks as the most influential shareholders.

[12] 78.7% of which are passive holdings.

These developments are already resulting in a change of behaviour by shareholders and companies: there is more active engagement at companies' general meetings compared to the past. For example, many DAX executives and board members are likely to remember vividly the weak voting results at the 2016 and 2017 AGMs. After decades of approval rates beyond 90 percent, results with less than three-quarters of approval rate may not be read as an expression of fundamental mistrust, but rather as a clearer articulation of shareholder interests. This all culminated in the 2019 AGM of Bayer AG, where the shareholders, for the first time in German corporate history, refused to approve the management board. The reasons for this increasing shareholder 'revolt' are manifold. Non-transparent compensation structures for management board members, blank authorisations for capital increases, and doubts about the independence of supervisory board members are the most frequent criticisms by shareholders. The good news is that some companies apparently are listening and responding to the concerns of investors. For example, software company SAP has responded to the vote at the 2017 AGM and has made every effort to understand the scepticism of its shareholders in order to change the incentive structure and transparency of their compensation system.

The developments in corporate finance show again how the previous model of coordination is eroding and being replaced by a new more flexible system enabling firms to pursue their own strategies. Next, we will turn to the changes in the education and training system, highlighting how the tertiary expansion has enabled firms to increase their say in training arrangements and further weaken the associational culture of the previously dominant apprenticeship model.

The overall picture that emerges shows a new decentral political economy, increasing the room for manoeuvre of individual firms while diminishing the role of unions and associations. Before turning to an assessment of what can explain the different outcomes in the different German Länder we turn to the role the state has played in the described developments.

2.2.2.4 Role of the state

Even though there was a widespread understanding by political actors that aspects of the German Model needed to be reformed, there was no agreement at the national level on what steps to take. This was due to party differences, but especially due to competing regional interests that were largely opposing each other (Herrigel, 2010: 206). The deadlock at the federal level left an increasing role for policy at the Länder level. Indeed, Lemb (2017) shows

how industrial policy differences are becoming more pronounced across the German Länder over the last decades.

More generally, German Politics has seen an increasing 'autonomy' from associations since the 1990s (Weßels, 2014). In other words, the observed frequency and intensity of contacts between the major social partner associations and politicians has decreased markedly. In fact, many federal policy changes contributed to the increasing decentralisation. Ringe (2015) shows how a corporate taxation law change contributed to the erosion of the Deutschland AG and encouraged the diversification of ownership and increasing internationalisation. The 2001 taxation reform is an example of the diminishing influence of unions, as it was introduced by an SPD-Green coalition, supported by CDU and FDP led Länder governments. Business associations themselves also suffered from lower membership numbers because many members perceived a lack of influence, as many larger firms pursued the additional direct contact with politicians (Schroeder & Greef, 2020). All this speaks for politicians' higher independence from associations and unions. Instead, the weakened social partnership model was partially substituted or compensated by the introduction of the minimum wage introduction, and other laws such as the *Tarifeinheitsgesetz* (Schroeder & Greef, 2020; Schroeder & Hassel, 2021), which in part has further undermined the social partners. More so, a recent legislative change in 2021 is manifesting the observed shift from the macro to the micro level, giving works councils more of a say in strategic matters of training and digitization (*Betriebsrätemodernisierungsgesetz*). Further reinforced by the current government's coalition contract (2021-25) which outlines further plans to strengthen the role of the *Betriebsrat*.[13] This suggests that politicians are now turning their focus on strengthening the social partnership at the company level opening the door further to more variation across firms and regions.

The overarching increasing regional differentiation falls outside the traditional cooperative federalism model pursued in Germany, which for most of the second half of the 20th century had led to further centralisation and an increasing financial dependence of the Länder on Berlin (Sturm, 2015).[14] While the respective Länder executive branches retain a certain influence due

[13] Section "Mitbestimmung" pages 71-72

[14] The role of EU regulations should also be mentioned here. European integration which markedly sped up since the 1990s has led to further restrictions on the Laender's autonomy in terms of their access, use and distribution of funds. The, by some hoped for, hollowing out of the national level resulting in a Europe of the regions has not occurred thus far.

to the second legislative chamber of federal politics (*Bundesrat*), the Länder parliaments have all but lost out on any major influence today. Yet, the Länder can still make use of policies which have become increasingly crucial for the transition to the knowledge economy including education policy, many social policies, and different industrial policies and funding decisions to accommodate their specific regional circumstances.[15]

In this section we have discussed how the innovation driven competition has changed firms needs and affected the institutional framework governing the political economy in Germany. The social partnership model is becoming increasingly firm-centred with works councils becoming more important and gaining new responsibilities while unions and business associations are confronted with declining membership numbers. The increasing financialisation has led to an end of the so called 'Deutschland AG', a big web of cross-participations of major blockholders due to the pressures of globalization and linked increased international competition, and thus undermining their former coordinating role between German economic actors. The result is a more decentralised, firm focused, and flexible institutional landscape. In the next section we turn to a discussion around the resulting regional divergence between the Bundesländer and will try and explain why some regions have successfully managed the transition, while others are struggling to do so.

2.3 The Knowledge Economy and the increasing Länder gap

The more decentralised structure of the new German political economy makes it necessary to look carefully at the responses of different Länder to the challenge of transitioning to the knowledge economy. We could not study all German Länder in depth, instead we started looking at the Baden-Württemberg economy to try and understand the Southern German success as innovative regions in increasingly competitive global markets. While this region has been very successful, other regions have seen an ongoing decline (e.g. NRW and the Ruhrgebiet in particular). We find that with the increasing absence of coordinated institutional influence, it is firms themselves, which have to find new ways to organise themselves in order to remain competitive. We identify a particular set of firms as the key to the ongoing Southern German success. The absence of such firms in other regions might well explain the regional divergence. However, our results are inevitably tentative and will invite much qualification.

[15] Länder are also responsible for the regulations regarding foundations.

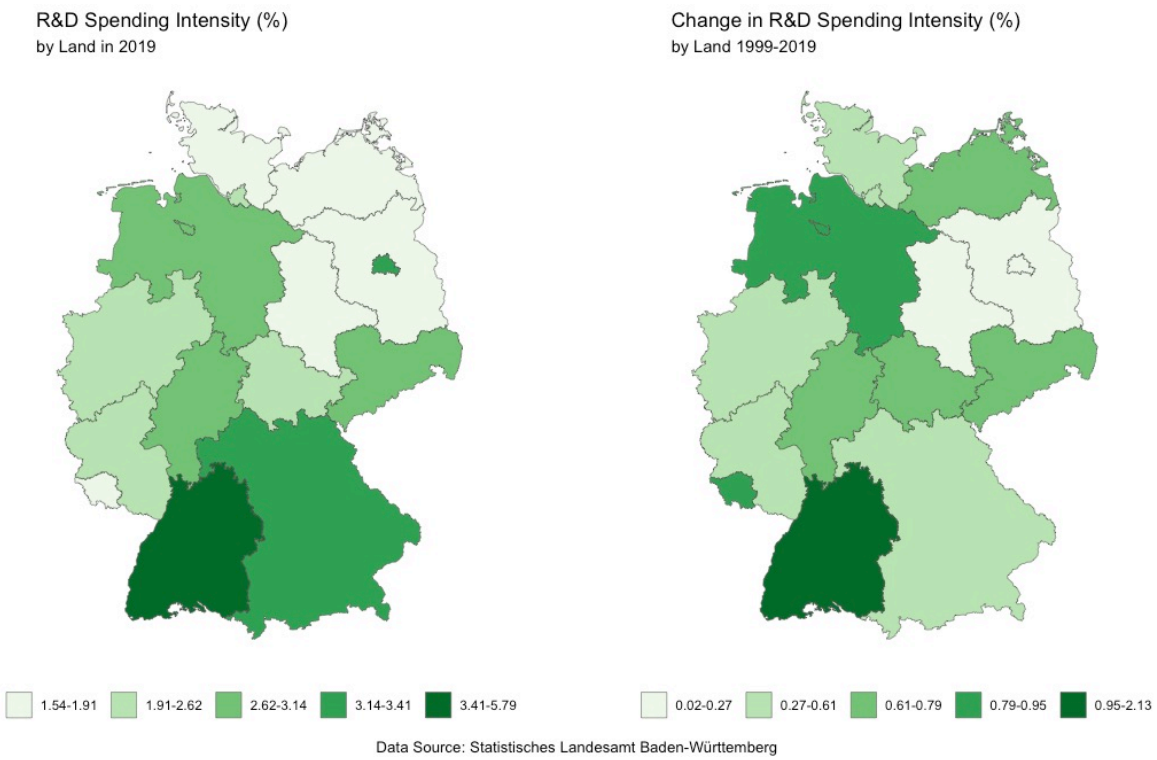
We argue that large research oriented companies have been and still are spearheading the knowledge economic transformation. With the increasing shift of agency towards strategic firm decision making as a result of the transition into the knowledge economy, the large research oriented companies have been trying to devise and define new institutional arrangements to keep or increase their competitive advantage. In BW the state was willing and able to cooperate on institutional innovations such as the dual university early, thus helping all companies facing the need for new highly skilled talent. All these activities have had positive spill over effects to the rest of the economy incl. SMEs in BW. In contrast, in NRW the preservation strategy of large companies prevented structural changes in its industrial heartland, thus hindering creating the prerequisites for more research economic activities in the Ruhr. The two cases show the importance of large firms engaging and pro-actively shaping the institutional landscape that they are embedded in, thus playing a crucial role in the transition process to the knowledge economy.

2.3.1 Regional Divergence

There are a few indicators such as the educational level of the labour force or R&D spending[16] which can shed light on how well regions are equipped for innovation based competition. Looking at the German Länder these measurements suggest that Southern Germany is in a better position to thrive in the knowledge economy. In 2017 more than 30% of BW and BY's labour force had tertiary education compared to 26.5% and 23.8% in NRW and Lower Saxony respectively (OECD, 2022). In 2019 the total R&D spending intensity measured as the share of nominal GDP was by far highest in BW with 5.79%, BY 3.41% and Lower Saxony 3.14%, whereas NRW invested only 2.16%.

Figure 2.6 R&D spending intensity by Bundesland 2019 and 1999-2019

[16] Following the OECD manual on R&D indicators (OECD, 2015).



Source: Author's calculations from Statistisches Landesamt Baden-Württemberg (2021) data: FuE-Ausgaben in Baden-Württemberg und Deutschland seit 1995, https://www.statistik-bw.de/GesamtwBranchen/ForschEntwicklung/FuE-Ausgaben-BL.jsp

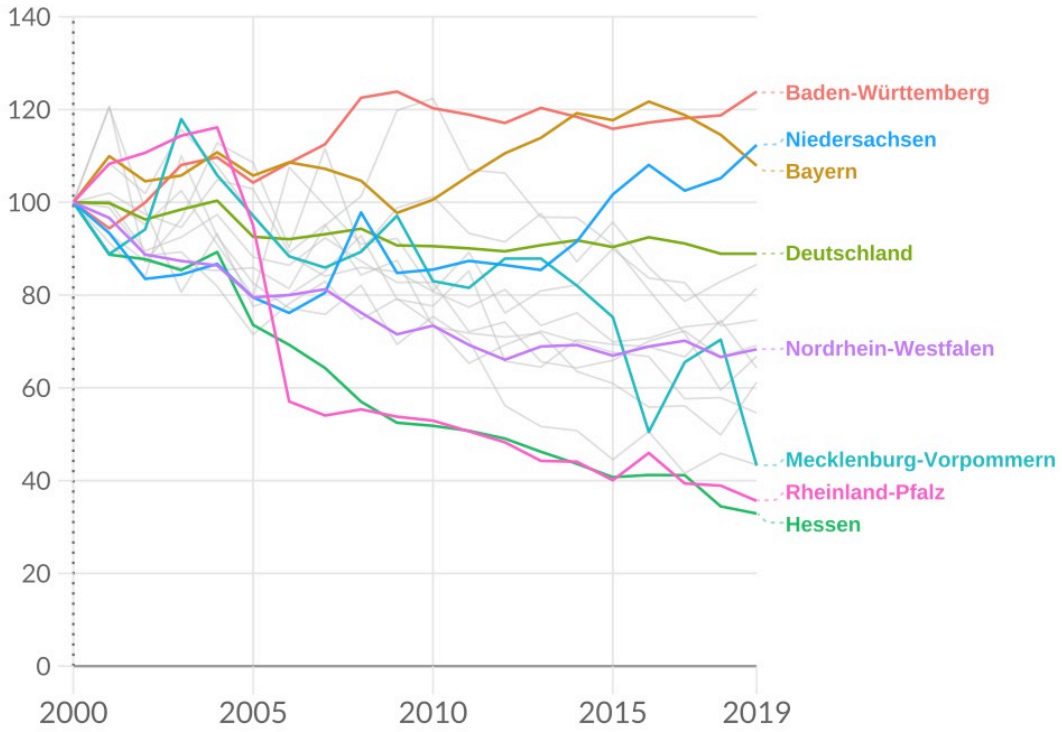
While all the Länder have increased their R&D spending intensity between 1999 and 2019 (see figure 2.6), with an increase of 2.13% BW is seeing an increase in the scale of investments into R&D that is more than twice that of the runner up (0.95% in the Saarland). Once again NRW is at the lower end with an increase of only 0.44% (13th place among 16 Länder).

While educational level and R&D investments give an idea around the 'input' into developing new ideas and products they do not necessarily say much around the output side of these investments. Patents are a measurement for the successful output in terms of knowledge economic activities and we see that the two southern Länder are increasing their already dominant position compared to the other Länder since 2000 (see figure 2.7, DPMA). In fact, only the three so called 'automobile states' (*Autoländer*) Baden-Württemberg, Bavaria, and Lower Saxony) were able to increase the number of patents registered since 2000. While companies and institutions in Southern Germany already registered 48.3% of all patents in 2000, their share reached 62.8% by 2019. The slight increase in the number of patents registered since 2000 in BW and BY contrast with the simultaneous fall in the number of patents registered in other West German states (except for Lower Saxony). NRW's share of

19.6% in 2000 which was almost on par with BW (23.5%) and BY (24.8%) dropped by 4.5% to 15.1% in 2019 and translates to ca. 3000 fewer patents registered compared to 2000.

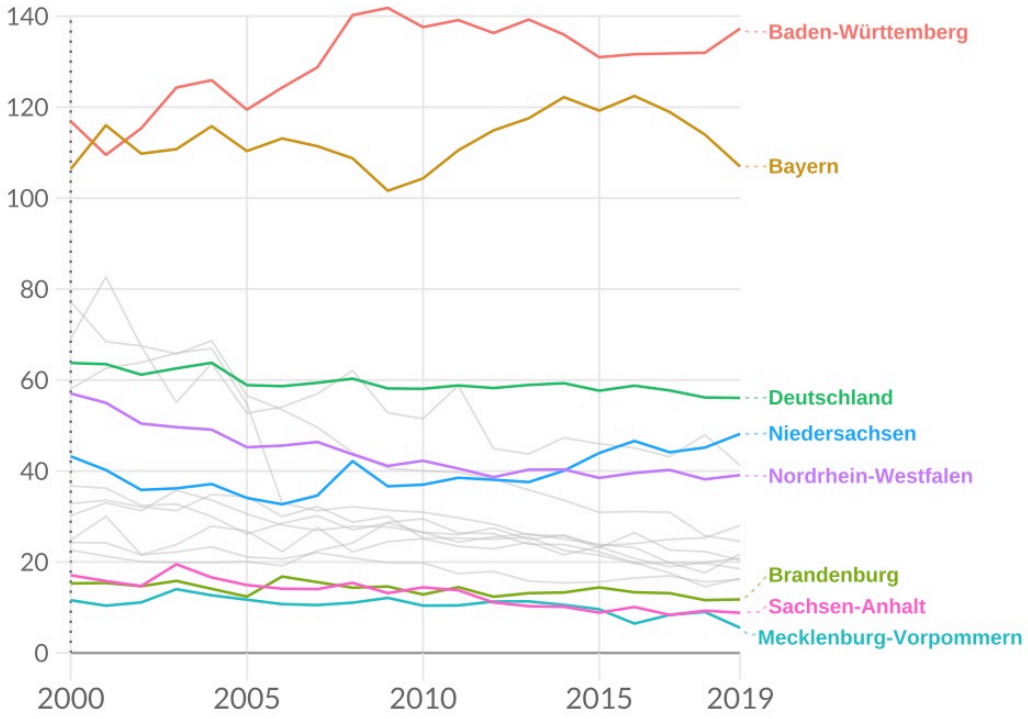
With the increasing importance of innovation based competition regions that show a stronger focus and investments in research and development tend to be economically more successful in the knowledge economy. In Germany we do not just see an East-West but also an increasing North-West and South divergence in the main input and output metrics, most pronounced in the contrasting developments in NRW and BW.

Figure 2.7 Number of patent registrations by Bundesland (2000=100)



Note: German Average and selected Länder highlighted. Source: author's calculations from DPMA (2020) data: Patentanmeldungen nach Bundesländern, https://www.dpma.de/dpma/veroeffentlichungen/statistiken/csv-statistiken/index.html

Figure 2.8 Number of patent registrations per 100,000 inhabitations by Bundesland



Note: German average and selected Länder highlighted. Source: Author's calculations from DPMA (2020) data: Patentanmeldungen geordnet nach Bundesländern, pro 100 000 Einwohner https://www.dpma.de/dpma/veroeffentlichungen/statistiken/csv-statistiken/index.html

2.3.2 The role of firms

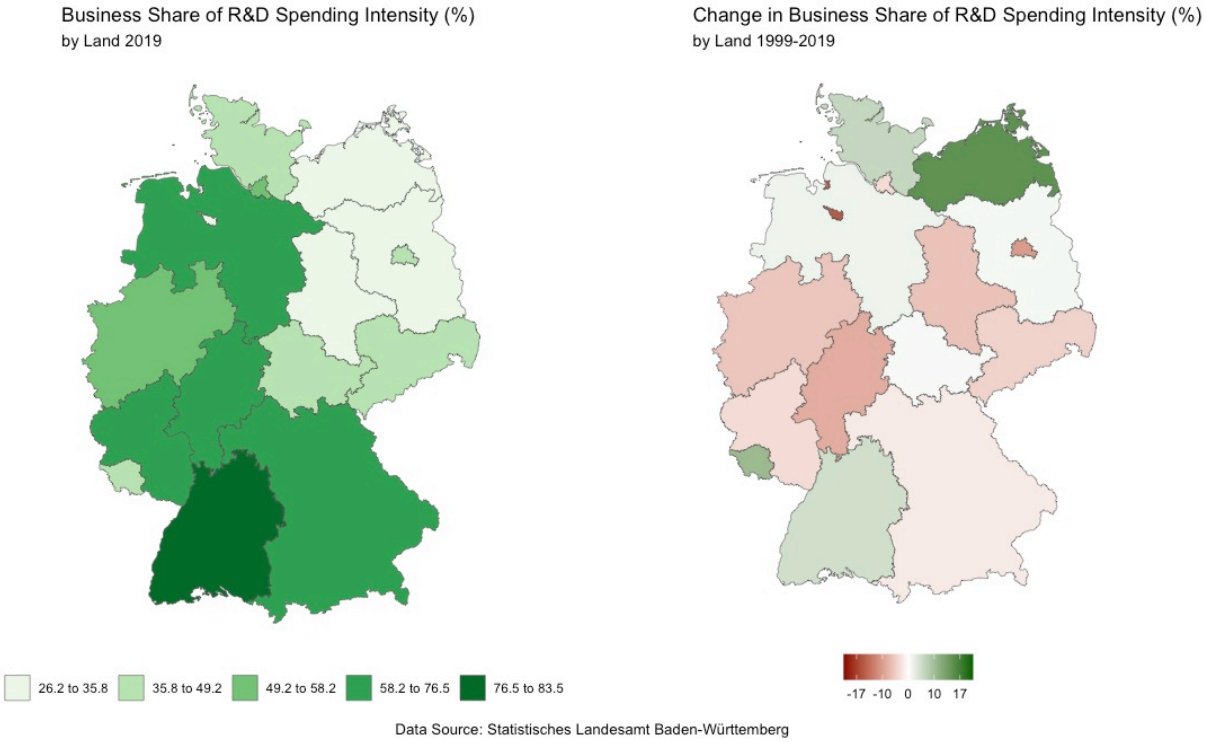
Businesses, and large research-oriented companies in particular are driving these patterns, which indicates the increasingly crucial role strategic decisions by companies play in this new economic environment. The share of private sector investments into R&D between 1999-2019 shows that Baden-Württemberg's business share of R&D spending intensity increased from 78.7% to 83.5%. Bavaria and Lower Saxony remained relatively constant moving from 78.5% to 76.5%, 69.5% to 71.2% respectively. In contrast, NRW's business share of R&D spending decreased from 63.9% to 58.2% over the last two decades.

In addition, the share of the labour force employed in knowledge intensive industries[17] further highlights the role firms play in the increasing divergence. With 16.9% in BW and 13.4% BY

[17] Knowledge intensive industries are classified according to the 2008 revised classification of economic sectors (Klasifikation der Wirtschaftszweige [WZ]) and include WZ 20-21 and 26-30. 20 – chemical; 21 – pharmaceuticals; 26 – electrical and optical; 27 – electric equipment; 28 - mechanical engineering; 29 – automobiles and parts; 30 – other automobile. The share of the labour force in knowledge intensive industries is calculated based on employees subject to social security contributions in knowledge intensive industries divided by all employees subject to social security contributions multiplied by 100.

of the labour force employed in knowledge intensive industries in 2019 the two Länder exceed the German average of 7.7% by far (see figure 2.10).

Figure 2.9 Business share of R&D spending intensity by Bundesland 2019 (%)

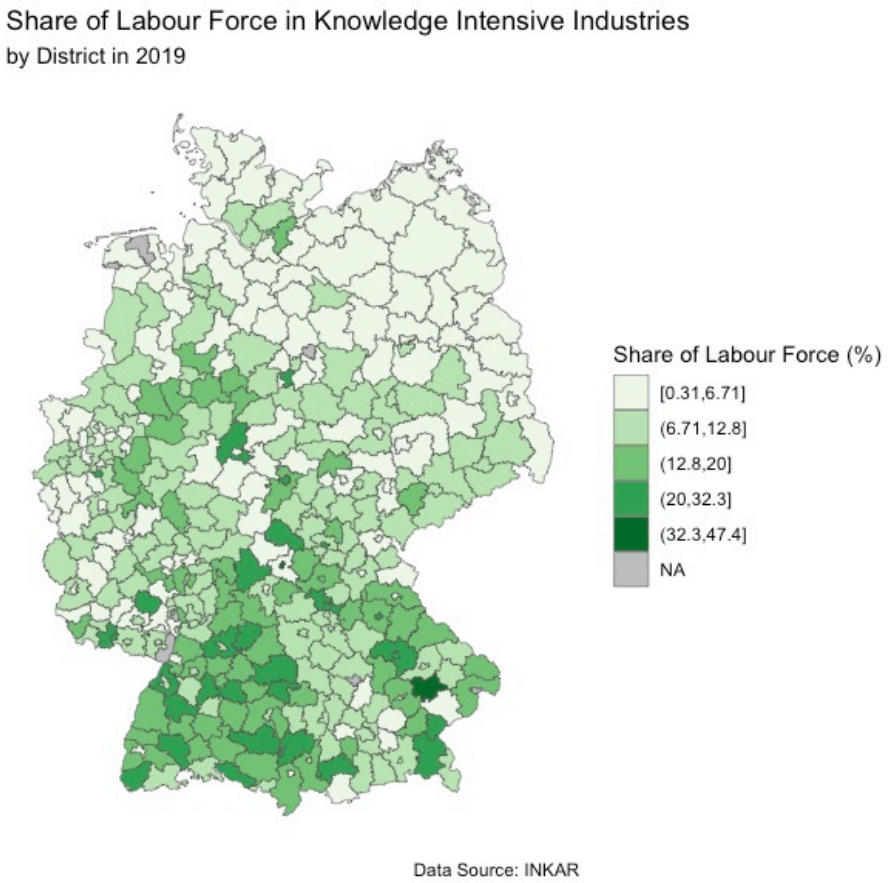


Source: Author's calculations from Statistisches Landesamt Baden-Württemberg (2021) data: FuE-Ausgaben in Baden-Württemberg und Deutschland seit 1995, https://www.statistik-bw.de/GesamtwBranchen/ForschEntwicklung/FuE-Ausgaben-BL.jsp

Looking at sectoral differences in terms of the R&D activity, 53% of all R&D investments are made in the automobile sector[18] (i.e. OEM and major suppliers) in BW, which also translates into 47% of investments of the German automobile sector. This might partly explain the immense difference in the magnitude of investments in BW compared to the other Länder, as this sector is facing major transformation challenges with e-mobility, autonomous driving, but also new services often linked to software development.

[18] Only Lower Saxony has a higher dependence on the automobile industry with 63% of all R&D investments. Bavaria as another automobile Land only sees 39% of its R&D investments made in the automobile sector.

Figure 2.10 Share of Labour Force in Knowledge Intensive Industries by administrative district 2019 (%)



Source: Author's calculations from BBSR (2022) data: Beschäftigte in wissensintensiven Industrien. https://www.bbr-server.de/imagemap/inkar/download/inkar_2022.zip

In fact, the increasing relevance of software development is reflected in the increase of R&D investments in BW for the ICT sector, which grew by 33% between 2017 and 2019, now making up 8.7% of all R&D investments in BW. This means that 51% of all business investments in the ICT services sector in Germany are made by companies in BW. Moreover, the two southern states are dominant in knowledge intensive services with 29% of employees in this sector located in companies in BW, and 20% in Bavaria. This shows that the transition is not solely due to the higher investment volume in the automobile sector, but that the southern states are also leading in other economic sectors adjusting to the knowledge economic competition.

This trend towards more knowledge intensive activities in BW is also present in data on new business formations. In a ZEW report on developments in new business formation in BW, using IAB/ZEW panel data Füner, Gottschalk and Lubczyk (2020) find that BW stands out

compared to other Länder as a high-tech business formation region, with 8.5% of new businesses classified as part of the high-tech sector compared with 7.6% in the rest of the republic in 2018.

In BW in 2019 over half (51%) of all R&D personnel was employed in a company with more than 10,000 employees (compared with 37% in Germany). The reasons behind this highly skewed distribution are that the cost of R&D activities is high and getting higher while investment returns in many product markets are diminishing due to increasing technological complexity and ever shorter product cycles. This makes SMEs (<250 employees) less likely to invest in R&D compared to larger companies – however that does not mean that they will not adopt and apply new technologies. Unsurprisingly, the share of R&D personnel employed at SMEs made up only 11% of all R&D personnel in the private sector in BW, the lowest figure across all the Länder (German average of 17%). However, with 19.4%, SMEs in BW employed the highest number of R&D personnel in Germany compared to the other Länder. Moreover, the total number of employed R&D personnel in SMEs in BW grew by roughly 19% in the time period 2017-19, showing that SMEs in BW are increasingly focusing on knowledge intensive activities as well (Einwiller, 2022).

Taking a closer look at the different sizes of companies and their patent activity shows that a few very knowledge intensive firms are increasingly dominating the number of patent registrations. While companies or institutions with more than 100 new patents a year already made up 31.6% of total newly registered patents in 2000, in 2021 they account for 49.3%. At the same time their share of all companies or institutions registering a patent increased from 0.2% in 2000 to 0.5% in 2021 (those with 11-100 rose from 2.1% to 4%). The top 50 list of companies with the most registered patent per year which is published annually by the DPMA gives some anecdotal insight into the Länder affiliation of these large research-oriented companies. The five companies with the highest number of new patent registrations in BW in 2018 made up 47.7% of new patents in BW compared to 36.7% in 2006 and 14.9% of all new patents by German companies or institutions in 2018 compared to 10.1% in 2006. The trend towards few very large firms driving the dynamic becomes also evident when looking at the top five companies in NRW even though to a much lesser degree. In NRW the top 5 are accounting for 22.6% of patents coming from the Land in 2018 compared to 10.4% in 2006, as well as 3.3% of all German patents in 2018 compared with 1.8% in 2006.

Southern Germany, i.e. BW and BY is dominating the top 50 list in 2018 making up almost half (20% BW and 28% BY) of all companies, but also NRW still has a comparable number of companies (16%). However, the number of patents by these NRW companies are much fewer (2% of German total in 2006 and 3.6% in 2018) compared to the southern companies in the list which increased their share of the German total from 25.3% (11.4% BW) in 2006 to 33.6% (17.1% BW) in 2018. The different data points suggest that the divergence in innovative activities is driven by large research oriented innovative companies.

Overall, the descriptive data suggests that southern Germany and Baden-Württemberg in particular has a higher concentration of large research-oriented companies which are driving the magnitude of R&D investments. However, there also seems to be a generally higher research activity of SMEs in BW. Next, we will turn to the regional environment companies find themselves in and how it was shaped by and is shaping the firms transition to the knowledge economy.

2.3.3 Role of regional policies

The success of the large and smaller companies is to some extent also dependent on the surroundings that they are embedded in. In other words, regional circumstances shaped by state policies and institutions still play a role for the chances of success for firms. We see state policies and the institutional environment as an important factor in guaranteeing firms success. However, unlike the institutionalist literature we see the agency coming from companies and not the institutions that they are embedded in (see Herrigel, 2010).

> "*Institutions (rules, norms) are markers or expressions of the (always provisional) arrangements that actors have created. Institutions do not constrain or enable actors; actors constrain and enable themselves.*" (Herrigel, 2010: 7)

In other words, with companies changing internally, they start to exert pressure externally to adjust the institutional framework to their new needs. Lemb (2017) sketches out regional industrial policies in the Bundesländer, and with contributing authors highlights the evolution and divergence in approach, as well as a variety of involved actors in different states. Ortiz (2013) corroborates this account by studying the differences in the regional innovation system of Baden-Württemberg and the Metropolitan Region Hannover Braunschweig Göttingen Wolfsburg in Lower Saxony. Lemb (2017) shows that the Southern German states pursued a stronger ordoliberal stance for most of the 20th century and have only started a more active

policy since the 1990s to support companies with digitisation and R&D infrastructure. In NRW on the other hand, industrial policies have been more interventionist and active since the middle of the 20th century as a result of the first phase of de-industrialisation (Strukturwandel) especially in the Ruhrgebiet. The two Länder show very different paths into the knowledge economy, and while leading firms in BW were at the forefront of trying to create a regional institutional infrastructure to their long-run advantage, many large firms in the *Ruhrgebiet* were initially less interested in structural transformations which hampered the development in the region.

2.3.3.1 BW and the dual university

The active role that Baden-Württemberg's firms played in preparing for the future and laying the foundations for the transition to the knowledge economy can be exemplified with the introduction of the dual university system. In 1971 Daimler approached the Kultusministerium with the idea of offering a dual style training for Abituerienten, i.e. combine apprenticeship with higher education courses. Daimler, Bosch, Standard Elektrik Lorenz AG engaged with each other to discuss the idea further. The three companies teamed up with the Verwaltungs- und Wirtschaftsakademie (VWA; continuous education institution for public and private) in Stuttgart and the Industrial Chamber Mittlerer Neckar and announced the so called 'Stuttgart Modell' in 1972. In the following year, Willhelm Hahn (Kultusminister BW), announced the vocational educational offensive which included the Stuttgart Model idea in the form of the *Berufsakademie* (BA) as one of its core aspects with the main idea to transfer the dual apprenticeship model into tertiary education. The first pilot *Berufsakademie* programmes started in 1974 in Stuttgart and Mannheim offering economic and technical subjects. Six further BAs across the Land were founded by 1981. The success led the Land to pass the *Berufsakademie Gesetz* (BA law) in 1982 which ended the pilot study and formalized the institutions as a part of BW's tertiary education. In 1985 5,000 study places were to be made available, however demand was higher and the availability needed to be increased to 12,140 by 1990 and 18,000 by 2004. The numbers have continued to increase since then. In 2019 there were 36,212 dual students in BW (33.4% of all dual students in Germany; BiBB, 2020). During the same time period BW intensified its lobbying efforts with the other Laender to acknowledge the BA degrees and following German unification the BA model was adapted by Berlin, Saxony and Thuringia. In 1995 the *Kultusministerkonferenz* suggested to all Länder to treat BA degrees as equivalent to UAS degrees. (i.e. Diplom (FH) ~ Diplom (BA)). With the

Bologna reform, the degrees have become universally equivalent and in 2009 BW transformed its BA into the Dual (or cooperative) University Baden-Württemberg (DHBW) with one location in Stuttgart and many branches/campuses across the Land (following the model of the state university system in the US). Not all states followed suit. So far only Thuringia in 2016 and Saxony is intending to transform their BA into one Dual Study University as well. That BW pursued this strategy of the Dual University is arguably largely a result of its company landscape. In addition, over time the role of the Dual University has now become especially critical for family companies in non-urban areas (Demary et al., 2020: 64; Schenkenhofer & Wilhelm, 2020). These companies – mostly SMEs – are as a result benefitting from the large research-oriented companies' and state cooperation into the scheme. This is likely contributing to the higher research orientation of SMEs in BW compared to other Länder. A more recent example of companies' initiative in creating ecosystems for their and their region's benefit is also the transformation of the city region around Heilbronn by the Schwarz foundation, which is controlling Lidl. Over the last two decades the foundation and company have invested in educational infrastructure in and around the city, which have attracted research institutes such as Fraunhofer and a new campus of the Technical University Munich or coding school Ecole 42 to the city.

2.3.3.2 NRW – Ruhr Area

A contrasting story to the early public-private partnership and later success in BW is the *Ruhrgebiet* in NRW. The Ruhr area was hit hard by the industrial decline in the heavy industries such as coal, iron, and steel due to greater global competition and substitutes for coal since the 1960s. As a result, unemployment rose rapidly and in 2014 the share of people employed in industry or manufacturing stood below 15% in most cities. Until the mid 1980s the economic actors pursued a strategy of reindustrialisation which was an attempt to preserve the existing economic structure mostly via raising scale and productivity (Hospers, 2004). The state government was at the same time engaged in trying to find alternative more long-term growth paths for the region by trying to attract other light and technologically more sophisticated industries e.g. micro-electronics via establishing a higher education sector and securing sites for new industries. Even though the Ruhr opened its first university in 1965, existing local large firms showed little to no interest in these initiatives. As a quote by Gustav Krupp illustrates: "What we need in the Ruhr are muscles, not brains." (in Hospers, 2004: 151). In addition, large firms prevented the use of their sites for more inward investments via very unattractive

conditions or refusing to cooperate and thus the Opel factory in Bochum was the only new arrival to the region. As a result, a coalition of local businesses, politicians, labour unions and workers whose shared interest was the preservation of the existing structure were successful in opposing any meaningful structural changes. This initial attempt by the state to attract new industries could have worked as examples from other regions show. The old industrial heartland of northern Italian managed to diversify its economic structure and thus avoided major industrial decline in the long-run, still generating GDP per capita above the national average (Felice, 2018).

The situation in the Ruhr only changed in the 1980s when the strategy shifted towards a strategy of neo-industrialisation, that is an emphasis on the development of new, future oriented branches around the existing old industries (Röhl, 2019). This change of heart came from the large coal and steel corporations themselves, after recognising that they were faced with a structural and not just a cyclical trend. The major companies' willingness to branch out coincided with a change in industrial policy by the state of NRW which shifted its focus on technology policy aiming at the establishment of especially new environmental technology thus building on the existing industries' pre-existing strengths (Hospers, 2004). Unfortunately for the region, the reorientation soon after coincided with the re-unification and a major shifting of funds from federal sources towards the East of Germany. As a result, the region has not been able to attract a lot of research intensive activities – either by existing firms or new start-ups. While the higher education landscape has continuously grown, the universities are lacking resources, the number of non-university research institutes is low, and the number of university-firm cooperations is low (Kiese, 2019; Arndt et al., 2015). As a result, the supply of graduates outpaced demand, and the region has experienced a brain-drain (Kriegesmann et al. 2016). This is not limited to the industrial sector as the share of employees in knowledge intensive services has been growing but remains below most other metropole regions in Germany (Röhl et al., 2018). In fact, the old steel industries could make use of other locations which had better prerequisites for expanding their R&D activities. Many companies moved their R&D activities to Styria in Austria which had invested heavily in keeping its heavy and low industries competitive via technological advances and had created a very attractive ecosystem for steel companies (Lee, forthcoming).

The discussion has shown that large research-oriented firms are crucial in the process of successfully transitioning to the knowledge economy. While the *Ruhrgebiet* case shows how

large firms can hinder the transition, the case of Baden-Württemberg suggests that large research-oriented firms were able to setup and shape the higher education infrastructure in the Land to their needs. The resulting private-public coalition led to positive spill-over effects for the rest of the economy and might explain the higher research orientation among SMEs, as well as the high start-up number in R&D intensive businesses in Baden-Württemberg compared to other Länder. These developments were aided by the high concentration of long-term oriented firms in the south of Germany which might also play an important role in these firms' willingness to more successfully focus on the knowledge economic transformation.

2.4 Conclusion

This paper has described how pressures from the transition to the knowledge economy and globalisation have caused the partial breakdown of previous national cooperative institutions underlying the German political economy. As a response to the changing institutional requirements of firms the German political institutional framework has become increasingly decentralised along its main pillars and given more weight to the role played by firms as well as regional governments. This new decentralised order has thus prevented a coordinated national response to adjust to the knowledge economy, and instead different Länder (including their economic, social, and political actors) pursued different strategies which have led to the observed diverging economic outcomes across the Länder[19]. As a result, in the southern German states large firms together with regional political actors have managed to create successful ecosystems for themselves and other economic actors, while in other states the transition has not been as successful.

The reasons behind the current Southern German success are likely to be multifactorial. While this study has highlighted how the changes in the institutional framework have contributed to the regional divergence and that large research-oriented firms and regional governments are playing an important role in helping economic actors to adjust to the new innovation driven competition it is far from providing a complete explanation. The comparative political economy literature still treats most advanced countries as coherent wholes in their analyses.

[19] The presented account may at first appear similar to Herrigel's (1996) regionally differentiated national framework. However, our account is quite different to the typology presented in his book "Industrial Constructions". For Herrigel Bavaria has an *autarkic industrial order* and Baden-Württemberg a *decentralized industrial order*, which are both long running orders that continue to shape adjustments until today. We see both Southern German Länder in a similar situation which would not match the expectations of their respective industrial orders.

For some countries with coherent institutional frameworks across regions this approach seems defensible, however not necessarily for countries which are characterised by a system of multi-level governance, with competence distribution across different levels that could much more easily lead to regional variety and differentiation. Thus, future research should study regional aspects in more depth to establish which policies or firm characteristics are the main drivers behind the observed dynamics.

3 Age against the Machine: Automation Risk and the AfD in Germany

Abstract

Research on the effects of technological and right-wing populist party (RPP) voting has paid particular attention to older routine workers. Another so far understudied group under pressure from technological changes are young individuals with lower educational and training backgrounds. Thus, the paper highlights a sizeable group of potential automation losers at the beginning of their careers. Combining a new data set on automation risk in German Occupations with German panel data, this paper shows that while younger individuals in the workforce tend to be generally less likely to vote for a German RPP, the Alternative für Deutschland (AfD), than older ones, young people in high risk occupations and with no higher secondary school diploma or university background are more likely to vote for the AfD than their more educated peers and older counterparts. The results suggest that status anxiety and future aspirations might play a crucial role for young individuals in their voting behaviour.

3.1 Introduction

An increasing number of publications have been focusing on the current technological shift and its potential distorting consequences on society (Osborne & Frey, 2013; Arntz et al. 2016, 2018; Bonin et al., 2015; Acemoglu & Restrepo, 2018). This new technological era will exert more pressure on the workforce to adjust or face the risk of becoming redundant. However, not all of us are affected equally by technological change. Autor et al. (2003) already highlighted in the early 2000s that workers with a high share of routine tasks are especially exposed to automation risk (see also Dengler & Matthes, 2015)[20]. In most advanced societies the main structural response to these shifts have been an expansion of tertiary education (Baethge & Wieck, 2015), equipping future entrants into the labour market with better skillsets to cope with the changing labour market demands. However, not everyone receives a university education which have led some experts to paint gloomy pictures of especially this group's occupational future, e.g. Frey & Osborne (2017) suggest that approximately 47% of jobs in the

[20] I will use the terms technological change and automaton (risk) interchangeably. This paper's scope cannot address the discussion around the two dimensions of technological change, namely automation and the creation of new tasks (see Acemoglu & Restrepo, 2018).

USA will be replaced in the next 10-20 years (see also Arntz et al. 2016, 2018; Bonin et al., 2015).

More recently, political scientists have become interested in how the rising awareness and discussion of potential negative consequences of new technologies is affecting individuals vote choice. First results show that individuals in high automation risk occupations are more likely to vote for right wing populist parties (RPP)[21](Im et al. 2018). However, technological change is a very gradual process and while there is an aggregate decline in occupations with a high share of routine tasks, many of these workers manage to stay in their jobs until retirement (Cortes, 2016; Kurer & Gallego, 2019). So far, no research has been conducted into understanding what role age plays in an individual's reaction to the increasing automation risk among the affected groups. The career trajectories of younger individuals with a lower educational background and now in occupations with higher automation risk could be particularly affected. While many of these occupations had guaranteed a decent standard of living and prospects of upward mobility in the past (Nachtwey, 2016), the susceptibility to automation by new technology is undermining this positive outlook (Kurer, 2020). Such a situation causes status anxiety for many (Kurer, 2020) which has been shown to increase RPP voting likelihood (Gidron & Hall, 2017; 2020). Hence, we should ask is there a generational effect in the political consequences of automation risk?

In Germany, a new RPP, the 'Alternative für Deutschland' (AfD) has become an established player in the German party landscape and performed very well during the 2017 federal elections. The party's success was especially pronounced in regions with a strong manufacturing base (DIW Berlin 2018), a sector with occupations particularly prone to more automation as well as increasing competitive pressures. However, Germany is renowned for its very stable training and welfare system, which could weaken any worries associated with being in a high automation occupation. A defining characteristic of the German training system is employers invested in training and/or re-training their employees leading to a highly qualified workforce and a high likelihood of qualified older workers (Battisti, Dustmann, &

[21] This article follows Mudde's definition of populism (2004 : 543) as *"[…] an ideology that considers society to be ultimately separated into two homogeneous and antagonistic groups, 'the pure people' versus 'the corrupt elite'",* and further states "[…] *that politics should be an expression of the volonté générale (general will) of the people*". This definition understands populism as a so-called thin ideology which tends to be coupled with other ideologies and ideas. Right-wing populism is usually a combination with xenophobic and authoritarian tendencies, i.e. nativism.

Schonberg, 2022). In addition, German labour security laws and regulations reward the length an employee has been staying with their employer and generally offer high protection by taking an employee's personal circumstances such as caring responsibilities into account if an employer can make an employee redundant. These labour laws are thus especially strong for older employees who are not just more likely to be employed with the same company for longer, but also tend to face the qualifying personal circumstances more often. This means that younger generations in the workforce are generally less protected and thus relatively more vulnerable to be made redundant compared to their older counterparts. In addition, while older workers are likely to have already achieved some upward mobility during their career, it is younger workers who are more likely to face social anxiety about their current and future position in the labour market and society, which according to Gidron and Hall (2017; 2020) could make them more likely to vote for a RPP. However, younger individuals in the labour market are obviously not a homogenous group. Their educational and training background will differ among themselves as well as compared to the older generations. Accordingly, their expectations about their futures are likely to be different as well. A university graduate might start in a low paid temporary contract in an occupation consisting of a high share of routine tasks, but this individual will still have a higher likelihood of finding a new job compared to a traditional apprentice with a specific skillset who might be find themselves in a declining sector and career path under threat of future unemployment. Thus, especially the young lower skilled facing high automation risks are potentially facing the status anxiety that could lead them to vote for a RPP.

This article uses individual level data from the SOEP panel in combination with new data on automation risk for German occupations (Matthes & Dengler, 2018) to analyse what role age plays in the political behaviour of the group of individuals in occupations with high automation risk without a high education background. Controlling for various socio-demographic and cultural factors, the results show that individuals in high automation risk occupations and no higher secondary or university background are more likely to vote for the AfD than their more educated or older peers with a similar educational background. A likely explanation for these results is that due to the uncertainty about their occupational future they experience status anxiety and consequently become more likely to vote for the AfD.

This research contributes to the emerging literature on political behavioural consequences as a result technological change (Galego & Kurer, 2022). The paper explicitly studies the role

played by the age of individuals in their reactions to possible automation threats. To the best of my knowledge, it is the first article to explore a generational effect in the political consequences of technological change and among the first to study the topic in the German context with automation risk data specifically tailored to German occupations[22]. In addition, the fine-grained automation risk data allows controlling for within occupational group variance which has not been possible due to data limitations in previous studies.

In the following section, the existing literature on RPP, the AfD and their link to voting behaviour of the so called 'automation losers' will be reviewed. Subsequently, as part of the theoretical underpinning of the analysis the recent developments in education and training in the German context will be described and analysed. The third section discusses the data and method used to test the developed hypotheses. Afterwards, the fourth section will present and discuss the results of the analysis. In the last part of the article, implications of the results will be put into the wider context of the literature and potential future research questions will be highlighted.

3.2 Right Wing Populist Parties, the AfD and Automation

3.2.1 RPP literature and automation

While there is an ongoing debate about the effects on automation in the labour market and to which extent human jobs will be replaced (Frey & Osborne, 2017; Goos & Manning, 2007), the links between (expected) technological change and political behaviour still remain largely unstudied. Previous research hypothesized that individuals threatened by automation are a likely voter group for populist right parties (Camus & Lebourg, 2017). However, automation and technological change has been at fringes of the debate around the recent rise of radical-right-wing populist parties. In general, academics have tried to explain the rise of RPPs in recent years using different starting points. Demand-side explanations are theories which focus on the role of voter's attitudes, values and opinions as the main cause of party platforms and success. Supply side explanations focus on the role of the party in convincing potential voters to side with them based on the result of constraints and opportunities that the political-institutional context offers, i.e. especially the space left by political competitors (De Vries & Hobolt, 2020). In fact, populist right parties in Europe are increasingly using the threat of

[22]Except recent article by Schoeller & Kurer, 2023

automation in their political campaigns (Mulot, 2017 in Im et al., 2019). This fits with these parties' overall narratives of warning about exogenous changes and nostalgia of the past (Mudde, 2007; Steenvoorden and Harteveld, 2018). Thus, populist right parties have identified fear of technological change as an opportunity that can be exploited and are supplying or offering potential voters with answers to the perceived threat that automation could pose to them. Based on the fact that disadvantages are strongly concentrated among blue- and white-collar workers with a high share of routine tasks in the lower middle class, Kurer and Palier (2019) argue that socially conservative parties in general and right-wing populist parties in particular have recognized the electoral potential of disaffected routine workers and skillfully address and acknowledge their anxieties.

Demand side explanations are the dominant approach in the literature around RPP voting. The literature is divided between two competing explanations: the cultural backlash or economic insecurity theses. The cultural backlash thesis emphasizes the populist surge as mainly a reaction or backlash against progressive cultural change, whereas the economic insecurity thesis focuses on the consequences of changes transforming society and the workforce in post-industrial economies (Inglehart & Norris, 2016, 2019; Oesch 2008; Colantone & Stanig, 2018; Rodrik, 2017). Technological change and automation is thus often seen as one of the contributing factors to the economic insecurity thesis, as automation arguably poses a threat to economic security. Unsurprisingly, a consistent finding of the emerging literature on the political consequences of technological change is that losers of technological change are more likely to vote for right-wing anti-establishment parties (Galego & Kurer, 2022). Anelli, Colantone and Stanig (2019) find evidence that technological shocks increase the vote for nationalist and right-radical parties by studying the introduction of robots into the labour markets of 15 European countries between 1993 and 2016. They argue that the effect is likely due to the technological shock driving structural changes and thus is similar to the much-discussed impact of Chinese imports. Yet, not all employees or workers should be affected by automation risk equally. Im et al. (2019) find that individuals who are just about managing economically are more inclined to vote for radical right parties while the pressure of automation rises. Kurer and Gallego (2019) show that while technological change is negatively affecting non-/ and semi-skilled workers, it has a positive economic effect for higher skilled workers. Kurer (2020) also shows that a perception of relative economic decline among the politically powerful group of workers with a high share of routine tasks drives support for conservative and, especially, right-wing populist parties.

However, both cultural and economic factors could be interlinked and contribute to the likelihood to vote for a RRP via a common channel. Gidron and Hall (2020) try to combine the two competing accounts and show how both, cultural and economic factors and their interaction leads to social status anxiety. According to their argument widespread social status anxiety is the cause for the recent surge in right-wing populist party support. Thus, they see the rise of populist parties as a problem of social integration. Those *socially marginalized*, that is *"some people have the sense that they have been pushed to the fringes of their national community and deprived of roles and respect normally accorded to full members of it*" (Gidron & Hall, 2020: 1028). In other words, social status anxiety is the main predictor of the probability to vote for a RRP, and the sources of this anxiety can be both cultural or economic, and in fact the two may interact with each other. As a consequence, automation risk might not just contribute to social status anxiety via the economic channel but also affect more cultural notions. This is to some extent corroborated by Gingrich's (2019) findings that worker groups exposed to technological change are not just more likely to vote for the mainstream left and populist right, but also that compensation does not forestall the rise of the populist voters.

3.2.2 The AfD – a party of contradictions

In the light of the general literature, research about what explains the AfD's success in Germany is quite inconclusive and contradictory. The AfD was founded as a single-issue party in 2013 focused on getting Germany out of the Eurozone before it slowly transformed itself into Germany's first right-wing populist party (Franzmann, 2016). Until today the party is experiencing internal conflicts about the political and ideological orientation of the party. Yet, the refugee crisis in 2015 is seen as a decisive turning point with the AfD showing more populist radical right tendencies (Schmitt-Beck, 2017).

Research findings show that the AfD drew its voters from across the political party spectrum as well as from previous non-voters in 2013 (Hansen & Olsen, 2019). AfD voters tend to show mostly the same socio-demographic characteristics as all other German Parties except of being defined by a majority of male voters (Hansen & Olsen, 2019), who are mostly young and middle-aged men and over proportionally wealthy (Bergmann et al., 2017; Niedermayer & Hofrichter, 2016). Goerres, Spies and Kumlin (2018) call the AfD a populist radical right party with special features due to its anti-redistribution economic policy preferences and the strong

support by specific immigrant groups (i.e. Russian-Germans in particular). AfD sympathizers and voters showcase very strong anti-immigration and anti-establishment, as well as communitarian and anti-cosmopolitan attitudes (Hansen & Olsen 2019). Tutic and Hermanni (2018) find evidence for the economic insecurity thesis, while Manow (2018) shows with the help of a deprivation index that the economic insecurity thesis does not hold. Manow further argues that labour market insiders upset about easy welfare access for new immigrants are more likely to vote for the AfD. Kohlrausch (2018) argues more similarly to Gidron and Hall (2017; 2020) that social uncertainty and fears, especially the fear of social decline motivated voters to elect the AfD in 2017. Manow and Schwander (2022) also suggest that status anxiety is a central driver for AfD support, however the sources of the anxiety are different between East and West Germany. They argue that while it is especially former labour market insiders that experience status anxiety in West Germany, in East Germany it is a more collective status decline experience following reunification and its consequences on the regional labour market and social security.

The last radical right party that was relatively successful in Germany were 'Die Republikaner' (REP) in the 1990s. The REP employed similar strategies as the 'new' populist right, so the recent electoral success of the AfD appears to be less about the newness of its message than about new opportunity structures. From this supply side view, the AfD emerged due to a rise of Euroscepticism and D-Mark nostalgia, which arguably had to make way for the opportunities offered by the refugee crisis in 2015/16. The changing face of the AfD allowed it to initially cater to different and often contradicting interests. This phase seems to be coming to an end with the party having moved away from a mainly economically liberal stance towards typical RPP positions (Arzheimer & Berning, 2019; Schmitt-Beck, 2017).

Even though there are to the best of my knowledge no studies that link technological change to the AfD's success, there is some circumstantial evidence, that the AfD is indeed attractive to 'losers of automation' (Im et al. 2019). The AfD electorate is more likely to be concerned about their jobs as a survey study with ca. 5000 employees by the Hans-Böckler Stiftung (Hilmer et al., 2017) suggests. The study results show that 34% of AfD voters are concerned about their occupational situation compared with 26% overall. Further, the survey shows that AfD voters are more likely to perceive the EU and globalisation as a threat to jobs in Germany. This is an indication that there is a concern among the AfD electorate for their occupations,

even though the study does not shed any light on the underlying reasons for these fears directly one can hypothesise about possible mechanisms.

The AfD sees technological change, i.e. especially automation and robotisation, as a necessity to guarantee Germany's strong economic position in the future. However, it recognizes that there will be losers in this process which are more commonly found in the industrial sector and among occupation with a high share of routine tasks.[23] The party's strategy to attract them is to combine its position about accepting and pushing for technological change with heightening the threat from low-skill labour immigration which will not just compete with lower skilled Germans, but also put more strain on the welfare state (e.g. Joa, 2019).[24] Finseraas et al. (2017) show that such a strategy is exploiting a polarizing effect among voters experiencing negative wage effects of immigration. Yet, how the present and future lower skilled employees affected by automation should be helped or prepared is not clear, as no substantive statements regarding upskilling or other approaches have been put forward by the party or its members so far. Instead, publications by the AfD's working group on digitalisation are focused on creating the right framework by cutting red tape, targeted subsidies for promising start-ups in the ICT sector and expand the cooperation between research and economic actors (AfD Fraktion im Bundestag, 2018). While the AfD's stance on welfare provision for those affected is not entirely clear, it is fair to say that one envisioned solution is to reduce access to the welfare state for foreigners in order to guarantee welfare to those 'Germans' affected. This message is in line with the AfD's success to reach voters by highlighting a deteriorating welfare state as was previously discussed by Manow (2018).

The AfD also highlights the threat of foreign investors taking over German high-tech and know-how, as well as the negative role of the EU as a hurdle to a more successful national strategy (AfD Kreisverband Halle (Saale), 2019).[25] The party is trying to establish a link between the investment activities of Chinese companies and a growing political influence of China in Germany. Thus, the party is actively trying to frame some of the issues related to technological change into worldview based on competition between nations.

[23] Landtag von Sachen-Anhalt Drucksache 7/3409, p. 4; Abgeordnetenhaus Berlin Drucksache 18/12142, p. 4.
[24] Landtag Brandenburg Drucksache 6/5778, p. 3; Thüringer Landtag Drucksache 6/1942, p. 3; Landtag von Baden-Württemberg Drucksache 16/1416, p. 4; Thüringer Landtag, Drucksache 6/2549, pp. 4-8;
[25] Deutscher Bundestag Drucksache 19/645

Overall, the AfD's solution to the effects of technological change seems to be focused on reducing the exposure of vulnerable groups to labour market competition from lower skilled migrants. What makes the party stand out in Germany is the emphasis on those workers who will be negatively affected by heightening their possible fears. This shows that the AfD is in line with the general suspicion raised in the literature about RRPs having identified this group as possible electorate. While the AfD refers to the negative consequences of technological change for parts of the workforce, it is not clear which groups are, or perceive, themselves to be particularly affected and thus might be more prone to vote for the AfD. Next, we will try to establish why especially younger less educated individuals might be especially susceptible to this message.

3.3 Theory: Automation Risk, RPPs and Age

There is a dissonance around the major impact of technological change on labour markets and the lack of political debate around it (Galego & Kurer, 2022). The traditional causal chain of technological change affecting an individual's economic policy preferences and thus voting behaviour is not very robust (Weistanner, 2021). One reason may be that the effects of technological change are prone to misattributions due to their intangible nature. This does not mean that technological change is irrelevant for political behaviour. Instead, economic decline caused by technological change is likely to manifest itself in the political debate, at least partially, through other issues, such as immigration or trade (Galego & Kurer, 2022). As pointed out above, it might not be a coincidence that the AfD is linking these issues together. In line with this view of technological change causing economic decline for those negatively affected, I build on Gidron and Hall (2017; 2020) in their assumption that social status anxiety is a main driver for individuals to vote for RPPs. Thus, I understand occupational automation risk as one of the factors that can increase social status anxiety and thus make individuals more likely to vote for the AfD.

The obvious threat of automation risk is redundancy.[26] The subsequent loss of income as a result of economic decline can have a direct effect on an individual's social status anxiety. Yet, existing institutions can have mediating effects around this immediate threat such as labour

[26] While the link between automation and unemployment is still being debated, there are an increasing number of publications pointing to the shrinking number of routine task workers, as well as increasing non-participation rates with the introduction of computer based automation (Galego & Kurer, 2022; Jaimovich et al. 2020)

protection laws (Vlandas & Halikiopoulou, 2021). An individual under labour protection laws will perceive the risk of automation differently than an individual without. In addition, such regulations could not just protect an individual from redundancy but could even incentivise the employer to upskill or retrain the workers at risk. A similar logic applies to other protecting institutions such as sectoral union membership. The risk of redundancy carries with it the potential for long-term unemployment or a worse economic situation due to e.g. a new lower paid occupation. The perception of the consequences of being made redundant will differ between individuals depending on their personal circumstances. Even if the adoption of new technologies does not lead to redundancy, workers affected might still suffer economic consequences. For example, Dauth et al. (2021) show that in the German manufacturing sector workers affected by technological change could retain their employment, but their wages suffered. The probability of finding new (equivalent) employment is a likely influence on an individual's perception of how negative the consequences of automation are to them as well. Their future labour market prospects are largely dependent on their educational and training background (Cortes et al. 2017, Kurer & Gallego 2019). At the same time, both risk of prolonged unemployment and a lower paid job can contribute to an individual's social status anxiety. Older workers might find themselves in a position of already having achieved many milestones in their careers, as well as in their personal lives. This provides them with a certain social status even when facing job-loss. Automation risk is thus likely to affect individuals' social status anxiety differently, mediated by institutions, as well as their socio-demographic background.

The literature generally sees older voters as more likely to vote RPPs, whereas younger voters tend to favour socially progressive parties (Inglehart & Norris, 2019). However, the empirical relationship between age and radical right-wing voting has been called into question. When controlling for other characteristics, younger voters become as, if not more likely to vote for an anti-establishment party (Schäfer, 2021). In Germany older workers are generally less likely to be in a high automation risk occupation due to the upskilling nature of the German labour market system (Battisti, Dustmann, & Schonberg, 2022). Yet, even if they are in an occupation under threat to be automated, they are likely to be more shielded from possible negative consequences due to German labour market regulations and employee protection laws, as well as the strong influence of unions trying to protect labour market insiders in the manufacturing sector (Dauth et al. 2021). Many of them will hold on until retirement (Kurer, 2020), an unfeasible option for younger workers in a similar occupation. Similarly, as theorised above, a

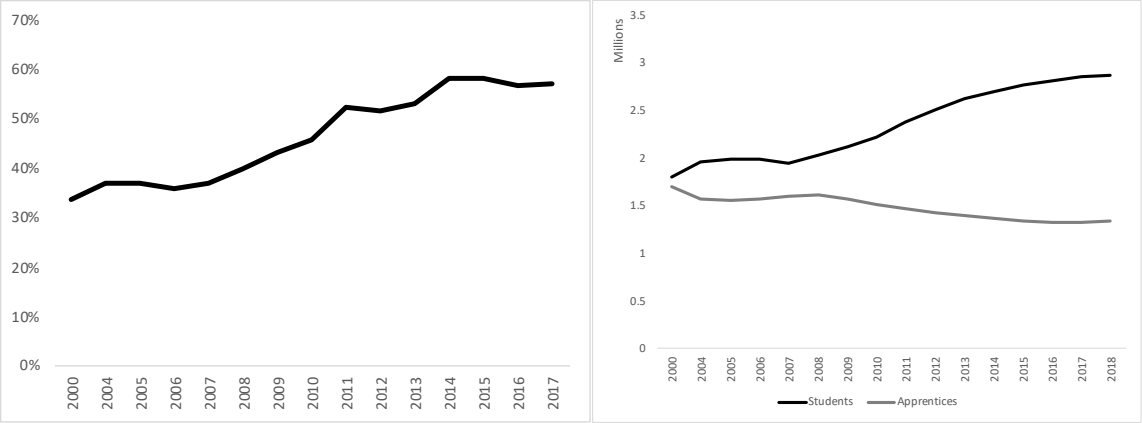
possible redundancy might also affect their social status anxiety less compared to younger workers. Hence, I expect that older workers are likely to remain relatively unaffected by being part of the high automation risk occupation group, which leads me to my first hypothesis:

> **H1** A higher occupational automation risk is more likely to increase the probability of younger individuals to vote for the AfD than for older individuals.

Recent developments in the German education and training system point towards an emerging labour market cleavage along educational lines. Holding at least a higher secondary education or university degree are the new fault line between winners and losers of this new labour market, which has effects on who might perceive automation risk more negatively.

Since 2000 Germany has seen an increase in the number of students eligible for and pursuing university studies (see figure 3.1). This increase came as a response to the rise of the knowledge economy and increasing educational aspirations among the population. German politicians incentivised the further tertiarization of the educational system and pushed for more university graduates entering the labour market. The German school system tends to sort pupils very early on into different labour market access paths. Lower and middle secondary schools are designed to prepare pupils for apprenticeships, while higher secondary schools are more theoretical and prepare for university studies or more demanding apprenticeships in the service sector (Thelen, 2014). Numbers of pupils holding a higher secondary diploma have increased dramatically since the start of the millennium. These individuals have more flexibility and choice compared to their peers, and crucially have the option to take on university studies right after school or at a later point in time. Pupils with a lower or middle secondary diploma are limited to the apprenticeship track or try the shift into a higher secondary school which represents a profound challenge for some due to the different more theoretical nature of education at higher secondary schools.

Figure 3.1 Increasing tertiary education trend in Germany



Note: Left: Share of students of age cohort eligible for university studies. Right: Number of students and apprentices 2000-2018. Source: Author's calculations from BMBF (2019) data: Tab 1.9.6 Grunddaten zum Bildungswesen, https://www.datenportal.bmbf.de/portal/de/Tabelle-1.9.6.html

In line with the increasing number of higher secondary school leavers, university student numbers have been rising while apprenticeship numbers have simultaneously been falling. According to the Bertelsmann Stiftung this trend is far from over as they foresee a continuous significant decline in demand for apprenticeship degree holders and simultaneous increase of demand for university graduates (Euler & Severring, 2017). Apprenticeship training schemes tend to have a strong applied focus geared towards refining and perfecting routine tasks. However, with the need for more complex skillsets this type of training might not be sufficient anymore. In simple terms, many occupations have now increasing skill and educational attainment requirements compared to the past which call for more extensive training. This shift also partly explains the increasing academisation of many occupations that were previously 'just' apprenticeships.

Thelen (2014) shows that companies across all sectors are more likely to offer stable employment opportunities to highly skilled individuals which show promise, while the least skilled often end up in a state-financed "transitional" system (Übergangssystem) waiting for a normal in-firm training slot to open up or take on 'shorter' apprenticeships. As a result, the trend towards more university graduates has consequences for young people in the apprenticeship system as well. The Hans Böckler Stiftung (Elsholz et al., 2018) assumes that there will be a general upgrading of the educational system and companies demanding more qualified individuals. In fact, many BA holders are taking previous apprenticeship entry jobs. Elsholz and co-authors' prediction would mean more pressure on less educated apprentices. Zika et al. (2018) expect large movements between sectors, occupations and skill requirements for the

German labour market over the next 15 years. This increasing pressure for more flexibility of labour market participants is also not well suited for the apprenticeship system, which is geared to produce sectoral specialists.

The developments show that there is an emerging cleavage along educational lines across the entire labour market which is likely to intensify in the coming years. Holding at least a higher secondary education or university degree are the new fault line between winners and losers of the new labour market. This would be in line with Kurer and Galego's (2019) findings about the skill split of those who are benefitting or losing out from technological change. As a consequence, of the shift to more knowledge economic activities, academisation and technological change, entering the labour market today via the apprenticeship path without a higher secondary school diploma means facing more pressures and competition on the labour market than for previous generations. As a result, young workers without a higher secondary diploma who went through the German apprenticeship system are likely to perceive that the social mobility previous generations with their training background enjoyed is not guaranteed anymore. They are not just facing competitive pressure for high value apprenticeships with higher secondary school diploma holders (directly or via dual studies programmes), but their sector specific training makes them generally less favourable candidates on a shifting labour market compared to more generally trained university graduates. Higher secondary school diploma holders always have the benefit of possibly entering university, whereas this option is not easily achievable for lower educated individuals. This is a situation which can lead to fears about job security, the future more generally and ultimately cause social status anxiety - thus increasing the likelihood for an individual to vote for a RPPs. This leads me to the second hypothesis:

> **H2** A high automation risk occupation is more likely to make young individuals with no, lower or middle secondary school diploma and an apprenticeship or no vocational training more susceptible to vote for the AfD than their peers with a higher educational background.

Based on the discussion the expectations for the analysis can be summarised as follows: young, less qualified (i.e. lower than higher secondary school diploma) individuals, with a high

occupational automation risk are more likely drawn to the AfD compared to their older, as well as more educated younger peers.

3.4 Data and Descriptive Statistics

3.4.1 Data

To test explore the validity of these hypotheses, I draw on data from the socio-economic panel survey (SOEP) and a dataset about substitution potentials of German occupations from the Institute of Employment Research (IAB).

The Socio Economic Panel Data (SOEP) from the DIW Berlin is an annual survey that has been running since 1984. With nearly 15,000 households and about 30,000 persons participating in the survey, SOEP provides representative longitudinal data of private households in Germany. SOEP provides both a broad set of self-reported "objective" variables, such as household income, age, gender, education, or employment status, and a broad set of self-reported "subjective" variables, such satisfaction with life, or fairness and reciprocity perceptions. Since 2013 each survey following after a federal election year includes a question about the respondent's party choice during the last federal election. The main problem with answers to survey questions –and with questions regarding possibly radical political party affinity in particular – are that individuals do not necessarily reveal their true preferences. This also becomes evident in the SOEP federal election responses. In the entire data set 8.9% (excluding non-voters, not eligible to vote, multiple party mention and no-answers) stated they voted for the AfD. Thus, the party is underrepresented in the survey compared to the 12.6% of the proportional vote in the actual federal election results from 2017 (Bundeswahlleiter)[27]. The inconsistencies are not surprising as the question was posed after the results were already published and thus some survey response bias is likely. This issue is common to other surveys as well (see for e.g. Lee et al. 2018).

Occupations in the SOEP are reported according to the German occupational classifier (KdlB 2010), which allows the SOEP data to be amended with more information about each

[27] Other parties underrepresented are the FDP with 8.35% (vs. 10.7% proportional vote excl. non-voters); Die Linke is also underrepresented with 8.09% (vs. 9.2%); the Green party is heavily overrepresented with 15.6% (vs. 8.9%); the CDU/CSU is overrepresented with 34.14% compared to 32.9%; the SPD is overrepresented with 23.97% (vs. 20.5%).

occupation from the Institute for Employment Research (IAB). To assess an individual's automation risk this study relies on an objective measure of an occupation's so called substitution potential from the IAB (Dengler & Matthes, 2018). The data compiled by the IAB is different to other datasets interested in automation risk of tasks, as it is specifically tailored to the German occupation classification (KldB2010) system which allows for a much more fine-grained analysis of a possible effect on political choices, but more importantly it does not try to make predictions about possible future task substitutions. Instead it calculates the substitutability of a task based on current technological capabilities. The researchers have been calculating and adjusting their data twice so far in 2013 and 2016 which also allows for testing longitudinal trends. Assuming that only certain tasks in an occupation, rather than entire occupations, can be substituted, the IAB team assessed whether tasks can be replaced by computers or computer-controlled machines to programmable rules. Hence, the researchers also prefer referring to the calculated values as 'substitution potentials' and not automation risk. Based on the existing literature the term automation risk is used in this article.

The IAB researchers used data from the German BERUFENET, an expert database of the Federal Employment Agency that contains information that is quite similar to the US O*NET. BERUFENET provides information regarding all known occupations in Germany online and free of charge. It contains up-to-date information as occupational experts yearly update the BERUFENET. It is used in particular for vocational guidance or job placement and currently comprises approximately 3900 occupations. In addition to information on tasks, it includes information regarding the work equipment used, work conditions, required training or legal regulations in each occupation. In their calculations they used the so-called requirement matrix for the year 2013 from the BERUFENET, which assigns approximately 8000 tasks to these 3900 occupations. The requirement matrix assigns each single occupation the tasks to perform in this respective occupation. Then, three coders independently researched each of these approximately 8000 tasks to determine whether there is a computer-controlled machine or a computer algorithm that can perform this task fully automatically in 2013. In line with Autor et al. (2003), the decision of whether a task is to be regarded as substitutable corresponds to the distinction between routine task and non-routine task in the task-based approach (Dengler et al., 2014). The term 'routine' means that an activity can be broken down into machine-programmable sub-elements and can be replaced by machines.

The IAB classification (see tables 1 and 2) is based on the homogeneity of occupations based on their task structure. Based on this definition, the German labour market can be divided into five main sectors and 14 segments. Each of the 14 occupational segments can be further differentiated by main occupation groups according to the KLDB 2010, which in turn are further refined into four skill activity requirement levels[28]. Based on the sectors, segments, groups, and skill requirements the IAB calculated aggregated and weighted their automation risks. The calculated automation risk values range from 0% to 85.6%. To give an example, a service engineer is equivalent to skill level 4 in the machine- und vehicle technology occupational group, which is part of the manufacturing and other industry segment in the Occupations involving manual labour and work in production sector has an associated automation risk of 34.2%. In other words, 34.2% of tasks of this occupation could be substituted by an already existing technology.

Table 3.1 Overview of Sectors and Segments in the IAB classification

Sector	**Segments**
Occupations involving manual labour and work in production.	Agriculture, Forestry and Fishery Mining
	Manufacturing and other industry; Construction
Personal service occupations	Gastronomy and hospitality; Medical and non-medical health occupations; Social and cultural service occupations
Retail and enterprise/business-oriented service occupations	Retail and trade occupations; management and organisation occupations; business-oriented service occupations
IT- and natural science-oriented service occupations	IT- and natural science-oriented service occupations
Other service occupations	Security services (non-military); Traffic and logistics; Cleaning services

Source: Matthes, Meinken & Neuhauser (2015)

[28] if all skill activity requirement levels exist within an occupational group.

Table 3.2 Example of automation risk classification including occupational group and skill level

Sector	Segments	Occupational group	Skill Level	Automation Risk
Occupations involving manual labour and work in production.	Agriculture, Forestry and Fishery Mining	e.g. Horticultural professions and floristry	1	42.5%
			2	36.1%
			3	32.3%
			4	16.7%

Source: Matthes, Meinken & Neuhauser (2015); Dengler & Matthes (2016)

3.4.2 Descriptive Statistics

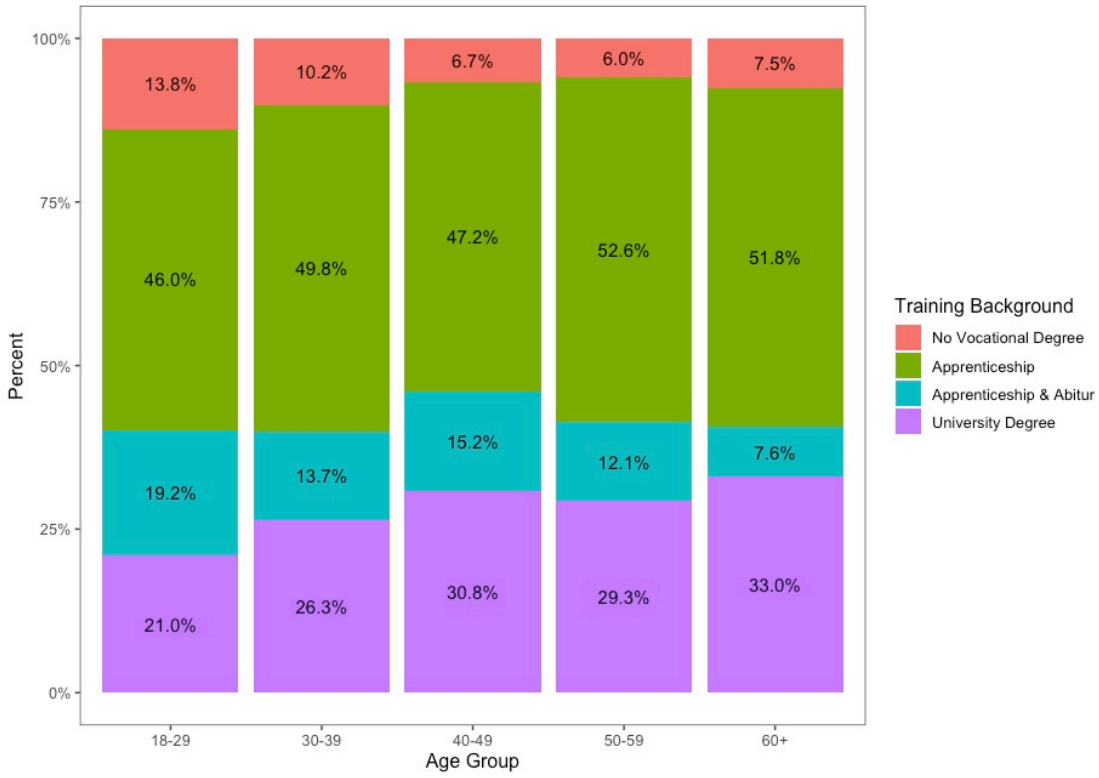
After combining data from the socio-economic panel data v35 (SOEP) and the automation risk dataset from the IAB excluding non-responses to all questions of interest, the data sample consisted of 6872 respondents who were in an occupation in 2017, and had indicated their voting behaviour during the 2017 election and respondent to all control questions of interest.[29] Of the final sample 551 (i.e. 9% excl. non-voters) allegedly voted for the AfD in the last federal election.

The descriptive statistics show that the general educational and training level of individuals in the workforce increases with age which matches the expectation around the continuous training in German labour markets (see figure 3.2). It should be noted that in the data around 40% of the 18-29 year olds without a vocational degree have Abitur.

Linking the educational background by age group with the voting behaviour during the last federal election shows that apprenticeship degree holders without a higher secondary school diploma are the group with the highest share of AfD voters for the 18-29 and 30-39 year olds (see figure 3.3). For 40-49, 50-59 and 60+ age groups the highest proportion voting for the AfD is among those without a vocational degree.

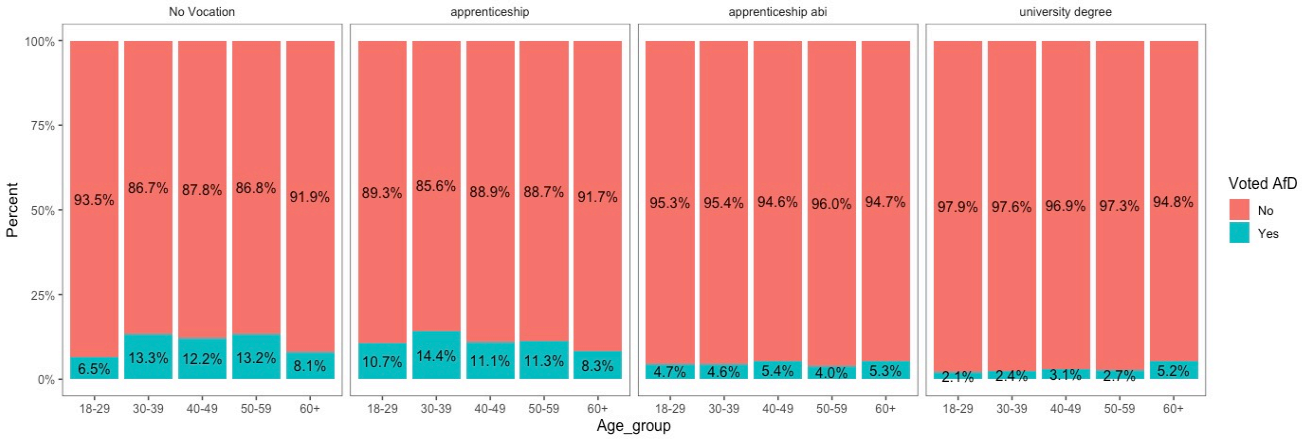
[29] Excluding those without an occupational automation risk: retired; still in training; un- and atypically employed individuals; and those non-eligible to vote during the 2017 federal election.

Figure 3.2 Educational background and age groups



Source: Author's own calculations

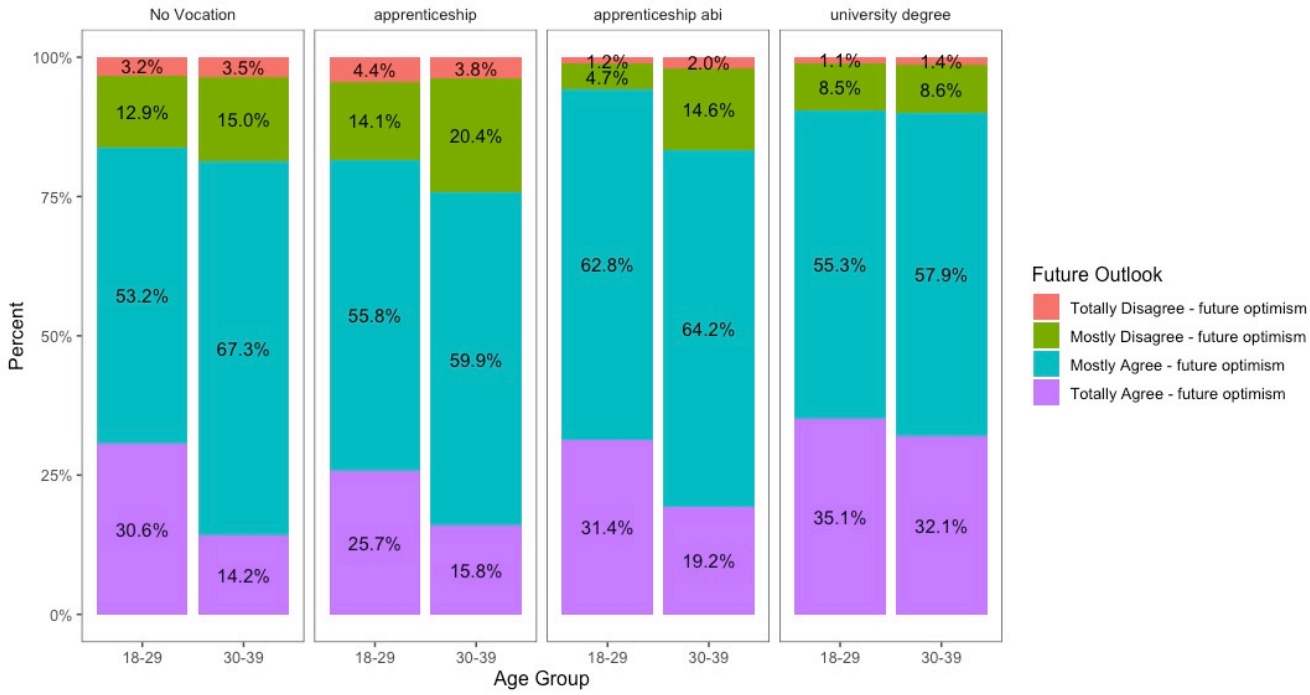
Figure 3.3 Share of AfD voters by educational background and age group



Source: Author's own calculations

The descriptive statistics (figure 3.4) also show that young individuals with a lower educational background and especially those with apprenticeship degrees but without a higher secondary school diploma are less optimistic about the future than their more educated peers.

Figure 3.4 Future outlook by educational background and age groups 18-29 and 30-39



Source: Author's own calculations

The data and approach have limitations for the purposes of understanding if and how an occupation's automation risk influences an individual's political behaviour. Even though e.g. in a certain occupation 70% of tasks could be automated and thus the occupation would classify as under high-automation risk, the remaining 30% of tasks could be so crucial or not substitutable in the foreseeable future, that there is no real automation threat to the individual in question. In addition, someone in a high-risk occupation might be an employee of a company that is likely to introduce training programmes which will change the nature of their tasks and is investing in its employees instead of making them redundant. This type of information is unfortunately inaccessible. Kropp and Dengler argue that it is reasonable to assume that occupations with high automation risk will change more than jobs with low automation risk, and that regions with high values of employees with highly substitutable occupations will experience more change than regions with low values (Kropp & Dengler, 2019). Anelli, Colantone and Stanig (2019) argue along similar lines in order to explain the political consequence of automation, namely that these are indicators which predict structural changes similar to previous trade shock exposure.

3.5 Research Design

3.5.1 Model and Methodology

The data are a cross-section, where the dependent variable takes the form of a binary variable indicating if a respondent has voted for the AfD in the 2017 German federal elections. To separate out the impact of automation risk and age from other potentially confounding factors, we begin by estimating a simple logit regression model. This is estimated for each individual 'i' and takes the following form:

$$Pr(y_i = 1) = p_i$$
$$logit(p_i) = \alpha + \beta_1 Automation_i + \beta_2 Age_i + \beta'_3 Person_i + \beta'_4 Automation_i \times Age_i + \varepsilon$$

Where p_i is the probability of having voted AfD in the last federal election. "Automation" is an individual's occupational calculated automation risk. "Age" is an indicator for the age group each individual belongs to. "Person" is a vector of individual characteristics such as gender, education or attitudes. "Automation × Age" is the linear interaction term between an individual's automation risk and age group.

In a second step, we will re-run the regressions for two sub-populations based on an individual's educational and training background. Thus, the data will be divided into two groups, one consisting of individuals with a higher educational and training background, i.e. higher secondary school diploma and apprenticeship or university graduate, and another group with a lower educational and training background, i.e. no, lower or middle secondary school diploma and apprenticeship or no vocational certificate.

3.5.2 Control Variables

The choice of control variables is informed by the literature on populist voting in general and for Germany in particular. A set of variables controlling for the basic demographic characteristics of individuals.

Educational attainment is generally understood as a critical determinant for populist views, with those holding lower educational qualifications being likely to be more drawn to RRPs. Hence, we expect individuals with a lower educational background group to be more likely to vote for the AfD. In this study education carries a more crucial dimension, since an individual's

future career trajectory could be influenced by holding a higher secondary degree or a university degree already.

Not all occupations and occupational sectors will be equally affected by automation risk. Most civil servants should be relatively sheltered, whereas especially many blue-collar workers are likely to be among the most exposed, making them more sensitive to the labour market situation. The distribution of these different occupational categories is likely to be uneven across different sectors of the labour market. Blue collar workers are likely to be concentrated in the manufacturing and industrial sectors, whereas most service sectors are likely to be dominated by white collar workers. In addition, the contractual status is likely to affect an employee in their attitudes as well due to less labour market protection of temporary contracts compared to permanent ones. Hence, the models the occupations control will be further differentiated along contractual status. The different sectors also differ in terms of their economic outlook. The industrial and manufacturing sector has been in decline and is dominated by gloomy stories of the future which are likely to affect workers and could make them more open to RRP messages. Thus, the models will control for occupational category and sectors as well.

The models will also control for gender. It is generally understood that women are less likely to vote for RRPs (Harteveld & Ivarsflaten, 2018). In this study the role of occupations and education is expected to play a crucial role and the German system shows longstanding and stark gender differences in the kind of training and career women and men receive and pursue. Apprenticeship programmes in general and technical ones in particular have been traditionally dominated by men (Dengler & Matthes, 2020). Technical apprenticeships in the manufacturing sector are especially affected by the current technological changes and hence men are likely to be on average more affected than women. Dengler and Matthes (2020) find that in general the automation risk is higher for men than women, that means that women complete less tasks that could be currently substituted. The difference is especially pronounced in the case for so called un-/semi-skilled occupations. In addition, the status effect of their job might be different between women and men. Over 75% of part-time contracts are with women in Germany (see also Appendix Figures A.1 and A.2). As a consequence, a woman might perceive the role of a job in her differently and possibly play a lesser role in her status anxiety compared to men (esp. keeping in mind the male breadwinner image). However, a job and a career (even part-time) can still be valued very highly by women due to emancipatory reasons. Ultimately, due to the

higher automation risk exposure and generally lower education levels we expect males across all age groups to be more likely to vote for the AfD compared to females.

The models also include a control for residence in East-Germany. The AfD receives especially strong support in East Germany and the literature is still debating the reasons for the differences in support between East and West Germany (see e.g. Manow & Schwander, 2022). Another control will be an individual's union membership. Union membership is especially concentrated in the core manufacturing sectors (Thelen, 2014) and thus more likely to be exposed to automation risks. Yet, union members are expected to be generally less likely to vote for AfD due to their increased labour market protection, as well as their ties to the left party spectrum. Union membership has been declining and is higher among older workers (see Appendix Figure A.4). Due to German labour laws employees who are with an employer for longer tend to have higher labour market protection. As a result of this incremental increase in security we expect less support for the AfD.

3.6 Results and Discussion

Table 3.3 Average Marginal Effect Regression Results

	Dependent Variable: Voted AfD in last Federal Election			
	Model 0		**Model 1**	
	AME	**SE**	**AME**	**SE**
AutoRisk	0.10***	(0.02)	0.03	(0.03)
Female			-0.04***	(0.01)
Age[1]: 30-39			0.01	(0.03)
Age: 40-49			-0.01	(0.03)
Age: 50-59			0.00	(0.03)
Age: 60+			-0.02	(0.03)
Edu[2]: Apprenticeship			-0.03	(0.02)
Edu: ApprenticeshipAbi			-0.05*	(0.03)
Edu: University Degree			-0.08**	(0.02)
Socio-Demo Controls	-		X	
Observations	6872		6872	

Notes: estimated as a weighted logit regression with robust errors. Displayed are Average Marginal Effects (AME) and Robust Standard Errors (SE) in brackets. All continuous predictors are mean-centred and scaled by 1 standard deviation.
Unreported socio-demographic controls are for: East Germany; occupational type; occupational sector; union member; part/full time employment; household income.
[1] Reference category Age: 18-29
[2] Reference category Edu: No Vocational Degree
*** p < 0.01; ** p < 0.05; * p < 0.1.

Note: for full logit regression results see Appendix table A.1.

The regression results are summarised in table 3.3. Since a logit is a non-linear model, the effect of an increase by one unit for any variable in the model will differ from individual to individual. Hence, the results are displayed as Average Marginal Effects (AME) which are the average change of all individual effects for a one unit increase of any model variable (for standard logit results see appendix). The base model 0 shows that automation risk has a significant effect on the probability to vote for the AfD. It shows that increasing automation risk by 1% increases the probability to vote for the AfD on average by 0.1 percentage points. Model 1 introduces all socio demographic controls and adds the interaction term between age and automation risk. The interaction term shows whether the effect of automation risk on the likelihood to have voted for the AfD depends on (or varies) the values of being part of a specific age group. The results of Model 1 confirm previous findings in the literature that on average males and individuals with a lower educational background are all more likely to vote for the AfD. The educational background is a significant predictor as well. The higher the educational level the less likely a vote for the AfD becomes compared to the base educational attainment (no vocational degree). In model 1 this difference is significant at the 10% level for apprenticeship degree holders with higher secondary school diploma (Abitur) and at significant at the 1% level for University graduates. The coefficient shows that university graduates are on average 8 percentage points less likely than those without a vocational degree to have voted for the AfD during the last election. The results of the educational categories provide some evidence for the educational fault line between those who can and cannot go to University.

As far as the controls are concerned as I show in the appendix (table A1) in line with previous findings East-Germans have on average a 7.5 percentage points higher probability to vote for the AfD compared to West Germans. The occupational group also plays a role in the predicted likelihood to vote for the AfD. Blue collar workers are the most likely to vote for the AfD compared to all other occupational groups. Being a civil servant reduces likelihood of voting for the AfD compared to a blue-collar worker by on average 7.5 percentage points. This should not come as a surprise as most civil servants in the sample are not just highly educated and qualified (80% university degrees) but also shielded from labour market competition. Equally, white collar workers and the self-employed are also less likely to vote for the AfD compared to blue collar workers (2.6 and 4.7 percentage points respectively). However, being a union

member significantly reduces the likelihood to vote for the AfD by on average 4.7 percentage points.

With the added controls automation risk becomes an insignificant predictor for the AfD vote in model 1. While the AME of automation risk is not a significant predictor, the interaction between automation risk and age groups highlights an interesting trend (see table 3.4) that automation risk has on different age groups. There is no significant difference between the reference group of 18-29 year olds and the other age groups, however there is a trend with the older age groups becoming less likely to vote for the AfD with higher automation risks compared to those with the same automation risk in the 18-29 age group. This indicates that the automation risk could play a larger role for younger individuals for voting for the AfD compared to their older peers.

Table 3.4 Model 1 Marginal Effects at Representative values (MER)

	Dependent Variable: Voted AfD in last Federal Election		
	Model 1		
	AutoRisk	**ME**	**SE**
AutoRisk::Age30-39[1]	20%	0.01	(0.03)
	40%	0.02	(0.03)
	60%	0.02	(0.04)
	80%	0.03	(0.07)
AutoRisk::Age40-49	20%	0.02	(0.03)
	40%	0.00	(0.02)
	60%	-0.02	(0.03)
	80%	-0.04	(0.06)
AutoRisk::Age50-59	20%	0.02	(0.03)
	40%	0.00	(0.02)
	60%	-0.03	(0.03)
	80%	-0.06	(0.05)
AutoRisk::Age60+	20%	0.00	(0.03)
	40%	-0.02	(0.02)
	60%	-0.05	(0.03)
	80%	-0.08	(0.06)
Socio-Demo Controls	X		
Observations	6872		

[1] Reference category AutoRisk::Age:18-29
*** p < 0.01; ** p < 0.05; * p < 0.1.

The results in this first regression model do not provide definitive results about the role of occupational automation risk in individual's voting behaviour. However, they do suggest that age and the educational and training background might play a role in an individual's susceptibility to vote for the AfD. Educational attainment does play a role across all age groups and university educated individuals are significantly less likely to vote for the AfD than those without a vocational degree.

To further investigate the role of the educational background for different age groups the data is divided among the educational and training background and the regression models will be re-run. To retain a meaningful sample size, the observations are divided into two sub-populations, one consisting of individuals with a higher educational and training background, i.e. higher secondary school diploma and apprenticeship or university graduate, and another group with a lower educational and training background, i.e. no, lower or middle secondary school diploma and apprenticeship or no vocational certificate. The lower educational background group consists of 3957 observations whereas the higher educational background group has 2915 observations.

Table 3.5 Regression results for sub-populations according to educational and training background

	Dependent Variable: Voted AfD in last Federal Election							
	Lower Education		**Higher Education**		**Lower Education**		**Higher Education**	
	Model 2		**Model 3**		**Model 4**		**Model 5**	
	AME	**SE**	**AME**	**SE**	**AME**	**SE**	**AME**	**SE**
AutoRisk	0.07	(0.04)	0.03	(0.04)	0.08*	(0.05)	0.02	(0.03)
Female	-0.05***	(0.02)	-0.01	(0.02)	-0.07***	(0.02)	-0.01	(0.01)
Age: 30-39[1]	0.06**	(0.03)	-0.03	(0.03)	0.06**	(0.03)	0.00	(0.02)
Age: 40-49	0.03	(0.03)	-0.04	(0.03)	0.04	(0.03)	-0.01	(0.02)
Age: 50-59	0.03	(0.02)	-0.03	(0.03)	0.02	(0.02)	0.00	(0.02)
Age: 60+	0.00	(0.03)	-0.03	(0.03)	-0.01	(0.03)	0.00	(0.02)
Socio-Demo Controls	X		X		X		X	
Cultural Controls	-		-		X		X	
Observations	3957		2915		3957		2915	

Notes: estimated as a weighted logit regression with robust errors. Displayed are Average Marginal Effects (AME) and Robust Standard Errors (SE). All continuous predictors are mean-centered and scaled by 1 standard deviation.

Unreported socio-demographic controls are for: East Germany; occupational type; occupational sector; union member; part/full time employment; household income.
[1] Reference category Age: 18-29
[2] Reference category Edu: No Vocational Degree
*** p < 0.01; ** p < 0.05; * p < 0.1.

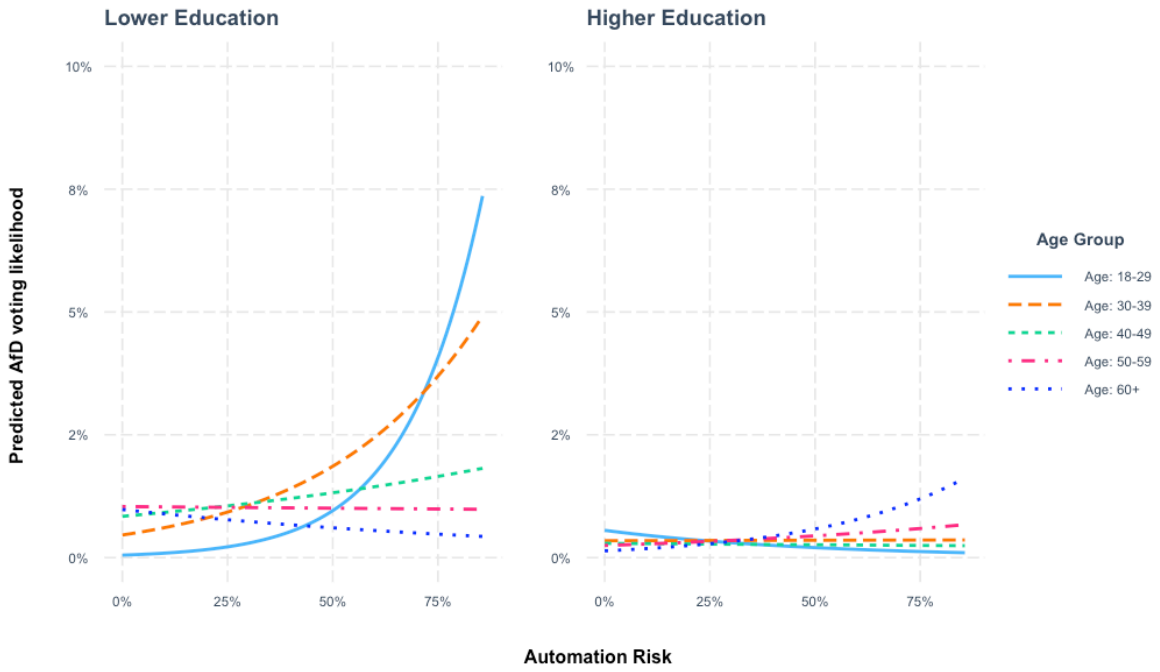
The new results (tables 3.5 and 3.6) show a strong difference in terms of the relationship between occupational automation risk and voting behaviour between the two populations. Occupational automation risk only plays a significant role for the sub-population with a lower educational and training background (Models 2 and 4), and within that group it is younger individuals who become more susceptible to vote for the AfD with a rising occupational automation risk (Table 3.6; for a visualisation see figure 3.5). The results for individuals with a lower education background in model 4 show that compared to a 18-29 year old in an occupation with 80% automation risk, a 60+ year old individual with the same automation risk is on average 26% less likely to vote for the AfD. In contrast, individuals with a higher educational background (Models 3 and 5) are not affected in their probability to vote for the AfD by increasing automation risk. These results are consistent with the expectations of both hypotheses.

Table 3.6 Model 4 and 5 Marginal Effects at Representative values

		Dependent Variable: Voted AfD in last Federal Election			
		Lower Education		**Higher Education**	
		Model 4		**Model 5**	
	AutoRisk	**ME**	**SE**	**ME**	**SE**
AutoRisk::Age30-39[1]	20%	0.07***	(0.02)	0.00	(0.02)
	40%	0.07***	(0.03)	0.01	(0.03)
	60%	0.04	(0.06)	0.02	(0.04)
	80%	-0.04	(0.11)	0.03	(0.05)
AutoRisk::Age40-49	20%	0.09***	(0.02)	-0.01	(0.02)
	40%	0.06***	(0.02)	0.00	(0.03)
	60%	-0.02	(0.05)	0.01	(0.04)
	80%	-0.16	(0.10)	0.02	(0.04)
AutoRisk::Age50-59	20%	0.09***	(0.02)	-0.01	(0.02)
	40%	0.04**	(0.02)	0.01	(0.03)
	60%	-0.05	(0.04)	0.03	(0.04)
	80%	-0.21**	(0.09)	0.05	(0.05)
AutoRisk::Age60+	20%	0.07***	(0.02)	-0.01	(0.02)

	40%	0.01	(0.03)	0.02	(0.03)
	60%	-0.09**	(0.05)	0.05	(0.04)
	80%	-0.26***	(0.10)	0.09	(0.06)
Socio-Demo Controls	X			X	
Cultural Controls	X			X	
Observations	3957			2915	
[1] Reference category AutoRisk::Age:18-29 *** p < 0.01; ** p < 0.05; * p < 0.1.					

Figure 3.5 Interaction between Age Group and Automation Risk for different education and training backgrounds

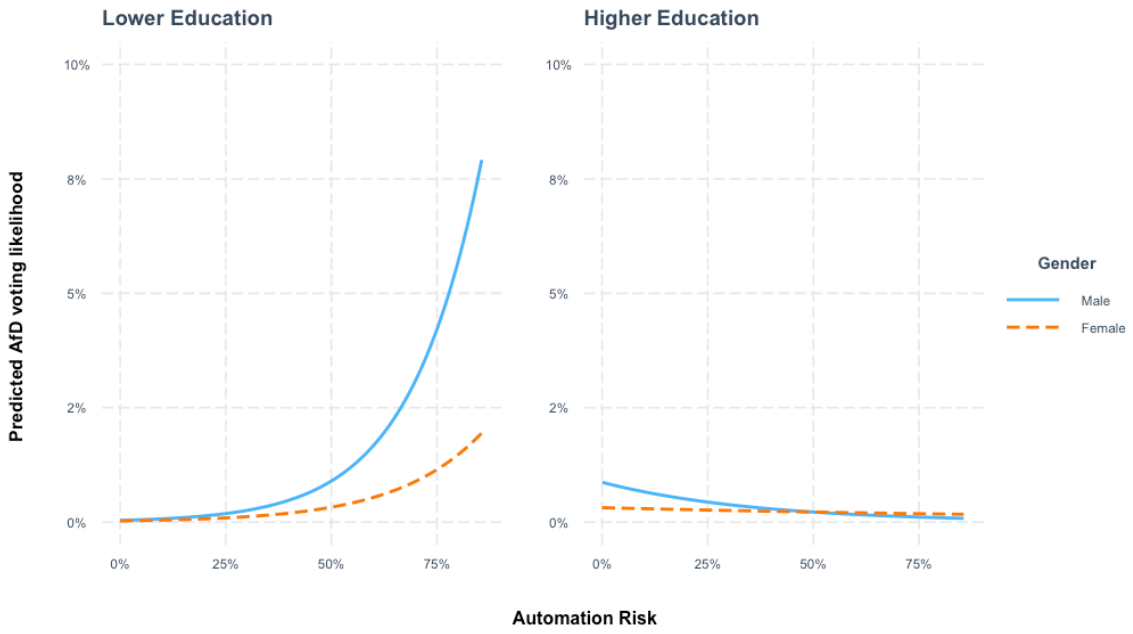


Note: based on models 4 and 5; hidden confidence intervals for improved readability (for CI see Appendix figure A.7)

Models 4 and 5 also control for variables trying to capture cultural explanations to RRP voting. These models include variables on an individual's attitude towards immigration as a proxy for xenophobic tendencies, attitude towards climate change to control for postmaterialist values, and attitude towards crime as a conservative value measure. As can be seen in table A2 in the appendix the cultural explanatory variables themselves are all significant: The more concerned an individual from both groups is about crime, the more likely they are to have voted for the AfD compared to those not concerned about crime. The same holds for individuals concerned about immigration. Individuals who are somewhat or very concerned about climate change are less likely to have voted for the AfD compared to those who are not concerned about climate change across both groups.

Gender remains only a significant predictor for the lower educational background sub-population (Models 4 and 5). To further understand the effect of automation risk and gender, additional models 6 and 7 (see Appendix Table A.2) include an interaction term between the two variables. The model results are visualised in figure 3.6. They show that women with a lower educational background still show an increase in likelihood to vote for the AfD with increasing occupational automation risk. However, the effect is clearly less pronounced for women and automation risk has less of an impact on women's political behaviour than on men.

Figure 3.6 Interaction between Gender and Automation Risk for different education and training backgrounds



Note: based on model 6 and 7 (Appendix Table A.2); hidden confidence intervals for improved readability (for CI see Appendix Figure A.6)

Overall, the models suggest that the observed effect of technological change is pronounced among a subgroup of young people. The age divergence in an individual's response to their occupational automation risk is likely to be due to young individuals more fragile labour market position. Younger individuals are more likely to be at the start of their careers and thus in occupations which require less skilled activities making them more substitutable. Yet, as the results show there is a difference among younger individuals who might find themselves in less attractive occupations at the beginning of their careers. Individuals with a higher secondary school diploma or university degree are much less affected in their electoral choice by being in an occupation under technological change threat, whereas those who entered the labour

market coming from lower or middle secondary schools and via the traditional dual vocational training path have been more likely to vote for the AfD.

In the wider discussion about explanations of the rise of RPPs in recent years, the results suggest that economic factors matter especially for those with lower educational and training backgrounds. Cultural explanatory variables are better at predicting higher educated individuals RPP voting relative to individuals with lower educational backgrounds. The scope of the analysis does not allow for a direct causal interpretation of the effect of occupational automation risk on voting behaviour, however the age divergence suggests that an individual's aspirations and social anxiety which could explain the strong response among young individuals with a lower educational background.

3.7 Conclusion

There is now consensus that votes for the radical right are, in part, driven by fears of automation. This paper shows that this is not true for the majority of the population in Germany but instead applies only to young people without a higher education background. These young people are at the beginning of their lives and careers and face an uncertain future. With a declining industrial and manufacturing sector and a disadvantage compared to their higher skilled university graduate peers, they cannot rely on the labour market protection that older workers without university education have and are enjoying. As a consequence, they are likely to feel more anxious about their situation. Gidron and Hall (2017, 2020), as well as Kurer (2020) showed how social status concerns are a major driver in voting for RRPs in recent times. The results presented in this paper show that this phenomenon is likely to be affecting parts of the younger generation and could explain why some of them are drawn to a party like the AfD in Germany.

How generalizable are these specific results? The discussed age divergence is likely to be especially acute in countries that emphasize narrow and specialized education and training for their labour markets. Whereas general skillsets allowing for a very flexible workforce are a priority in liberal market economies, coordinated market economies such as Germany, rely on much narrower education and training schemes to support an economy characterised by specialist firms (Hall and Soskice, 2001; Thelen, 2014). The analysis showed that the German training system is generally working with a training and upskilling trend that makes older

workers harder to substitute. This also means that social status fears might be overall at higher levels in systems unlike Germany's. A potential most similar case to study is Austria. The two countries are organised in a relatively similar fashion and the close similarities of AfD and FPÖ have already been partly established (Grigat, 2017). The profile of the typical FPÖ voters are also indicative of the proximity between the experiences of the two countries. The FPÖ received most support from younger voters, as well as individuals with an apprenticeship degree. However, it is difficult to draw comparative conclusions without more research.

The academisation discourse in Germany has so far concentrated on the upward mobility narrative and the younger generations who are achieving at least higher secondary school diplomas. While the university system itself is slowly undergoing a transformation in the country with new programmes (e.g. dual university studies) to build on the country's strengths in the apprenticeship tradition, the challenge of how to uplift those who come from lower educational backgrounds remains. The numbers of new students who enter university via the so called third way, i.e. qualifying for university studies via an apprenticeship, are still very low and show that there might be a lack of options for many in the future. This paper has underlined that in a world in which skills and education are becoming ever more important, groups of young people are facing greater difficulties in achieving social mobility compared with the past. Research has to start thinking more seriously about how to help those falling through the gaps of the education and training system.

A Appendix

Appendix Table A.1 Regression Results

	Dependent Variable: Voted AfD in last Federal Election	
	Model 0	Model 1
AutoRisk	0.25 ***	1.26 ***
	(0.0)	(0.29)
Age: 30-39	-	1.14 ***
	-	(0.41)
Age: 40-49	-	0.92 **
	-	(0.40)
Age: 50-59	-	0.92 **
	-	(0.39)
Age: 60+	-	0.57
	-	(0.43)
AutoRisk::Age30-39	-	-0.83 ***
	-	(0.31)
AutoRisk::Age40-49	-	-1.13 ***
	-	(0.32)
AutoRisk::Age50-59	-	-1.32 ***
	-	(0.30)
AutoRisk::Age60+	-	-1.48 ***
	-	(0.36)
Female	-	-0.51 **
	-	(0.20)
East German	-	0.79 ***
	-	(0.17)

Occupation:CivilServ	-	-2.34 **
	-	(1.00)
Occupation:SelfEmpl	-	-0.75 **
	-	(0.31)
Occupation:WhiteColl	-	-0.38 **
	-	(0.19)
Sector:Primary	-	0.53 *
	-	(0.30)
Sector:ServiceOther	-	0.68 **
	-	(0.31)
Sector:ServiceBusiness	-	0.30
	-	(0.31)
Sector:ServiceIT	-	-0.06
	-	(0.46)
Sector:ServicePeople	-	0.21
	-	(0.36)
Union Member	-	-0.74 ***
	-	(0.27)
Full Time Empl	-	-0.18
	-	(0.20)
HH Income: Middle	-	0.04
	-	(0.33)
HH Income: High	-	0.01
	-	(0.35)
Observations	6872	6872

Appendix Table A.2 Sub-Population Regression Results

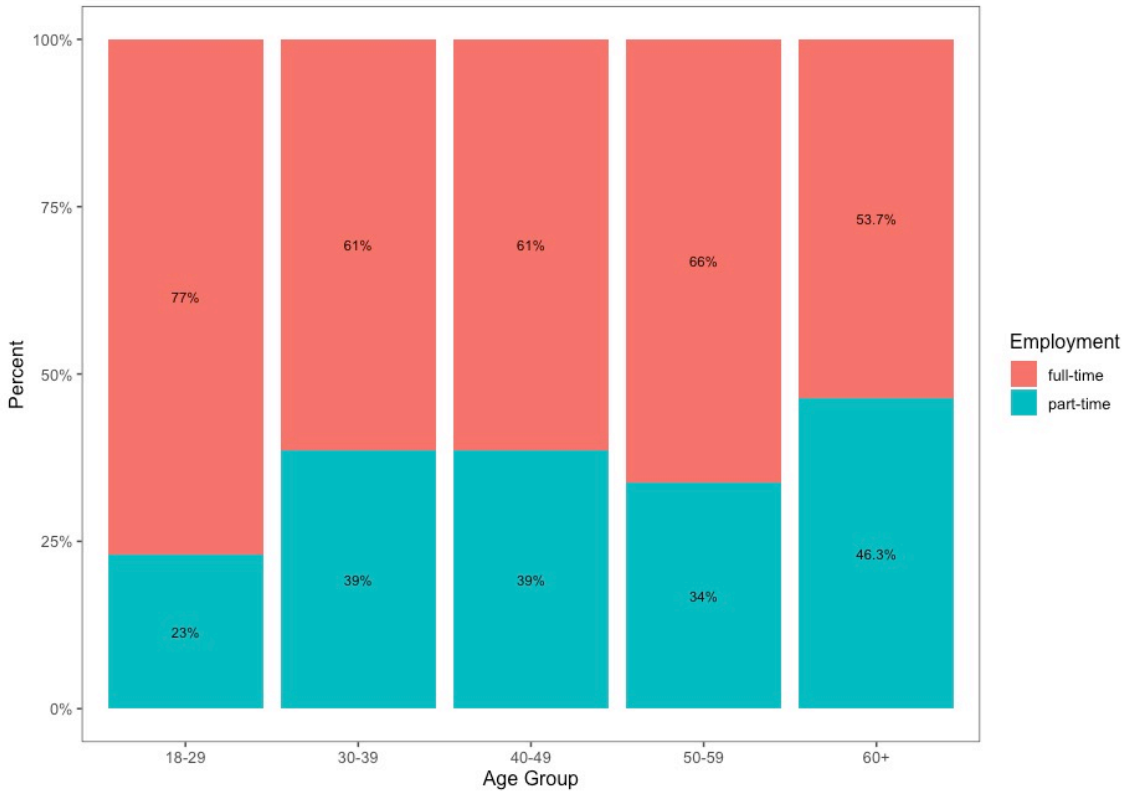
	Dependent Variable: Voted AfD in last Federal Election							
	Lower Education	**Higher Education**	**Lower Education**	**Higher Education**	**Lower Education**	**Higher Education**	**Lower Education**	**Higher Education**
	Model A0	Model A1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
AutoRisk	0.17**	0.23**	1.26 ***	-0.51	1.29 ***	-0.40	1.25 ***	-0.36
	(0.03)	(0.12)	(0.29)	(0.54)	(0.33)	(0.68)	(0.33)	(0.65)
Age: 30-39	-	-	1.14 ***	-0.52	1.04 **	0.05	1.03 **	0.04
	-	-	(0.41)	(0.62)	(0.42)	(0.68)	(0.42)	(0.67)
Age: 40-49	-	-	0.92 **	-0.68	0.91 **	-0.19	0.92 **	-0.18
	-	-	(0.40)	(0.53)	(0.39)	(0.62)	(0.40)	(0.59)
Age: 50-59	-	-	0.92 **	-0.57	0.75 **	0.00	0.74 *	0.05
	-	-	(0.39)	(0.52)	(0.38)	(0.63)	(0.39)	(0.61)
Age: 60+	-	-	0.57	-0.57	0.35	-0.14	0.35	-0.18
	-	-	(0.43)	(0.60)	(0.44)	(0.65)	(0.44)	(0.63)
AutoRisk::Age30-39	-	-	-0.83 ***	0.71	-0.67 *	0.41	-0.69 *	0.38
	-	-	(0.31)	(0.54)	(0.37)	(0.70)	(0.36)	(0.68)
AutoRisk::Age40-49	-	-	-1.13 ***	0.59	-1.09 ***	0.36	-1.09 ***	0.27
	-	-	(0.32)	(0.58)	(0.35)	(0.69)	(0.34)	(0.67)
AutoRisk::Age50-59	-	-	-1.32 ***	0.69	-1.30 ***	0.63	-1.31 ***	0.56
	-	-	(0.30)	(0.56)	(0.33)	(0.67)	(0.33)	(0.65)
AutoRisk::Age60+	-	-	-1.48 ***	1.00	-1.50 ***	0.98	-1.50 ***	0.98
	-	-	(0.36)	(0.61)	(0.39)	(0.74)	(0.39)	(0.71)
Female	-	-	-0.51 **	-0.27	-0.87 ***	-0.39	-0.87 ***	-0.50
	-	-	(0.20)	(0.37)	(0.22)	(0.41)	(0.23)	(0.39)
East German	-	-	0.79 ***	0.82 ***	0.46 **	0.62 *	0.47 **	0.62 *
	-	-	(0.17)	(0.30)	(0.19)	(0.35)	(0.19)	(0.35)
Occupation:CivilServ	-	-	-2.34 **	0.05	-2.12 **	-0.35	-2.10 **	-0.41

	-	-	(1.00)	(0.95)	(0.96)	(0.98)	(0.95)	(0.98)
Occupation:SelfEmpl	-	-	-0.75 **	0.66	-0.68 *	0.39	-0.66 *	0.35
	-	-	(0.31)	(0.83)	(0.36)	(0.91)	(0.37)	(0.90)
Occupation:WhiteColl	-	-	-0.38 **	0.84	-0.31	0.93	-0.29	0.84
	-	-	(0.19)	(0.73)	(0.20)	(0.78)	(0.20)	(0.78)
Sector:Primary	-	-	0.53 *	-1.57 **	0.65 *	-1.95 *	0.73 **	-1.99 *
	-	-	(0.30)	(0.77)	(0.34)	(1.06)	(0.35)	(1.05)
Sector:ServiceOther	-	-	0.68 **	1.03	0.85 **	0.87	0.93 **	0.67
	-	-	(0.31)	(0.65)	(0.40)	(0.78)	(0.41)	(0.81)
Sector:ServiceBusiness	-	-	0.30	-0.10	0.55	-0.27	0.65 *	-0.40
	-	-	(0.31)	(0.55)	(0.36)	(0.60)	(0.37)	(0.60)
Sector:ServiceIT	-	-	-0.06	-0.50	-0.04	-0.07	0.03	-0.22
	-	-	(0.46)	(0.71)	(0.51)	(0.83)	(0.51)	(0.86)
Sector:ServicePeople	-	-	0.21	-0.21	0.72	0.11	0.71	0.05
	-	-	(0.36)	(0.59)	(0.44)	(0.77)	(0.45)	(0.75)
Union Member	-	-	-0.74 ***	-1.09 *	-0.67 **	-1.04 *	-0.66 **	-1.00
	-	-	(0.27)	(0.57)	(0.27)	(0.63)	(0.27)	(0.61)
Full Time Empl	-	-	-0.18	-0.70 **	-0.07	-0.85 **	-0.10	-0.84 **
	-	-	(0.20)	(0.34)	(0.22)	(0.41)	(0.21)	(0.41)
HH Income: Middle	-	-	0.04	-1.24 **	0.12	-1.07 *	0.15	-1.06
	-	-	(0.33)	(0.56)	(0.33)	(0.64)	(0.32)	(0.65)
HH Income: High	-	-	0.01	-1.24 **	-0.01	-0.87	0.04	-0.86
	-	-	(0.35)	(0.51)	(0.35)	(0.65)	(0.34)	(0.66)
Immigration: Somewhat Concerned	-	-	-	-	0.82	1.78 **	0.82	1.78 **
	-	-	-	-	(0.53)	(0.74)	(0.52)	(0.74)
Immigration: Very Concerned	-	-	-	-	2.32 ***	4.01 ***	2.32 ***	4.04 ***
	-	-	-	-	(0.53)	(0.79)	(0.53)	(0.79)

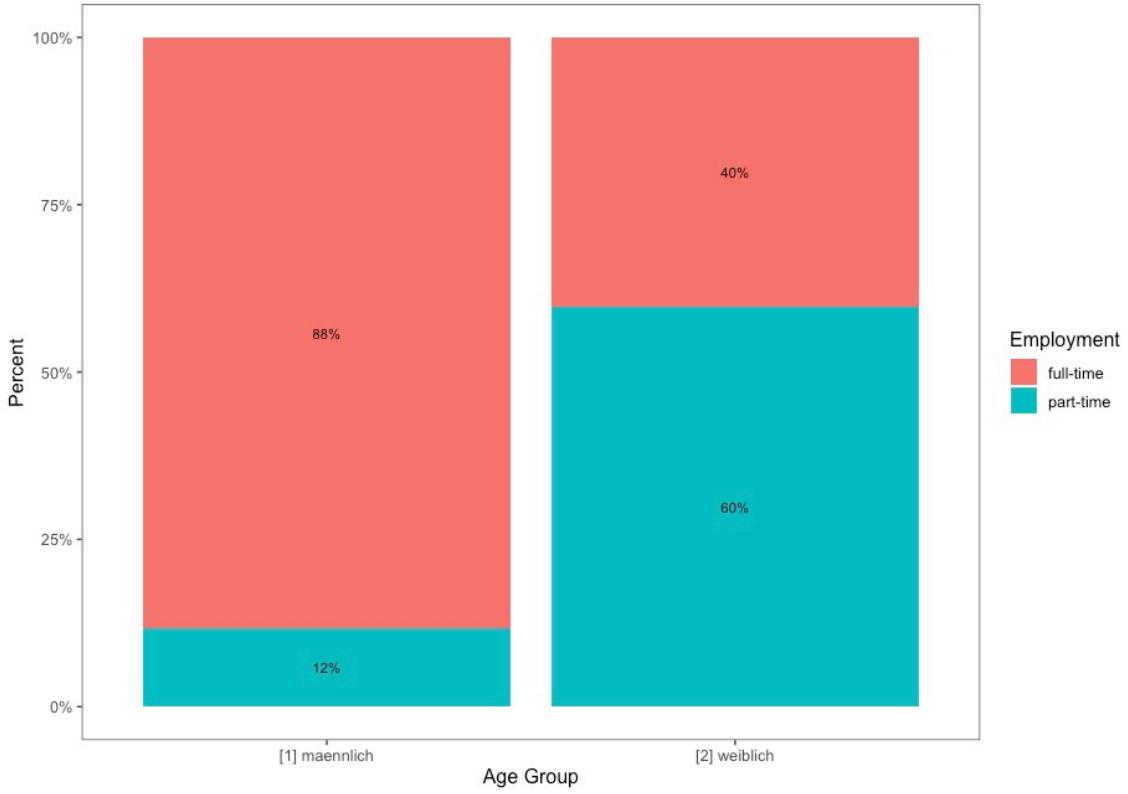
Climate Change: Somewhat Concerned	-	-	-	-	-0.64 ***	-2.05 ***	-0.65 ***	-2.11 ***
	-	-	-	-	(0.23)	(0.44)	(0.23)	(0.44)
Climate Change: Very Concerned	-	-	-	-	-0.72 ***	-1.33 ***	-0.74 ***	-1.39 ***
	-	-	-	-	(0.24)	(0.47)	(0.24)	(0.47)
Crime: Somewhat Concerned	-	-	-	-	0.98 **	2.02 **	0.98 **	2.00 **
	-	-	-	-	(0.46)	(0.99)	(0.46)	(1.00)
Crime: Very Concerned	-	-	-	-	1.68 ***	2.67 ***	1.68 ***	2.64 **
	-	-	-	-	(0.49)	(1.03)	(0.49)	(1.04)
Female::AutoRisk	-	-	-	-	-	-	-0.27	0.40
	-	-	-	-	-	-	(0.19)	(0.29)
Observations	3957	2915	3957	2915	3957	2915	3957	2915

Notes: estimated as a weighted logit regression with robust errors in parentheses. All continuous predictors are mean-centered and scaled by 1 standard deviation.
*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

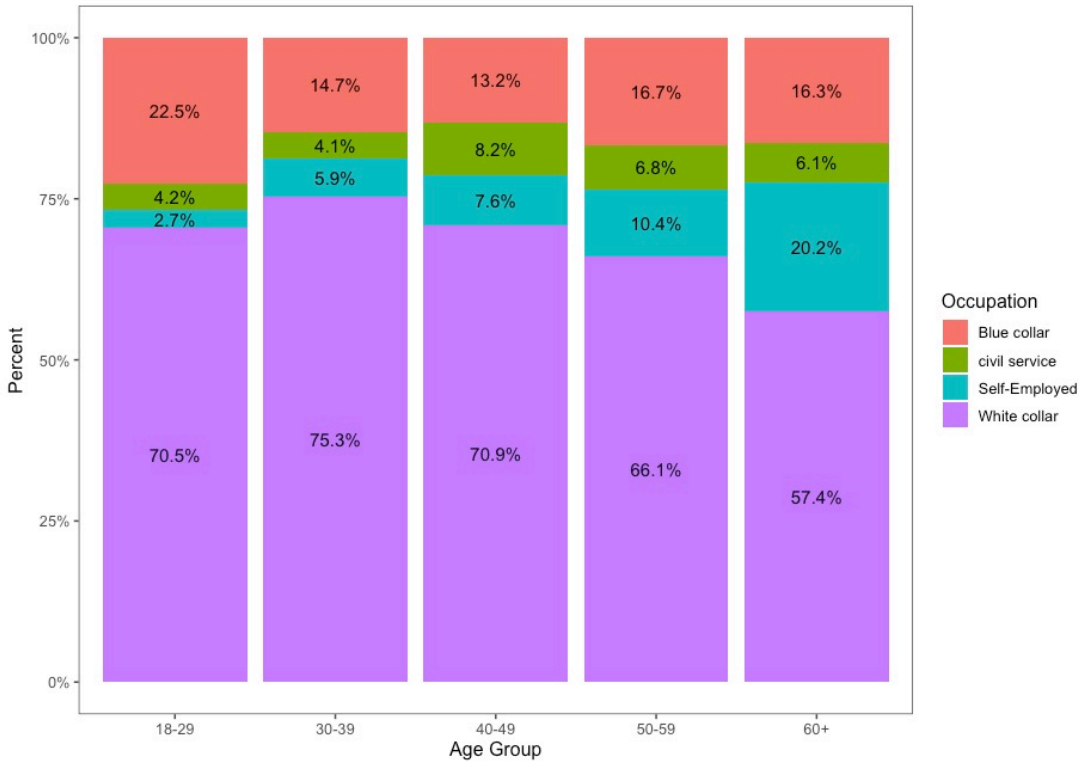
Appendix Figure A.1 Share of full- and part-time employed by age groups



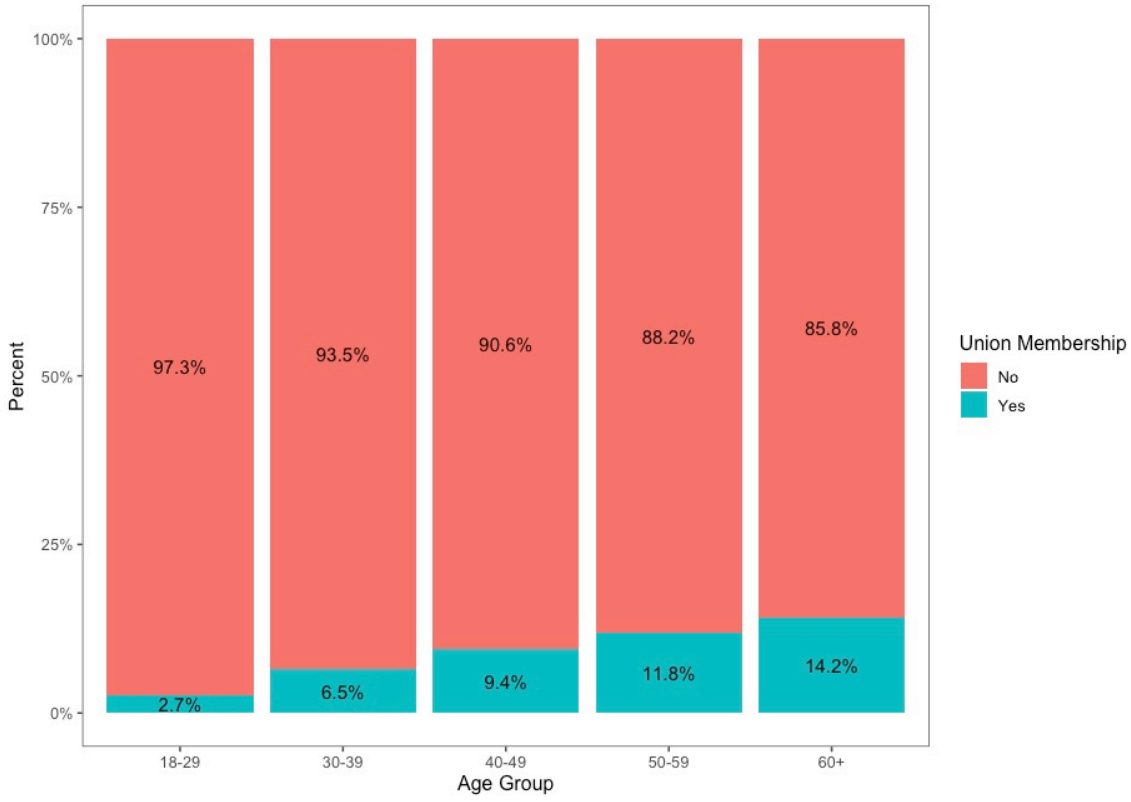
Appendix Figure A.2 Share of full- and part-time employed by gender



Appendix Figure A.3 Occupations by age groups



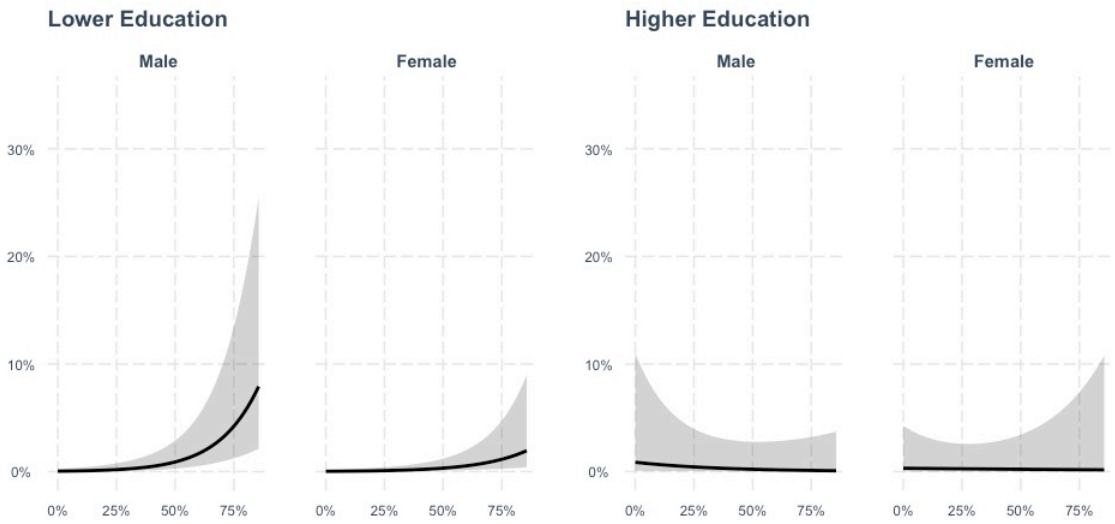
Appendix Figure A.4 Union Membership



Appendix Figure A.5 Interaction between Age Group and Automation Risk

Note: based on models 4 and 5 with 95% confidence intervals

Appendix Figure A.6 Interaction between Gender and Automation Risk



Note: based on models 6 and 7 with 95% confidence intervals

4 Political implications of 'green' infrastructure in one's 'backyard': The Green Party's Catch-22?

Co-author: Andrew McNeil[30]

Abstract

The benefits of a clean environment are shared by all, yet the cost is often borne by the few. We test how the potential building of wind turbines and solar farms changes one's political preferences in the German state of Baden-Württemberg. We use a difference-in-difference design based on whether one's area is designated for potential future infrastructure. When the burden of 'green' infrastructure falls on voters, wind turbines or solar farms in one's 'backyard', residents of these local authorities vote less for the Green Party. Additionally, using individual level data from SOEP, we find those individuals who previously voted Green are the most likely to desert their party in the face of green infrastructure, rather than disincentivising potential 'switchers'. We argue that this has profound implications for the move to 'net zero'. Green parties face a Catch-22 situation, the very policies that draw their support create a backlash when implemented.

4.1 Introduction

The salience of environmental politics and parties has dramatically increased over recent years. A consequence of the well documented scientific evidence of climate change (IPCC 2022), and a societal move towards post-materialistic attitudes (Inglehart 1971). The crux of the issue with tackling climate change is that for the major national polluters there are few immediate benefits from policy change. The benefits of a cleaner environment are predominantly reaped by future generations and those individuals living in lesser developed countries who are most geographically exposed. Thus, there is a well-known global collective action issue (Dietz, Ostrom, and Stern 2003; Ostrom 1990; Stokes 2016).

Similarly, within countries the 'cost' of the green transition and the associated journey to 'net zero' are not distributed equally. The burden often falls on lower socio-economic groups, more deprived areas, and smaller towns and villages (Arndt, Halikiopoulou, and Vrakopoulos 2022; Frondel, Sommer, and Vance 2015; Markkanen and Anger-Kraavi 2019). Rural areas suffer

[30] Government Department and International Inequality Institute, London School of Economics and Political Science, a.mcneil@lse.ac.uk

with the transition to green technologies given the lack of access to public transport and the high initial costs involved in the transformation. The latter is particularly salient as society moves to electric vehicles and the required widespread installation of charging points. Moreover, these locations are more likely to house green energy producing infrastructure, notably wind turbines and solar farms. The costs range from economic, such as less tourism and lower local house prices, to the impact on standards of living through noise pollution, destruction of wildlife, and aesthetic displeasure. In short, there is a huge benefit to be brought from 'green' policies, but it is shared by a vast number of people across places and generations. In contrast, the cost is borne by the few, and we know from a variety of literatures that this can often result in a 'Not in my back yard' (NIMBY) response (see O'Grady, 2020).

On a wider and more dramatic scale, the 2018 'Gilets Jaunes' (Yellow Vests) protests highlights the potential for a mass response when a part of the electorate perceives a disproportionate burden from the green transition (Mehleb, Kallis, and Zografos 2021). In the wake of a hike in fuel prices, partly a result of a planned increase in carbon tax and a decision to strip tax advantages for diesel, tens, if not hundreds, of thousands of protestors filled the streets. The actions included legitimate protests, blockades, and, on several occasions, protests spilled over to riots. Based on a protestor's quote in Le Monde (Rérolle 2018), for many individuals it was difficult to square the elite's preoccupation with "talking about the end of the world" when many are struggling to make it to "the end of the month" (Martin and Islar 2021: 601).

Given this context, we argue that in economically developed states where incomes have increased over time and thus post-materialistic attitudes have risen, we have seen a 'rational' aggregate increase in environmentally friendly attitudes. As post-materialistic attitudes dominate, individuals tend to focus on issues such as the environment. Moreover, for many individuals that live in cities, there are limited prospects of being directly impacted by environmental infrastructure in one's backyard. It is both inefficient and impractical to place renewable energy sources such as wind turbines or solar farms in the city because they require more space due to their lower energy density relative to fossil or nuclear power sources. As a result, the profitability of wind or solar infrastructure is higher in non-urban areas. Those living in rural locations may already be less 'green', due to a compositional effect, whereby those with higher educational and occupational status, and thus post-materialistic attitudes are

attracted to cities (Maxwell 2019, 2020)[31]. However, crucially, policies designed for the aggregate environmental 'good' often have a negative distributional consequence for groups in society who have already 'lost-out' from processes linked to the transition to the knowledge economy. These policies tend to fall disproportionately on those in rural areas, and individuals in rural areas are more likely to oppose climate change policies (Arndt, Halikiopoulou, and Vrakopoulos 2022; Carley and Konisky 2020). We identify a specific example, when green infrastructure such as wind turbines and solar farms are built in one's district. We expect those voters affected to turn away from the Green Party. More generally, we argue that forming political coalitions for the green transition will be tough without compensating those groups who bear the cost. The Green Party is left with somewhat of a Catch-22 situation; the very policies that draw their support create a backlash when implemented.

In our empirics, we use the case study of the German state of Baden-Württemberg (BW), to investigate how the imposition of 'green' infrastructure affects voting preferences. BW is a 'green' state, the Green Party won 32% of the votes in the latest state elections in 2021 and was the largest party. Thus, the case of BW is a pre-cursor for other places with (mainstream) parties which will have to increasingly turn 'green', in order to achieve their international commitments such as the Paris Climate Accords. We exploit the publication of designated areas for wind turbine and solar farms via an internet portal (LUBW and Umweltministerium Baden-Württemberg)[32]. We use a difference-in-difference model to show that when a local authority (Gemeinde) includes a significant area that is designated as a potential site for future wind turbines or solar farms, those local authorities tend to vote less for the Green Party. Our second step is to combine the regional 'green' infrastructure treatment and individual-level panel data from the *German Socio-Economic Panel* (SOEP). In areas that are designated as potential green infrastructure sites, existing Green Party supporters are significantly more likely to desert the Green Party than their non-affected peers. We find no evidence that those individuals who supported other parties in 2018, were any less likely to switch to the Green Party if they were in a potential wind turbine or solar farm area.

Our contribution is four-fold. First, we add to a small but growing literature illustrating the effects of environmental infrastructure on political attitudes. However, there is conflicting

[31] Maxwell references 'cosmopolitan' values rather than green attitudes.
[32] The Energieatlas was published online on 13 November 2015, but the potential analysis was only added in 2018 for solar and 2019 for wind.

evidence. Existing work shows that voters 'blame' incumbents retrospectively for wind turbines in their backyard (Stokes 2016), contributes to electoral polarisation through increases to both the Green Party vote and support for the AfD (Otteni and Weisskircher 2021), substantially decrease Green Party voting (Germeshausen, Heim, and Wagner 2021), and have limited effect on electoral outcomes (Umit and Schaffer 2022). Our findings in BW contrast with Otteni and Weisskircher (2021), whereby the potential for turbines reduces Green Party support, which arguably may be considered the incumbent. Second, we show that the effects are broader than just wind turbines and apply equally to solar farms. Third, we nuance previous studies by showing that it is existing Green Party supporters who are the most likely to remove their support. Fourth, whilst our empirics focus on wind turbines and solar farms, our argument is much broader, we attempt to show how the political feasibility of a green transition depends crucially on maintaining the support of those bearing the cost.

The paper is structured as follows. The next section describes the rise of green values and green policies in the quest to achieve 'net zero', and how there are distributional consequences to such policies. Following that we develop our expectations for voters' political response when they experience the costs of the green transition. Next, we describe the context of Baden-Württemberg, our data, and empirical strategy. Section 7 outlines the findings. We conclude with a discussion of the implications.

4.2 The distributional consequences of 'net zero'

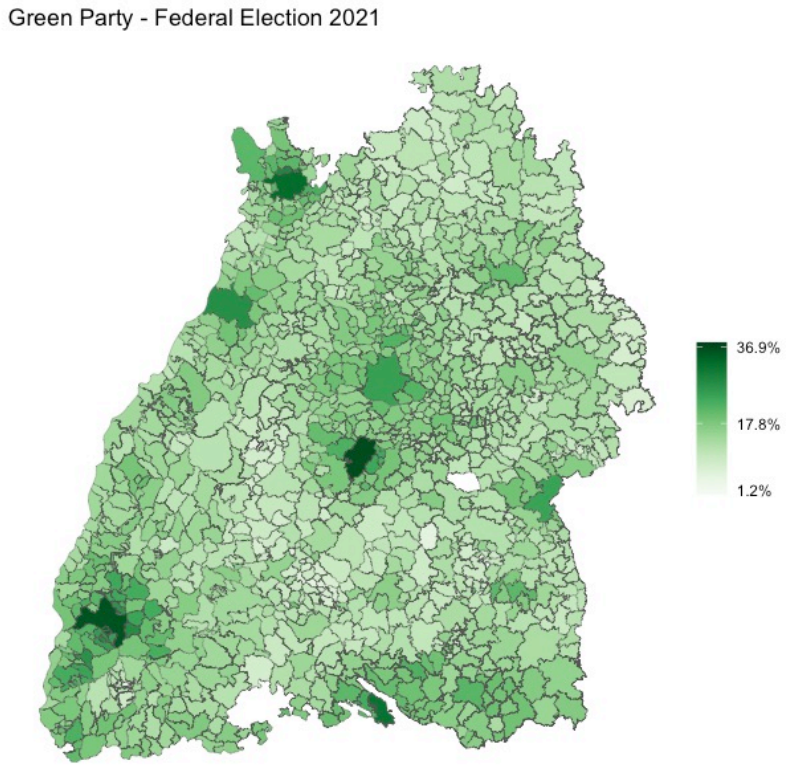
Across Europe, and in particular our country of study, Germany, 'Green' parties have seen a dramatic increase in popularity over the past 40 years. In the most recent German federal elections in 2021, the Greens received 14% of the votes cast and were the third largest party.[33] It is somewhat of a steep ascent from the 1980 election, when they only received 1% of votes. The increase in the 'green' vote is often ascribed to an increasingly wealthy population where there is an institutional structure that allows for mobilisation of an electorate with environmentally friendly attitudes (Grant and Tilley 2019). In advanced capitalist democracies, many individuals now have a level of income that sustains their material needs. Their attitudes and electoral priorities thus shift to post-materialistic issues such as gender roles, sexuality rights, and most relevantly for our paper environmentalism (Inglehart 1971). This is supported

[33] Based on Constituency votes.

by evidence from Abou-Chadi and Hix (2021), as they show the highly educated have shifted their support away from mainstream parties to the 'greens' across Europe. However, these pro-environment attitudes are most likely to be relevant at the ballot box when institutions are permissive. Most notably proportional representation and decentralization (Finnegan 2022; Grant and Tilley 2019). Both criteria apply to Germany.

Within countries there is a large divergence of Green Party support. As already noted, in the most recent 2021 Länder (State) elections in BW, 32.6% of votes were for the Green Party. By contrast in the Saarland only 4.9% of the electorate voted Green.[34] Within BW there was a divide between the urban and rural districts. The distribution of Green Party votes in the federal and state elections are shown below (Figures 4.1 and 4.2). The areas with the relatively highest Green Party vote share, the darker shading in Figures 4.1 and 4.2, include the university cities/towns (Freiburg, Tübingen, Heidelberg, Konstanz) and the state's two major cities (Stuttgart and Karlsruhe).

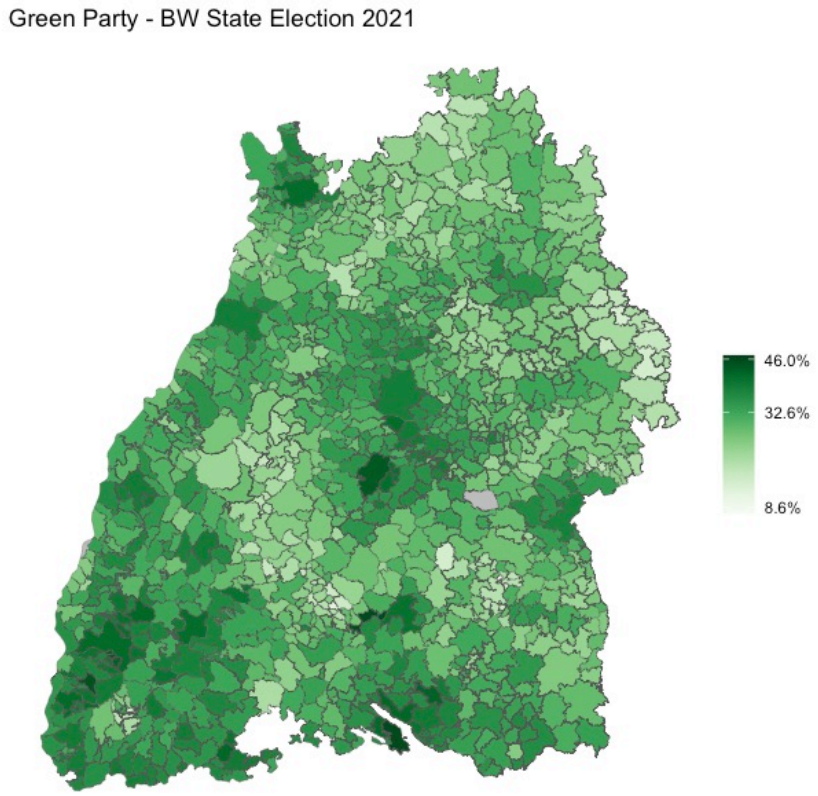
Figure 4.1 Green Party support by local authority in 2021 Federal elections



[34] The most recent Länder election in Saarland was 2022.

Source: Author's calculations from Landesamt für Statistik Baden-Württemberg (2021) data: Endgültige Ergebisse der Bundestagswahl 2021 mit Vergleichsangaben von 2017, https://www.statistik-bw.de/Wahlen/Bundestag/GVergleich.jsp?R=BT290

Figure 4.2 Green Party support by local authority in 2021 State elections



Source: Author's calculations from Landesamt für Statistik Baden-Württemberg (2021) data: Endgültige Ergebisse der Landtagswahl 2021 mit Vergleichsangaben von 2016, https://www.statistik-bw.de/Wahlen/Landtag/GVergleich.jsp?R=KR236

We argue that there are three drivers for urban areas tending to have the greatest support for the Green Party. First, there is the compositional effect (Huijsmans et al. 2021). Those voters in urban areas are more likely to be highly educated, be in high status professional occupations, and earn more. These are factors that we know tend to be associated with more post-materialistic attitudes (Inglehart 1997). Second, we anticipate there is an independent effect of 'place', those people in cosmopolitan areas are likely to promote and reinforce pro-environmental attitudes in those around them. The role of social networks is important, as 'green' views are not only encouraged but expected in friendship circles and in the workplace (Abrams, Iversen, and Soskice 2011; Nordbrandt 2021).

Most relevantly for our thesis, those voters in rural areas face potential costs during the 'green' transformation. There can be health costs[35], for example, Merkel's government decided to decommission nuclear power as there was increased fear of a potential disaster following the Fukushima Daiichi nuclear disaster in 2011[36]. Less dramatically, having 'green' infrastructure in one's vicinity can lead to decreased life satisfaction. Wind turbines, many would argue, are aesthetically displeasing, are noisy, and block out sunlight (Onakpoya et al. 2015). Solar farms, although potentially less intrusive, can reflect light and impact scenic views (The Economist 2021). Both may be destructive to local wildlife and forests (Măntoiu et al. 2020). In turn, there may be a knock-on effect on house prices. Dröes and Koster (2021) show how having a wind turbine within 2km reduces one's house value by 2%, and for large wind turbines of greater than 150m, the effect is as much as 5%. In the same study, having a solar farm in one's vicinity reduces house prices by 2-3% but only if it is very local, within 1km. Decreasing house prices is particularly likely to impact homeowners' attitudes, but we also know that there is a potential for a wider socio-tropic effect as house prices shape perceptions of local economic conditions (Adler and Ansell 2020). Similarly, 'green' infrastructure may impact local industry. Many tourists are attracted to the countryside in BW, which includes the Black Forest region, by the uninterrupted natural beauty, and there is the potential that wind turbines and solar farms may deter visitors (Broekel and Alfken 2015).

These 'costs' are likely borne by those in rural districts. There is not the required space or wind in most city locations. It is further plausible that those individuals chose to live in a rural environment to enjoy the idyllic peace and quiet that this very infrastructure may prevent. However, between rural districts the placing of green infrastructure is seemingly random. In theory, individuals may choose not to live in particularly windy or sunny spots given the fear of wind turbines or solar farms being placed there in the future – although this seems unlikely. Thus, we can then detect whether having new wind turbines or solar farms in one's local district changes political preferences.

Whilst our research design is based specifically on the effect of wind turbines and solar farms, our argument is much broader. We understand the construction of green energy producing infrastructure as just one example of the cost of the green transition. In the case of wind turbines

[35] Of course, there is much debate whether these health risks are meaningful, but the perception of potential health costs is what is relevant to our argument
[36] Announced on 30th May 2011

and solar farms, the cost is unequally spatially distributed. In many, but not all, cases the burden tends to fall more on the rural community. One could also think about the move to electronic vehicles. There will be costs in terms of new car purchases, increased fuel prices, and potentially charging infrastructure. Rural communities rely more heavily on cars than individuals in cities where public transportation is more convenient. That is not to say those living in cities do not face pressures, through congestion charges, low emission zones, or outright driving bans. Thus, our argument is linked to the rural-urban divide but is wider. The burden of the 'green' transition affects some groups more heavily than others (Breetz, Mildenberger, and Stokes 2018; Stokes 2016), thus support for such policies will depend, to a degree, on how much of the burden one expects to take.

It may also be that those individuals who tend to bear the cost of environmentally friendly policy are those who have lost out through other structural changes in the political economy. Those individuals from lower socio-economic positions are more likely to live in rural communities (Maxwell 2019; Valero 2021), which are more exposed to 'net zero' policies. Once again, we refer to the Gilets Jaune where the hiked fuel price was the instigator for protest, but the underlying issue was a perception of societal unfairness. A theme which is repeated in the literature on populism and political trust, where a key causal explanation is that of 'losing out' in the face of structural change (Colantone and Stanig 2018; Gidron and Hall 2020; McNeil and Haberstroh 2022; Mitsch, Lee, and Ralph Morrow 2021).

4.3 How do voters react to bearing the cost?

Individuals in Germany have a clear case to associate the prevalence of 'green' infrastructure with the Green Party (see also Germeshausen, Heim and Wagner, 2021 or Otteni and Weisskircher, 2021). To take a brief excerpt from The Green Party's federal election manifesto, they promise "An accelerated exit from coal and to guarantee ongoing energy security a massive expansion of renewable energy sources with an energy market design oriented after solar and wind is required" (Bündnis 90 / Die Grünen, 2021: 21) [authors' translation]. For further historical details on the Green Party's support for renewable energy, and the empirical relationship between Green Party voters and support for renewable energy see Otteni and Weisskircher (2021).

Where we differ from Otteni and Weisskircher (2021), and instead draw more closely on the NIMBYism literature, is that we expect when individuals bear the cost of infrastructure, they will be less likely to support the Green Party. The classic examples are when voters are overall in favour of a policy proposal, such as infrastructure or housing, if it is 'not in their [my] backyard'. In relation to housebuilding, there tends to be a consensus that there is a lack of affordable housing, yet individuals do not want new housing stock in their immediate locality. This may be a function of impact on house valuations (Hankinson 2018; Marble and Nall 2021). Yet, it may also be a willingness to preserve existing ways of life and a reluctance to experience the unknown of rapid changes (O'Grady 2020). While most individuals would be broadly supportive of the policies required to transition to renewable energies and achieve 'net zero' (YouGov 2020), we would still expect them to behave like NIMBYists, that is they rationally do not want to pay the associated costs whilst they are ok to free ride. Radtke, Saßmannshausen and Bohn (2021) find in a representative study about attitudes towards wind turbines in North Rhine-Westphalia, that the expansion is met with great approval, roughly a third (30.3%) is opposed to a wind turbine in their own district.

Our expectations are in-line with Gaikwad, Genovese and Tingley (2022), whereby they think of four groups of voters: 1) policy threatened – those threatened by job losses because of decarbonisation policy, in their case living in coal communities, 2) climate change threatened e.g., living in coastal communities, 3) neither climate change or policy threatened, 4) cross-pressured, exposed to both climate and policy change. They use a survey experiment which asks individuals how they believe revenues from a hypothetical climate energy tax should be spent. The general population with neither exposure is mostly in favour of green energy infrastructure and a widespread rebate. The policy threatened group expects direct compensation, whereas the group who are climate exposed have a higher tendency to support spending on climate adaptation. This is analogous to our thinking, in our case the general population prefers green infrastructure, although we do not test it, we would expect those areas that are particularly vulnerable to be especially pro green infrastructure. However, those areas that are policy threatened through lower life satisfaction and lower asset prices will be against the policy.

Our study adds to this debate, despite several studies there is no consensus in this 'NIMBYism' field. To briefly summarise, some authors find no political behavioural effect in the case of construction or planning of wind turbines (Konisky, Ansolabehere, and Carley 2021; Umit and

Schaffer 2022). Otteni and Weisskircher (2021) find in Germany that a construction of a wind turbine polarises the electorate through increasing both AfD and Green Party voting. Contrastingly, Germeshausen, Heim and Wagner (2021) find a large magnitude decrease in Green Party support, approximately 17 percent, when a wind turbine is constructed close to one's residence, albeit this effect falls away quickly with distance to the wind turbine. Stokes (2016) shows in a study in Canada that wind turbines are one's vicinity cause a decrease in support for the incumbent party. This is also relevant for BW as in many local authorities Green Party politicians are the incumbent. We delve further into interaction effects with the Greens as the incumbent in the supplementary material[37]. Regarding solar panels, Umit (2021) shows that individuals who install panels on their roof do not change their political attitudes using longitudinal data from Germany, Switzerland, and the UK.

There is also literature focusing on the local and individual effects of other types of infrastructure. Again, there is surprisingly little consensus. Some cases find a NIMBYist type reaction, for example regarding power plants (Ansolabehere and Konisky 2009), and prisons (Martin and Myers 2005). A similar individual incentive logic works as workers in industries that are higher pollutants are less supportive of global climate cooperation (Arndt, Halikiopoulou, and Vrakopoulos 2022; Bechtel, Genovese, and Scheve 2019), as are individuals who live in areas reliant on such industries (Gaikwad, Genovese and Tingley, 2022). Other work shows a neutral to potentially even positive effect, which seems most prominent when the infrastructure is already there. For example, evidence from New Mexico (Jenkins-Smith et al. 2011) and restarting nuclear power plants in Japan (Uji, Prakash, and Song 2021) post the Fukushima disaster, shows individuals do not act in a NIMBYist way post construction, potentially because of existing local jobs. Conversely, when individuals are affected by natural disasters such as floods, which many will associate with climate change, they tend to become more in favour of policies addressing climate change (Baccini and Leemann 2020) and parties that promote such policies (Birch 2022).

Those living in the proximity of wind- and solar-farms do not just bear the outlined costs but could potentially also benefit from the green infrastructure. In Germany, there is no clear regulation or guideline for states and communes from the federal level, but there have been

[37] The Christian Democratic Union (CDU) has been the junior coalition partner during the last two legislative periods. We only treat those electoral districts as having an incumbent where the green party won the majority of the votes.

discussions around how to compensate affected communities. The suggestions range from communes receiving a share of the profits to a 'Windbürgergeld' ("wind-citizen-money"), i.e. direct payments to affected citizens (Die Zeit 2020). The state government of Schleswig-Holstein passed new legislation in 2016 that forces investors to offer shares to anyone living within 5km of the new development in order to give them the opportunity to benefit from the investment (Die Zeit 2020). However, in BW no regulations exist yet. Without regulations in place, compensation is not mandatory, and it is up to the contractual parties (local authority and developer) to decide if the projects are accompanied by any compensatory measures.

> **H1** In areas that are designated future potential wind turbine (solar farm) sites, the support for the Green Party will decrease.

Next, we theorise as to who it is that will cause a decrease in Green Party support in those areas potentially destined for green infrastructure. There are two potential sets of 'deserters'. First, the classic NIMBYists, those Green Party supporters who in theory were happy to support green infrastructure until it appeared in their direct vicinity. That is individuals who supported the Green Party in previous elections but will no longer, as they blame the Green Party for the direct costs they must now bear. These voters may switch back to the mainstream parties, such as the CDU, SPD, and FDP; or alternatively stage a protest vote for the anti-system left, Die Linke, or the anti-system right, the Alternative für Deutschland (AfD). Second, we know that the Green Party support has been increasing over time. Thus, we may not see the same added support as in other areas where wind turbines or solar farms are not being built. That is, 'switchers' from other parties may be put off by the proponents of green infrastructure.

Unsurprisingly, Green voters are not a homogeneous group. While they are united in their concern for the environment, they also tend to be younger and more likely to be graduates compared to the rest of the population which translates into higher concentrations of Green Party voters in cities, particularly university cities (Abou-Chadi and Hix, 2021). Yet, individuals are drawn to the party for different reasons and hold different views on what the party should prioritise. These different voter camps are also represented within the party's own fault lines, such as the conflict between "Fundis" (fundamentalists) and "Realos" (realists). However, more relevant for the topic of green infrastructure expansion, the Green party is facing a dilemma when it comes to the overlap between two of its core-aims, namely,

Klimaschutz ('climate protection'), focusing on how to prevent climate change, and Naturschutz ('nature protection'), focusing on protecting biodiversity. Party supporters are split when it comes to which protection should take the driver's seat. Emblematic for the resistance of those green supporters who favour Naturschutz has been the 'red kite'. Legislation to protect red kites is referred to frequently to prevent new wind turbines, because these birds of prey are looking to the ground while flying, they are potential rotor victims (Goetz, 2019). More generally, sceptics of the expansion of green infrastructure are concerned about the accompanying destruction of living space of animals and plants. For example, solar farms require vast free spaces. Given the disappointment and frustration that those who prioritize Naturschutz over Klimaschutz could feel with the Green party, if their concerns are not addressed, they may desert the party.

That means former supporters might desert the party due to the general NIMBY logic or because they do not feel as if the party is representing their priorities anymore if a wind turbine is built in their vicinity. This could lead former green supporters to either abstain or switch their party preference. If this hypothesis is supported, it proves a real dilemma for the Green Party. The very policies that are core to their existence drive away some of their supporters when implemented in their backyard.

> **H2** The decrease in Green Party voting in areas designated for wind turbines (solar farms) can be attributed to NIMBYist deserters, i.e., previous supporters.

Over the last years the Green Party has gained more support in both, state and federal elections across Germany and Baden-Württemberg in particular. A decrease in Green Party voting is thus not necessarily just driven by deserters, but also possibly by a lack of gained support in areas with new potential green infrastructure relative to unaffected areas. The expansion of green infrastructure can lead individuals to continue to support other parties instead. This could be due to the NIMBY logic or because of the heightened awareness around the potential effect of green infrastructure on the natural world that activists are trying to create to gather resistance.

> **H2** The decrease in Green Party voting in areas designated for wind turbines (solar farms) can be attributed to the lack of added support.

4.4 Regulatory Context and Baden-Württemberg

The planning and construction of new wind turbines is regulated across the different levels of government in Germany. The federal level sets general framework rules, which the state further defines via their own planning regulations and goals. The planning regions within a state have further say on designation of areas, and communes have their own planning committees that take final decisions. However, federal and state regulations decide the majority of the legislative framework. In addition to the planning regulations, the federal and state level set out the aims that should be achieved in terms of renewable energy expansion. If these aims are not met, they tend to increase pressure by, for example, implementing law changes.

From the federal level, onshore wind investors will have to get prior approval for their projects under the Federal Immission Control Act (*Bundes-Immissionsschutzgesetzes* or *BlmSchG*), the federal law regulating the harmful effects of air pollution, noise, vibration, and similar phenomena. Onshore wind is further restricted to specified 'grid congestion zones' where high inputs of renewable electricity cannot be accepted because of network congestion. These areas are to be identified by the Federal Network Agency.

At the state level, the major legislation is the state planning act (*Landesplanungsgesetz* or *LplG*) which defines, for example, the distance of green infrastructure to residential areas. In Baden-Württemberg, the minimum distance between a wind turbine and a residential area must be 700m. This regulation was the preferred option of the Green party, whereas the CDU would have preferred 1000m which became the federal guidance in 2021. In addition, the state law sets out specific clarifications which usually become part of the LpIG such as how to harmonize biodiversity and animal protection laws with the renewable energy expansion.

Baden-Württemberg is the third largest German state by area and population, with over 11.1 million residents (Federal State Office of Germany). It has a high mean income both absolutely and relative to Germany as a whole. In 2018 the average available income per citizen in Germany was €22,899, this figure was €24,892 for BW, only Bavaria (€25,309) and Hamburg (€25,029) have a higher average income per person (Regionalatlas Deutschland).

Special about the Greens in Baden-Württemberg has been the early success of the party not just in the big and university cities, but also in more rural areas. The Greens jumped the five percent hurdle in all but two of 70 electoral districts at the party's first state election in 1980 (LpB BW 2022). Traditionally the CDU has been the largest party, until the 2016 state election when the Green Party took this mantle.

Given its size, diversity, and strength of the Green Party across urban and rural areas, Baden-Württemberg is a good case to study the effects of the introduction of green infrastructure on voters. During the period we study, Baden-Württemberg had a coalition government between the Green Party and Christian Democrats. Given that Germany is a federal system with a multilevel governance system, voters might not always attribute policy decisions to the correct level of governance. The overlap between the CDU in the federal as well as State government will help us to test if we are seeing an incumbent effect as well. The strength of the Green party in the state is also beneficial as the Greens can be considered a mainstream party here, whereas in other parts of Germany the party has only recently experienced a considerable upswing in support which might not be stable and could distort the individual level analysis.

4.5 Data

We make use of data published by the Landesanstalt für Umwelt Baden-Württemberg (LUBW) which, according to the 'Umweltverwaltungsgesetzes' from 2015, allows access to specific environmental data and digital maps based on evaluation and measurement data from the LUBW as well as the information association of communal and state environmental agencies. This data can be accessed via an interactive online platform called Umwelt Daten und Karten Online (UDO).

To assess the potential of a wind turbine being placed in a local authority we use a dataset that was compiled as part of a state-wide report into potential geographic areas for future wind turbines[38]. Potential future areas were based on wind-speeds and other criteria which formed part of the Windatlas Baden-Württmeberg 2019 (including exclusionary criteria such as proximity to an environmentally protected area or specific infrastructure) which became part of the Energieatlas. Part of this data includes a variable that indicates the size of the area (in

[38] The report also considers 'limited potential' areas

hectares) within a local authority. We combine the potential area size with local authority area data from the Statistisches Landesamt Baden-Württemberg to calculate the share of local authority area which has been deemed to be a potential location for future wind turbines. Figure 4.3 highlights the areas which are potential future wind turbine sites, and Figure 4.4 the proportion of each local authority that is potentially exposed.

Figure 4.3 Potential wind turbine sites

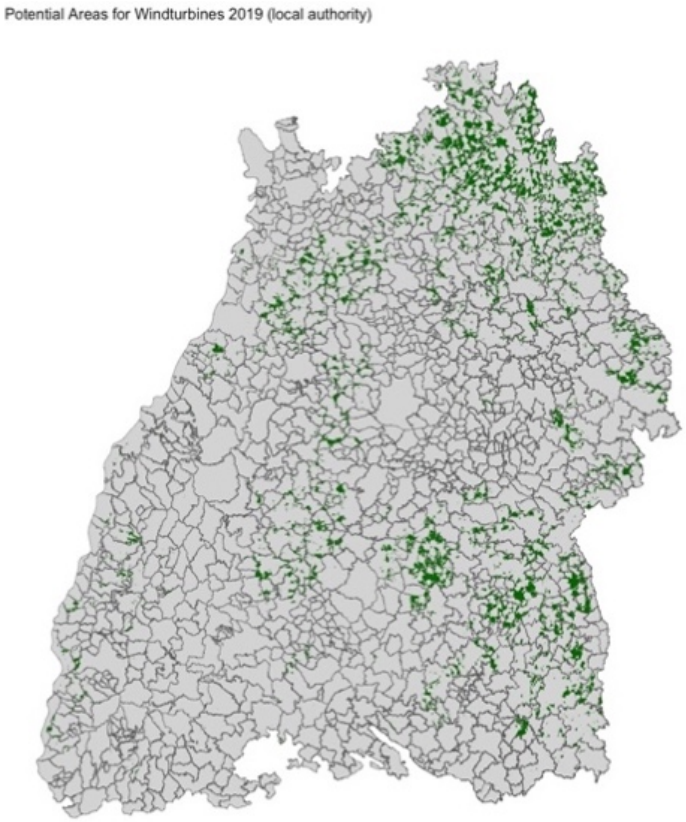
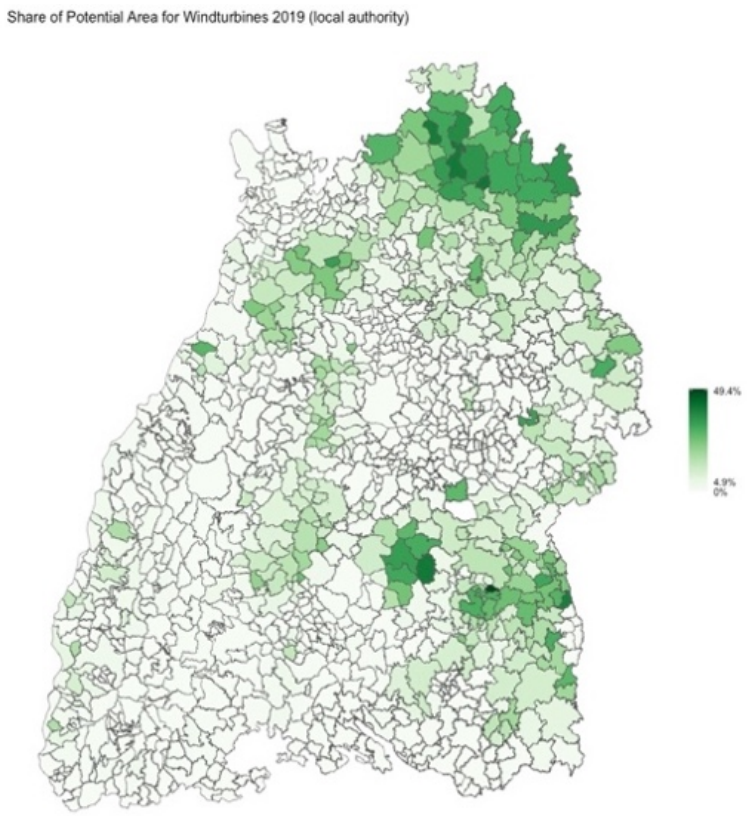


Figure 4.4 Potential wind turbine sites as share of local authority territory



The designated potential areas in the Windatlas are the best predictor of a future wind turbine site due to the natural restrictions, i.e. wind potential, as well as regulatory ones, e.g. distance to residential areas or natural protection areas. The impact on the development of wind farms is shown in a case study by Reusswig et al. (2016) where the official wind potential analysis triggered discussions around the development of a wind park.

We use data from the 2019 Windatlas, which is the updated version of a previous 2011 report. In 2011 Germany had decided its exit from nuclear energy and the Green Party in BW entered the first Green Party led state government. One of the Green Party's priorities was to start planning for the expansion of renewable energy. The 2011 Windatlas was the first official assessment of wind potential throughout the state which should help to identify areas for potential wind turbines. We use the updated 2019 version of the report as our treatment because of important changes to regulations and laws that followed the initial Windatlas in 2011 and saw important changes to the assessment of areas for wind turbines (see appendix p. 3 for further details).

Given the magnitude of changes, both in terms of suitable areas (designated potential areas roughly doubled) and legislative reforms (specifically Windenergieerlass 2012; Umweltverwaltungsgesetz 2015; animal protection 2015; noise protection 2017; EEG reforms in 2014 and 2017) that followed the initial assessment of wind potential in the 2011 report, we believe that the updated 2019 Windatlas version is better suited. In addition, the 2019 report takes new technological advances into account that allows for the building of wind turbines in less windy areas as well. This is particularly important in Baden-Württemberg which has relatively low wind potential compared to the more northern regions in Germany. To manifest the role of the new Windatlas in planning, the state published a note on the use of the Windatlas 2019 in July 2019 stating that the Windatlas calculations can be used as evidence to fulfil the planning efficiency requirement for new wind turbines, taking into consideration the new changes in law and practice.

Another contributing factor to choose the 2019 version is the change in salience around the topic of renewable energy expansion (the so called Energiewende). Salience for the topic greatly increased since the first 2011 report. In 2013 the Baden-Württemberg Parliament passed the 'Klimaschutzgesetz' which defined concrete emission reduction goals (90% reduction by 2050 compared to 1990 base line) emphasising the need for future expansion of renewable energy. On a wider scale the Paris Climate accords in 2016 and a federal debate around renewable energy in 2016/2017 linked to the EEG reform led to an increased salience of the topic nationwide (see Google trends graph in the appendix p. 4) and likely increase the awareness of and attention to the expansion of renewable energies further. The switch from seeing renewables as a potential option in communes to increasingly a necessity is most clearly outlined in the new coalition contracts of the federal and state governments in Germany and BW from 2021. According to the federal government, 2% of Germany's landmass should be reserved for onshore wind turbines and the so-called repowering, that is the replacement of old wind turbines through newer ones should be made easier and faster. The state government sees 2% of its landmass as the goal for onshore wind farms and solar farms, as well as the aim of building 1000 new wind turbines by the end of the legislative period (by 2021 BW had a total of 751 active wind turbines). Because of the increasing interest in the renewable energy expansion, regional media and newspapers widely reported on the new version of the Windatlas and major law changes, including the permission for free space solar farms (see below) raising awareness and interest further (see Appendix Table B.1).

Similarly, we use data around potential areas for solar farms, which is also published by the LUBW and as part of the Energieatlas. Unlike for wind, a solar potential analysis was first published in 2018 based on a law which was passed in 2017 (FFÖ-VO based on the EEG 2017) which extended the possibility of building solar farms in open spaces for the first time as these areas were considered restricted areas previously. We are only using data for solar farms in Freiflächen (open spaces). The potential areas are calculated according to criteria such as type of area, size of area, as well as average slope. Figures 4.5 map the potential solar farm sites, and Figure 4.6 the proportion of each local authority that is potentially exposed.

Figure 4.5 Potential solar farm sites in Baden-Württemberg

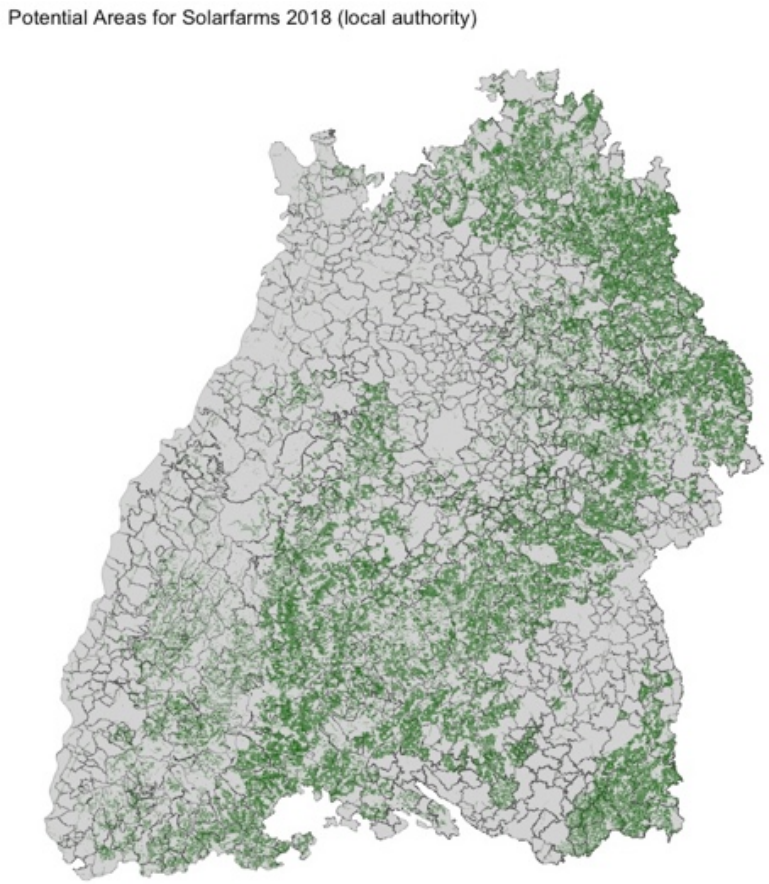
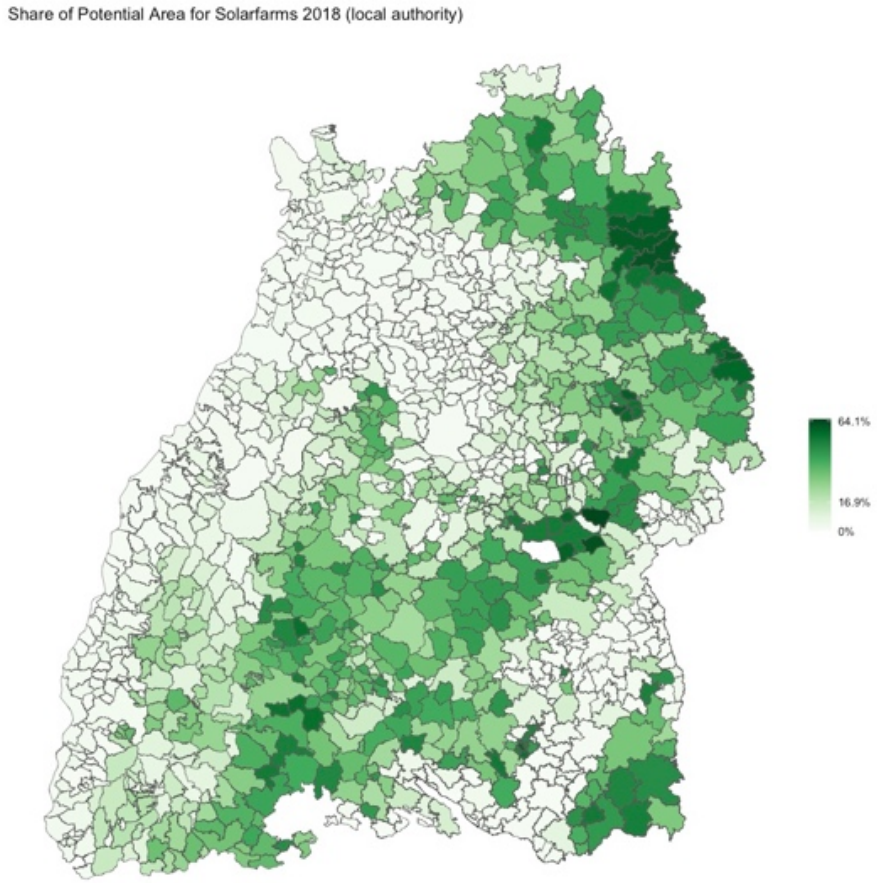


Figure 4.6 Potential solar farm sites as share of local authority territory

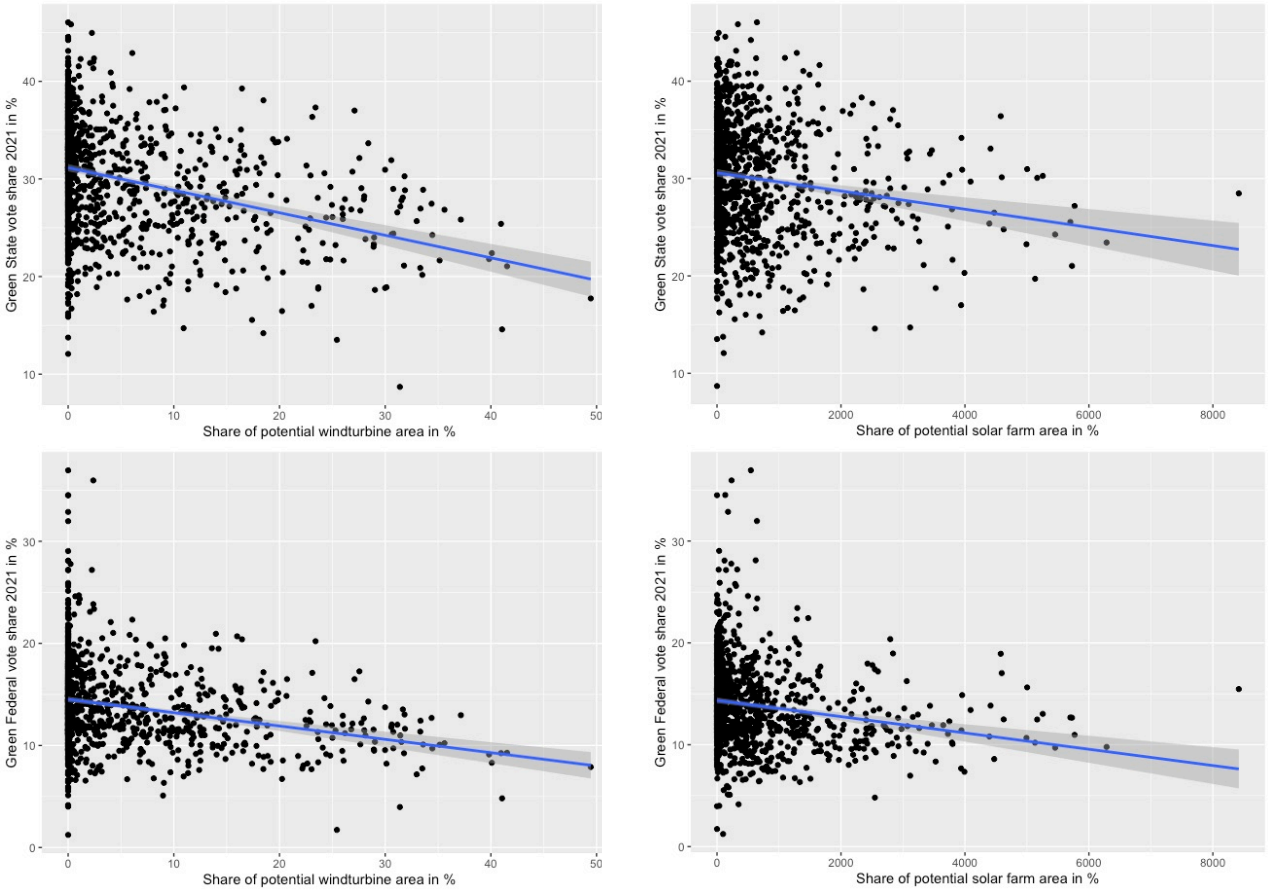


We combine the environmental data with federal and state election results from the Regionalstatistik which is published by the Statistische Ämter des Bundes und der Länder, and the Statistische Landesamt Baden-Württemberg. The election results are disaggregated to the local authority level. For federal elections, we base our analysis on Party List votes. We exclude mail voters because they cannot all be accurately linked to their local authority. We show pre-trends from previous elections (**Error! Reference source not found.**). Our analysis is based on federal elections in September 2017 (pre-treatment) and September 2021 (post-treatment). For state elections, we use the pre-treatment as elections in March 2016 and the post-treatment as elections in March 2021. To give context of the distribution of Green Party votes and potential area designated to wind turbines and solar farms for the 1,011 local authorities see Figure 4.7.

For the individual level analysis, we use the German Socioeconomic Panel (SOEP). SOEP is a nationally representative longitudinal dataset. We use data from Waves 35 (2018) and 37 (2020) for the wind turbine analysis. For the equivalent analysis on solar farms, we use the pre-

treatment data from Wave 34 (2017) because the treatment is in 2018. We include only those individuals for which we can track through both waves. We then link these individuals to the district[39] in which they reside, and accordingly whether that has been designated as a potential wind turbine site. Our dependent variable is based on the party which one supports. We remove respondents from our analysis with missing responses via listwise deletion.

Figure 4.7 Green Party vote and potential area for wind turbines and solar farms



Note: Share of area designated potential for wind turbines (left) or solar farm (right) against Green Party state (top) or federal (bottom) election vote share in 2021 by local authority

4.6 Empirical Strategy

Our approach exploits the exogenous timing and naming of sites that are potentially cited for wind turbines or solar farms in the future. We use a difference in difference (DiD) identification strategy to exploit the fact that only a proportion of the districts in BW are 'treated' (see Figures 4.3-4.6). For the analysis on solar farms, the treatment is in 2018. In the first section of our

[39] We use a larger spatial unit, 'district', for the individual analysis due to data constraints with SOEP.

empirics, our unit of analysis is the local authority (Gemeinde). We then exploit the panel nature of the data as shown in equation 1). Our dependent variable, Y_{it}, is the vote share within a local authority, *i*, for the Green Party, at time *t*. We regress Y_{it}, on district and time fixed effects, g_i and d_t respectively, to account for time-invariant characteristics of the local authority and any changes over time. We provide two sets of models, with and without time-varying controls, $X_{it,}$ at local authority level. We are restricted to these controls given the contemporary nature of the data; the state and federal elections were only last year (2021). We include population and population density (in the supplementary materials we include a time-varying control for number of turbines in the local authority)[40]. The local authority fixed-effect absorbs any time-invariant factors. Finally, tW_{it} estimates the impact of being in an area which has been designated for 'green' infrastructure. We measure this with respect to wind turbines and solar farms.

Our results consider three specifications at the local authority level[41], 1) the area has more than the median local authority potential sites designated for wind turbines (solar farms), 2) the area has more than the mean designated for wind turbines (solar farms), and 3) the district is in the top quartile of potential wind sites (solar farms)[42]. We show the 'mean' analysis in the main results, the other specifications are available in the supplementary material (pp. 6-11) but are substantively similar. This analysis is completed separately for federal and state elections. We also provide a supplementary analysis which considers the number of wind turbines that potentially could be built rather than the area. These values are obviously correlated but not identical. Results are substantively similar.

Equation 1

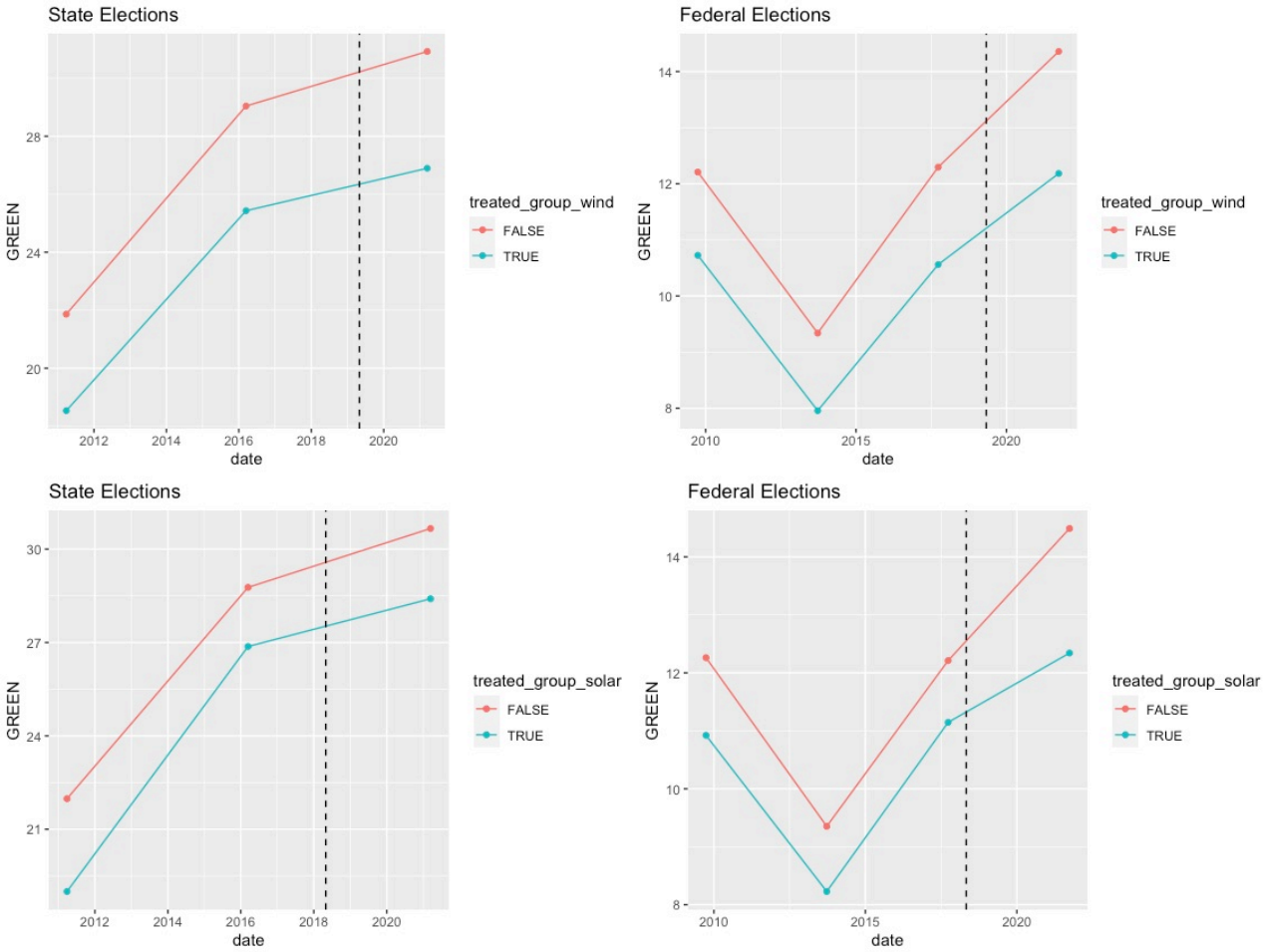
$$Y_{it} = \alpha + \tau W_{it} + \gamma_i + \delta_t + \beta X_{it} + \varepsilon_{it}$$

A causal interpretation of a difference-in-difference design relies upon the assumption that the non-treated districts represent a good counterfactual for those areas that are treated through being designated a potential wind or solar site. We show these parallel trends in Figure 4.8 for the pre-treatment period. The parallel trends assumption holds well for both state and federal

[40] We do not include this in our main results as this is essentially what we are trying to capture, the response to green infrastructure. However, results remain robust to their inclusion.
[41] We also provide a specification in the appendix (p. 6) whereby local authorities are 'double treated', that is designated as potential wind and solar sites.
[42] Medians and means calculated by excluding zeroes i.e. those local authorities without any land designated as potential for wind turbines (solar farms)

elections. Second, we are assuming there are no time-varying confounding variables between the pre-treatment and post-treatment periods. We address any concerns that we are capturing a further divide between urban and rural voters, rather than a 'green' transition effect per se, in the robustness section. Moreover, we include the vector X_{it} to control for time-varying variables as described above.

Figure 4.8 Parallel trends



Note: wind (top) and solar (bottom): left: Green Party state election results in % by local authority; right: Green Party federal elections by local authority.

We then merge our individual level data from SOEP, which is linked to the respondents' district of residence.[43] In line with the previous analysis, we use a difference-in-difference regression, with a linear probability model (Equation 2). We dichotomise the dependent variable, Y_{it}, the

[43] Residence is based on where one lives in 2020. We provide analysis for only those individuals who have not moved to alleviate any sorting concerns.

party one supports, as 'Green Party' and any other party. Now *i* refers to an individual at time t. We include individual fixed effects, q_i, to account for any time-invariant individual characteristics, and again d_t captures time fixed effects. In the main regression we do not include a vector of time-varying characteristics but do so in supplementary analysis, X_{it}. We are interested in the effect of the 'wind' and 'solar' treatment by an individual's party preference pre-treatment. To do so we introduce the interaction term mW_{it} * $2018P_i$ where $2018P_i$ refers to an individual's 2018 party support preference. Whilst we are not able to introduce individual time-invariant variables directly to the regression, because they are absorbed by the individual fixed effect, we can still use this variable to capture how the 'treatment' varies by group.

Equation 2

$$Y_{it} = \alpha + \tau W_{it} + \mu W_{it} * 2018P_i + \theta_i + \delta_t + \beta X_{it} + \varepsilon_{it}$$

4.7 Findings

4.7.1 Local authority level analysis

The first analysis uses the unit of analysis as the local authority (Gemeinde). Our results are split by federal elections (Table 4.1) and state elections (Table 4.2).

In all our models, at both state and federal level, there is a negative effect on Green party vote share as a result of being designated as potentially suitable for wind farms. There is a –0.44 percentage point effect on Green Party votes for federal elections and a –0.42 percentage point effect for state elections. In federal elections, based on models with and without time-varying controls, the effect is significant at all convention statistical thresholds. Whilst the magnitude of this effect is less than 1 percentage point, one must place this in the context of the Green Party achieving 14.8% in the 2021 federal election. Moreover, these effects are based purely on the announcement of a potential wind farm. The news of potential windfarms may not be well spread, and it may well be that any effect would be magnified if a wind farm appeared in one's area.

In the state election models, the magnitude of the effects is similar to that of the federal elections. That said, when we include our time-varying controls, population and population density, the coefficients lose their statistical significance.

There is a similar pattern for solar farms. If anything, the effect seems larger in magnitude for federal elections. Being 'treated' through being a potential solar farm site decreases the Green Party vote share by 1.08 percentage points (with no controls). In state elections, the effect loses its significance but is of a similar magnitude to the wind turbine treatment, -0.36 percentage points.

Table 4.1 Effect of wind and solar treatment on Green Party vote share at federal elections by Local Authority

	Wind turbines				Solar farms			
Treatment	-0.438	** *	-0.368	** *	-1.083	** *	-0.982	** *
	(0.136)		(0.135)		(0.133)		(0.136)	
Time-varying controls	N		Y		N		Y	
Local authorities	1101		1101		1101		1101	
Observations	2202		2202		2202		2202	

*** p<0.01, ** p<0.05, * p<0.1

Table 4.2 Effect of wind and solar treatment on Green Party vote share at state elections by Local Authority

	Wind turbines			Solar farms	
Treatment	-0.418	*	-0.282	-0.359	-0.188
	(0.240)		(0.242)	(0.234)	(0.239)
Time-varying controls	N		Y	N	Y
Local authorities	1101		1101	1101	1101
Observations	2202		2202	2202	2202

*** p<0.01, ** p<0.05, * p<0.1

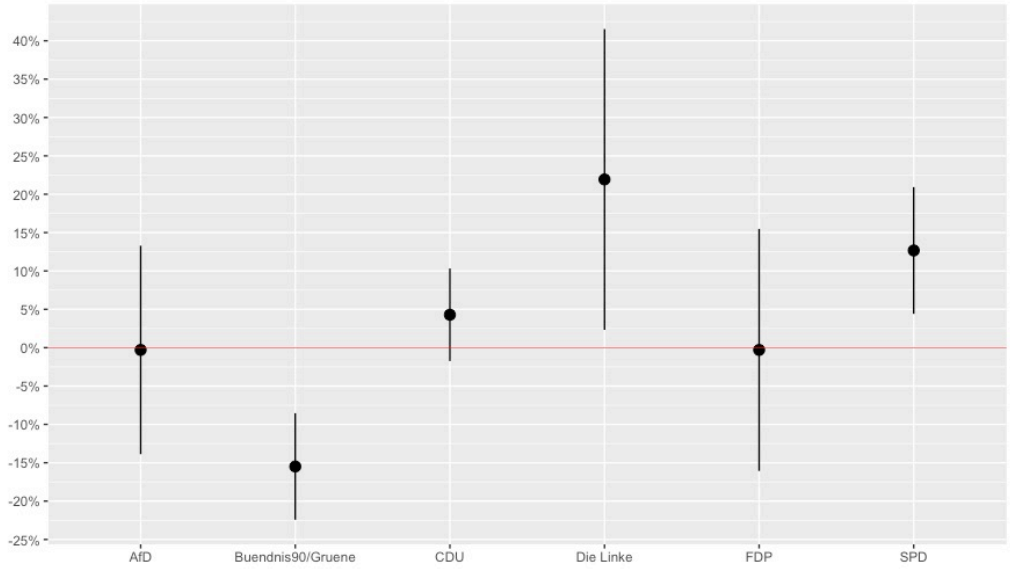
4.7.2 Individual level

We summarise our individual level analysis in Figure 4.9 and Figure 4.10. The effect of being treated, having one's district (Kreis) designated as potentially suitable for windfarms, for 2018 Green Party supporters was to decrease their tendency to vote for the Green Party compared to those non-treated 2018 Green Party supporters. This effect was statistically significant at all conventional thresholds and the point estimate large in magnitude, 14.8 percentage points [95% confidence interval, -0.20, -0.097].

Contrastingly, those 2018 SPD and Die Linke supporters who were treated were more likely to switch to the Green than their non-treated peers. We can only speculate as to why these voters may act in this way. It may be that those individuals already on the centre-left, or left, of politics are persuaded by the 'green' vote when they see the potential for action and change.

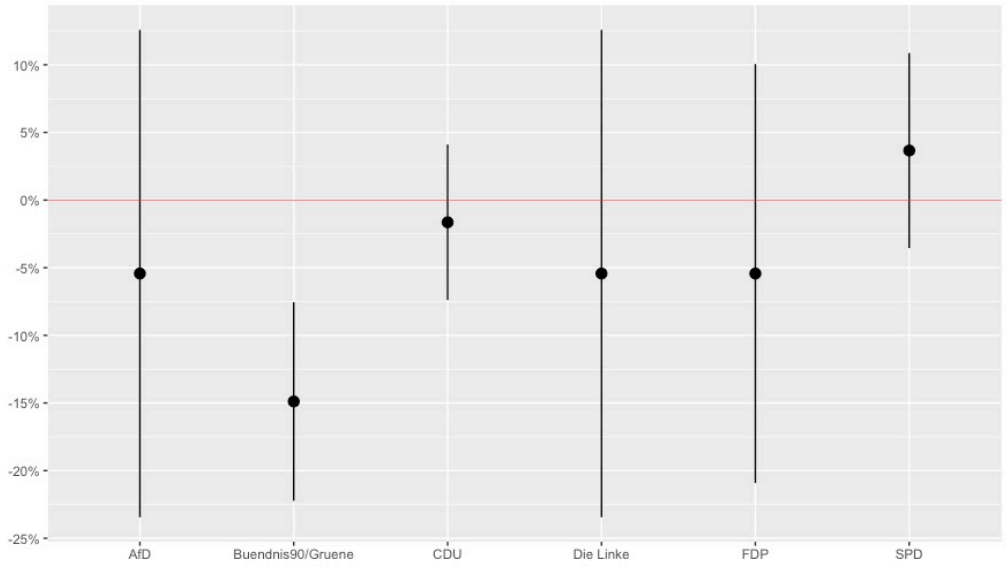
We observe similar results for those areas designated as potential solar sites. 2017 Green supporters are significantly more likely to desert the Green Party when in a treated area. This effect is of a similar magnitude to the 'wind' model, 13.2 percentage points. For the case of solar, we see no effect of treatment on any other 2017 supporter base.

Figure 4.9 Effects of wind 'treatment' on probability of Green Party 2020 support, based on 2018 party preference



Note: Bars are 95% confidence intervals

Figure 4.10 Effects of solar 'treatment' on probability of Green Party 2020 support, based on 2017 party preference



Note: Bars are 95% confidence intervals

4.8 Robustness

One concern may be that we are simply capturing an increasing divergence between rural and urban locations between elections. Empirically, we replicate the aggregate level data and remove the nine local authority districts that are city districts (Stadtkreise). The results are available in the supplementary materials and are substantively similar to our main analysis. Thus, we show that our findings are robust to a potentially confounding time-varying district level effect. Whilst we show that our results hold to this critique, theoretically we agree with this point, and it underpins our broader argument. We believe that a growing cleavage between urban and rural districts is inevitable because the burden of the 'green' transition will be borne to a greater extent by those living in the countryside. Our example of wind turbines and solar farms is meant to provide a concrete example of such a 'cost', often without compensation, but for many individuals in rural locations this could be just one of many potential negative implications. That is not to say that rural locations will not benefit from the 'green' transition, but the benefits are often widely diffused across location and generations.

4.9 Discussion and Conclusion

Our evidence shows that in BW being exposed to 'green' infrastructure through potential wind turbines or solar farms decreases the vote share for the Green Party. This supports hypothesis

1). At the individual level, we complement this finding by showing that those existing Green Party supporters are the ones withdrawing their support, rather than deterring new supporters. That is, we find support for hypothesis 2) and not hypothesis 3). The research design has allowed us to follow individuals who are exposed to a plausibly exogenous shock, the potential for green infrastructure in their backyard.

Whilst we think we make a direct contribution towards the evidence regarding political attitudes and green energy infrastructure (e.g. Stokes, 2016; Germeshausen, Heim and Wagner, 2021; Otteni and Weisskircher, 2021; Umit, 2021), we aim to use this case study to examine a much broader phenomenon. If, and despite some recent breakthrough such as the Paris Accord this remains a large if, nations can coordinate to mitigate collective action and free-rider problems, there remains a national coordination issue. Each country needs to build political coalitions in favour of moves towards 'green' policies and 'green' infrastructure. Inevitably, such decisions have distributional consequences. We have examined two examples of green infrastructure, which have direct consequences in terms of individuals' asset values and living standards. We see this as the tip of the iceberg, the choices and funding required over the coming decades will dwarf the consequences of wind turbines and solar farms.

Moreover, we identify a trap for the Green Party in Germany and Green parties more broadly. Their core reason for being is 'green' policy. However, some of those voters, who are presumably attracted by this message, turn away when such a policy is implemented. It could be argued that our case is unique, we have chosen a 'green' state within a country with an established Green party, which has permissive institutions (Grant and Tilley 2019). Yet, these are choices that mainstream parties across countries will need to make to comply with their international commitments over the coming years. The broader question is whether mainstream parties will bow to the pressure of those affected or push through with the transition to net zero. If they do the latter, how can they maintain a broad coalition? This requires further research on how to compensate the 'losers' from the green transition. For example, some of the latest research suggests that bundling climate change policy with economic and social policy can increase support (Bergquist, Mildenberger, and Stokes 2020; Furceri, Ganslmeier, and Ostry 2021; Kono 2020). In this case there is a broader cost for those voters, for example in cities, who previously were broadly unaffected. When this cost is more broadly shared, do these voters remain in support of 'green' policy?

B Appendix

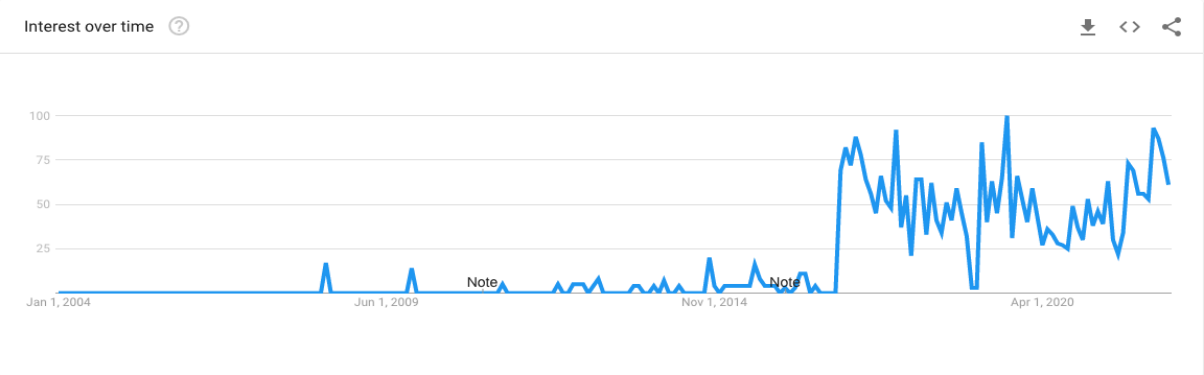
Law and regulatory changes after 2011

The years following the initial report can be called a transition period with law and regulatory changes to prepare a more certain regulatory environment for the expansion of renewable energy at the federal and state level. A first important change in BW state law happened in 2012 with the so called Windenergieerlass (2012) which ended the black & white designation of potential areas for new wind turbines as part of the 2003 state planning act. Whereas certain areas were excluded from building new wind turbines in the old act, they could now be potential areas if there are 'no concerns of public interest'. Such concerns include for example biodiversity or Immissionsschutz (quality of life). Further clarifications of what counts as legitimate concerns followed (e.g. a 2013 clarification which aimed at conditionally allowing new wind turbines in Landschaftsschutzgebieten (naturally protected areas)).

The 2011 Windatlas and 2012 Windenergieerlass were the cornerstone for the state planning regions to start adjusting the designation of areas and gave communes a better idea of if the planning of different renewable energy infrastructure would become a future option for them. The process, especially for the planning regions turned out to be quite lengthy, not least because of further law changes that followed at the federal and state level (e.g. the Rhein-Neckar Metropolregion plan was only finalised in 2019).

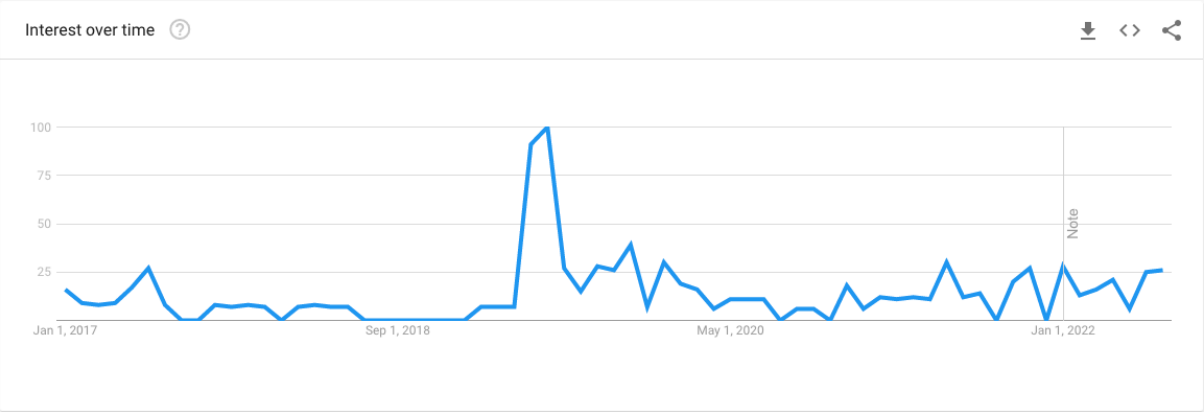
Federal law changes to the EEG (Erneuerbare Energien Gesetz) became effective in 2014 and 2017. While 2014 aimed at integrating renewable energy into the marketplace by changing the profitability calculations for new wind turbines (directly sold in the market + premium on price from state). The 2017 reform can be called a paradigm shift by introducing a tender procedure for energy prices from most renewable energy by limiting the supply, i.e. amount of new renewable energy that is fed into the grid per year (and not vice versa as previously). [this applies to on and offshore wind turbines of a certain size, freestanding solar farms, biomass power plants]. The 2017 change is crucial for the expansion of different types of renewables, as the market was disincentivised from focusing too much on one technology and diversify the installation of a diversity of renewables. More clarifying state legislation and policy notes were passed in 2015 (in regard to animal protection and wind turbine planning) and 2017 (noise protection and wind turbines).

Appendix Figure B.1 Google Trends ‘Renewable Energy Transition’



Trends for the topic ‘Renewable Energy Transition’ in Baden-Württemberg since 2004. Source Google Trends

Appendix Figure B.2 Google Trends ‘Windatlas’



Trends for the term ‘Windatlas’ in Baden-Württemberg since 2017. Source: Google Trends, https://trends.google.com/trends/explore?date=2017-01-01%202022-02-05&geo=DE-BW&q=Windatlas

Appendix Table B.1 Local and Regional Newspaper coverage of the Windatlas 2019

Publication	**Date**	**Article Title**
Südkurier	19.12.2019	Gegner sehen neue Planungen kritisch
Heilbronner Stimme	14.12.2019	Windpotenzial in der Region
Heidenheimer Zeitung	11.12.2019	Keine weiteren Flächen für Windkraft
Stuttgarter Zeitung	29.11.2019	Windkraftpläne verschwieben sich weit nach hinten
Schwarzwälder Bote	21.11.2019	"Schömberg wird sich wehren!"
Schwäbische Zeitung	21.10.2019	Neuer Windatlas: Geltende Pläne haben Bestand
Stuttgarter Zeitung	26.10.2019	14 Windräder für Leonberg
Südkurier	15.10.2019	Hunderte neue Windräder im Landkreis
Schwäbische Zeitung	20.09.2019	Mehr Windparks und Riesensolaranlagen
Stuttgarter Zeitung	30.07.2019	Uhingen wehrt sich gegen Rotoren
Haller Tagblatt	13.07.2019	Windkraft-Befürworter ziehen vor Gericht
Neue Württembergische Zeitung	29.06.2019	Pro Schurwald fordert Stopp für ES-02
Stuttgarter Nachrichten	18.06.2019	Mehr Abstand für Windräder zu Wohngebieten?
Stuttgarter Nachrichten	14.06.2019	Neuer Windatlas wirbelt Standorte durcheinander
Stuttgarter Zeitung	14.06.2019	Aufgewirbelte Windkraftpläne
Schwäbische Zeitung	14.06.2019	Bürger könnten sich finanziell an Windpark beteiligen
Südwest Presse	11.06.2019	Neue Windräder? Fehlanzeige
Stuttgarter Zeitung	08.06.2019	Heckengäu windiger als gedacht
Hohenloher Tagblatt	08.06.2019	"Der grüne Zeitgeist bestimmt, was richtig ist"
Schwarzwälder Bote	06.06.2019	Dicke Luft wegen Windkraft
Die Welt Online	05.06.2019	AfD stellt Windkraftausbau infrage, Regierung widerspricht
Badische Zeitung	04.06.2019	Alte Pläne gelten weiter - Folgen des neuen Windatlasses
Stuttgarter Nachrichten	31.05.2019	Wo es am heftigsten weht
Stuttgarter Zeitung	31.05.2019	Wo der Südwesten stürmisch ist
Badische Zeitung	31.05.2019	Mehr Standorte für neue Rotoren - Energieminister Untersteller stellt überarbeiteten Windatlas vor
Schwäbische Zeitung	31.05.2019	Streit um Windkraft hält an
Runschau	31.05.2019	Windkraft-Fläche verdoppelt
Südwest Presse	31.05.2019	Windkraft-Fläche verdoppelt
Neue Württembergische Zeitung	31.05.2019	Windkraft-Fläche verdoppelt
Haller Tagblatt	31.05.2019	Windkraft-Fläche verdoppelt
Hohenloher Tagblatt	31.05.2019	Windkraft-Fläche verdoppelt
Metzinger Uracher Volksblatt	31.05.2019	Windkraft-Fläche verdoppelt
Alb Bote	31.05.2019	Windkraft-Fläche verdoppelt
Hohenzollerische Zeitung	31.05.2019	Windkraft-Fläche verdoppelt
Reutlinger Nachrichten	31.05.2019	Windkraft-Fläche verdoppelt

Schwäbische Zeitung	31.05.2019	Mehr Flächen für Windkraft geeignet
Haller Tagblatt	26.04.2019	Warten auf Windatlas

Source: Database GENIOS, https://www.genios.de

Additional Empirical Results, Sensitivity Tests and Robustness

Appendix Table B.2 Effect of 'Double Treatment', by both wind and solar, on Green Party vote share in Federal elections

	No Controls		With Controls	
Wind and Solar Treatment	-1.076	***	-0.955	***
	(0.176)		(0.184)	
Time-dummy	Y		Y	
Time-varying controls	N		Y	
Local authorities	760		760	
Observations	1520		1520	

Note: We exclude local authorities where there was just a 'single' treatment, i.e. just wind or just solar.

	No Controls		With Controls	
Wind and Solar Treatment	-0.764	***	-0.625	***
	(0.167)		(0.172)	
Time-dummy	Y		Y	
Time-varying controls	N		Y	
Local authorities	1101		1101	
Observations	2202		2202	

Note: Here we include non-treated as those local authorities with no treatment or just a single solar or wind treatment

Appendix Table B.3 Effects of treatment (wind or solar) on party support, including individual level time varying control

	Mean Wind		Mean Solar	
Treatment # AfD	0.007		-0.049	
	(0.069)		(0.091)	
Treatment # Bündins 90 / Die Grünen	-0.153	***	-0.149	***
	(0.035)		(0.037)	
Treatment # CDU	0.046		-0.017	
	(0.031)		(0.029)	

Treatment # Die Linke	0.237	**	-0.059
	(0.099)		(0.091)
Treatment # FDP	0.000		-0.029
	(0.079)		(0.079)
Treatment # SPD	0.132	***	0.035
	(0.042)		(0.036)
Time-varying control	Y		Y
Individuals	961		854
Observations	1,922		1,708

Note: our time varying control is 'Erwerbsstatus' (labour market and occupational status)

Appendix Table B.4 Effect of green treatment on Green Party support in rural districts only

State

Wind

	Median wind turbines		Mean wind turbines		Upper quartile wind turbines	
Wind Treatment	-0.367 *	-0.275	-0.412 *	-0.282	-0.234 **	-0.101
	(0.219)	(0.221)	(0.240)	(0.242)	(0.285)	(0.287)
Time-varying controls	N	Y	N	Y	N	Y
Local authorities	1092	1092	1092	1092	1092	1092
Observations	2184	2184	2184	2184	2184	2184

Solar

	Median solar		Mean solar		Upper quartile solar	
Solar Treatment	-0.089	0.065	-0.352	-0.186	-0.735 **	-0.556 *
	(0.211)	(0.215)	(0.235)	(0.239)	(0.264)	(0.269)
Time-varying controls	N	Y	N	Y	N	Y
Local authorities	1092	1092	1092	1092	1092	1092
Observations	2184	2184	2184	2184	2184	2184

Federal

Wind

	Median wind turbines		Mean wind turbines		Upper quartile wind	
Wind Treatment	-0.311***	-0.291**	-0.380***	-0.328**	-0.348**	-0.285**
	(0.125)	(0.125)	(0.135)	(0.133)	(0.146)	(0.145)
Time-varying controls	N	Y	N	Y	N	Y
Local authorities	1092	1092	1092	1092	1092	1092
Observations	2184	2184	2184	2184	2184	2184

Solar

	Median solar		Mean solar		Upper quartile solar	
Solar Treatment	-0.889***	-0.831**	-1.022***	-0.938**	-1.232**	-1.144**
	(0.125)	(0.127)	(0.132)	(0.134)	(0.137)	(0.139)
Time-varying controls	N	Y	N	Y	N	Y
Local authorities	1092	1092	1092	1092	1092	1092
Observations	2184	2184	2184	2184	2184	2184

Appendix Table B.5 Effect of green treatment on Green Party support, number of potential turbines rather than area as the measure

State

	No controls	With controls
Wind Treatment	-0.222	-0.073
	(0.234)	(0.241)
Time-varying controls	N	Y
Local authorities	1101	1101
Observations	2202	2202

Federal

	No controls		With controls	
Wind Treatment	-0.317	**	-0.349	**
	(0.145)		(0.137)	
Time-varying controls	N		Y	
Local authorities	1101		1101	
Observations	2202		2202	

Appendix Table B.6 Effect of green treatment on Green Party support, median and upper quartile specification

State

	Median wind			UQ wind		
Wind Treatment	-0.374	*	-0.271	-0.240		-0.101
	(0.219)		(0.220)	(0.284)		(0.287)
Time-varying controls	N		Y	N		Y
Local authorities	1101		1101	1101		1101
Observations	2202		2202	2202		2202

	Median solar			UQ solar		
Solar Treatment	-0.099		0.064	-0.741	***	-0.558	**
	(0.210)		(0.215)	(0.263)		(0.269)	
Time-varying controls	N		Y	N		Y	
Local authorities	1101		1101	1101		1101	
Observations	2202		2202	2202		2202	

Federal

	Median wind				UQ wind			
Wind Treatment	-0.377	***	-0.335	***	-0.401	***	-0.322	**
	(0.127)		(0.126)		(0.147)		(0.147)	
Time-varying controls	N		Y		N		Y	
Local authorities	1101		1101		1101		1101	
Observations	2202		2202		2202		2202	

	Median solar		UQ solar	

Solar Treatment	-0.964	***	-0.883	***	-1.287	***	-1.186	***
	(0.127)		(0.130)		(0 .138)		(0.141)	
Time-varying controls	N		Y		N		Y	
Local authorities	1101		1101		1101		1101	
Observations	2202		2202		2202		2202	

Appendix Table B.7 Effect of wind treatment on Green Party support, including number of newly built turbines control

	Wind	
Treatment	-0.35	***
	(0.135)	
Population	0.001	***
	(0.0004)	
Population Density	1.354	
	(1.118)	
Active wind turbines	-0.082	
	(0.059)	
Time Dummy	Y	
Local authorities	1101	
Groups	2202	

Note: here we only consider new turbines built and working between 2018-2020 and federal elections.

Appendix Table B.8 Effect of treatment on Green Party support, including incumbent interaction

	Wind	Solar
Treatment	-0.429	-0.252
	(0.291)	(0.295)
Treatment # No Green incumbent	-0.049	0.28
	(0.413)	(0.394)
Time Dummy	Y	Y
Local authorities	1100	1100
Observations	2200	2200

Note: we test for state elections and Green Party directly elected incumbents only, local authority ‘Mannheim’ is excluded because it contains two state electoral districts with two different party incumbents.

5 Faith no more? The divergence of political trust between urban and rural Europe[44]

Co-authors: Neil Lee[45], Elizabeth Ralph-Morrow[46]

Abstract

Events such as Brexit and the Gilet Jaunes protests have highlighted the spatial nature of populism. In particular, there has been increasing political divergence between urban and rural areas, with rural areas apparently having lost faith in national governments. We investigate this divergence using data on over 125,000 EU citizens from the European Social Survey from 2008-2018. We show that people in rural areas have lower political trust than urban or peri-urban residents, with this difference clear for six different forms of political institutions, including politicians, political parties, and national parliaments. There has been divergence of political trust between urban and rural Europe since 2008, although this is primarily driven by Southern Europe. While these results can partly be explained by demographic differences between cities and the countryside, divergent economic experiences, differences in values, and perceptions that public services are less effective outside of urban areas, there is a residual 'rural effect' beyond this. We argue that the polarization of urban-rural political trust has important implications for the functioning of European democracies.

5.1 Introduction

There is growing concern about political polarisation in Europe between urban and rural areas (Jennings & Stoker, 2019; Stein et al., 2019). In the UK, the Brexit vote was geographically uneven, with residents of cities, on average, more likely to vote to remain than those living in the country or small towns (Lee et al., 2018; Abreu & Öner, 2020). Hungarian populist Viktor Orban has been strongest in the countryside (Rachman, 2018). And in France, the Gilet Jaune protesters have travelled from peripheral rural areas to Paris to protest against Macron's policies (Boyer et al., 2019). Economic geographers have suggested that this might, in part,

[44] A version of this paper is published in *Political Geography*, https://doi.org/10.1016/j.polgeo.2021.102426; The authors gratefully acknowledge financial support from the following sources: the NORFACE Joint Research Programme on Dynamics of Inequality Across the Lifecourse, which is co-funded by the European Commission through Horizon 2020 under grant agreement no. 724363, and the International Inequalities Institute at the LSE.
[45] Department of Geography & Environment, International Inequalities Institute, Centre for the Analysis of Social Exclusion, and Centre for Economic Performance, London School of Economics and Political Science, n.d.lee@lse.ac.uk
[46] Department of Political Science, University College London, liz.ralph-morrow@ucl.ac.uk

reflect patterns of uneven development and an urban-focused growth model where core areas and cities have done better than towns and the periphery (Rodríguez-Pose, 2018; Gordon, 2018). One explanation for this crisis of trust is economic failure, with lower incomes in the periphery shaping the perceptions of rural-dwellers who no longer feel the system 'works for them'. An alternative explanation is that the divide is cultural, with rural residents made anxious by urban government which they perceive as having different values to them.

The uneven geography of political trust represents a potentially important problem for European countries. Political trust is seen as underpinning the democratic process by ensuring citizens feel the government is likely to act fairly (Boyer, 1992; Levi & Stoker, 2000; Citrin & Stoker, 2018). Low levels of political trust are associated with a greater willingness to accept anti-social behaviour such as tax fraud (Marien & Hooghe, 2011) and may also drive populism, which entails the mistrust of experts (Oliver & Rahn, 2016; Citrin & Stoker, 2018). The apparent divergence of political trust between urban and rural areas may therefore have important consequences for democracy.

Despite the importance of political trust, few studies have – to the best of our knowledge – considered differences in trust in urban and rural Europe. This is an important omission. There has been widespread concern about the geography of the 'left behind' (Rodríguez-Pose, 2018), but relatively less consideration of the geography of distrust with government. In this paper, we address this gap. We use five waves of the European Social Survey for 18 European countries, giving us a sample of over 120,000 individuals. First, we show that the declining trust in politicians across Europe has been driven by residents in rural areas and towns. Even when we control for individual demographics (such as age, gender, and qualifications), economic outcomes (employment and income), and values (opinions about immigrants, lifestyle and so on), the residents of rural areas are more likely to have lower trust in government. Second, we show that there has been divergence over time. Since 2010, when there was little or no difference between urban and rural areas, we document a divergence in levels of trust – driven by trends in Southern Europe. Before the financial crisis, there was no difference in political trust between urban and rural Europe. Since then, levels of political trust have diverged significantly. We show that much of this divergence is explained by differences in perceptions of local economies, education, and healthcare – with education and healthcare most important. Rural areas are losing faith in national government because they perceive their

socio-economic infrastructure to be worse than core areas. However, a residual effect remains which suggests an underlying process of urban-rural polarisation.

Our research contributes to the growing literature on urban-rural political divides, which has been dominated by studies of the United States, where the election of Donald Trump was seen as the moment the "white rural voter roared" (Scala & Johnson, 2017, p. 162). Ethnographic work has begun to document a breakdown of the relationship between rural dwellers and urban institutions of government. In a classic study of rural America, Cramer (2016) highlights this phenomenon. Her interviewees suggest the elites looked down on the residents of rural areas, and unfairly focused funding on cities at the expense of towns and the countryside. The polarisation between urban and rural America has since become a well-documented, if complicated, fact (Hochschild, 2016; Scala & Johnson, 2017). In this respect, our paper contributes to the growing literature on trust in Europe, complementing national level studies such as Stein et al.'s (2019) work on Norway.

The paper is structured as follows. In section two we discuss the literature on urban-rural political polarisation and consider potential reasons for it. We develop four hypotheses which we test. In section three we present our data, and descriptive statistics to support our hypotheses. Section four presents a regression model which discusses our variables in more detail. Section five concludes with implications.

5.2 Geography and trust in government

Political trust can be defined simply as "*confidence in institutions such as the executive, the legislature, the judiciary, the bureaucracy, and the police.*" (Uslaner, 2018, p. 5). It has long been seen as important in political science. Early research on political trust highlighted the relationship between trust in government and the functioning of democracy, predominantly in Europe and North America (Crozier, et al., 1975; Listhaug & Jakobsen, 2018). Trust matters as it ensures voters feel that government acts in the individual or public's interest (Boyer, 1992; Levi & Stoker, 2000). For Hetherington and Rudolph (2018) political trust helps bridge the ideological gap that inevitably exists between policy ideas of the governing party and those of the opposition party. They argue that political trust has become polarized along partisan lines. This is due to partisanship placing greater weight on the criteria that favour a partisan's preferred political party. Hooghe (2018) argues that taking part in elections can boost levels of political trust, however this effect might be limited to supporters of the winning party.

Ideological allegiances increase or reduce trust if the 'right' party is currently governing (Listhaug, 1995). Research by Anderson et al. (2005) emphasizes that citizens who vote for parties who win elections are more likely to support the political system than those who vote for parties that are on the losing side in elections. Esaiasson (2011) does not deem 'losing' in an election an important factor and emphasizes that if trust in government declines, it is likely seen as a reaction toward violations of the democratic process.

Few studies have focused on the geography of political trust.[47] In a recent study of Norway, Stein et al. (2019) develop a framework based on that of the political scientist Stein Rokkan. They suggest that political trust may follow a core-periphery pattern, with trust in national politicians lower amongst those who are further away, possibly because distance from "decisions made in the political centre potentially fosters a sense of powerlessness and exclusion from the political system" (Stein et al., 2019, p. 4). Supporting evidence for his proposition is found in qualitative studies of urban and rural differences in the US. Hochschild's (2016) work on the narratives which develop amongst rural American voters shows a distrust of government which is often seen as providing good jobs for a few, over-regulating local economies, and helping disadvantaged groups, often from cities, rather than the average rural voter. Similarly, Cramer's (2016) work on the United States strongly highlights the loss of faith of urban areas and the cultural divide between residents of small-town America and those in cities.

Studies on the UK's 2016 referendum on EU membership have also suggested that trust and spatial division were relevant to the outcome. Hobolt (2016) observes that lower levels of trust in government are associated with higher probabilities of a leave vote, and Jennings and Stoker (2017) found cosmopolitan and metropolitan dwellers were both more supportive of the EU and immigration, and more inclined to vote Remain, than individuals in regional or coastal areas and post-industrial areas. However, the empirical results on whether greater population density was associated with the Brexit vote are equivocal. Using Local Authority level data, Obschonka et al. (2018) find that denser areas were less likely to vote for Brexit, but only before controlling for socio-demographic factors and individual psychology (they also find similar results for Trump votes). Matti and Zhou (2017) come to similar conclusions,

[47] In The Handbook of Political Trust (Zmerli & Van Der Meer, 2017), for example, no chapters consider geographical variation.

suggesting that people were more likely to vote for Brexit if they lived in lower-population density areas.

5.3 Theory and hypotheses

What determines political trust? Much of the literature emphasises economic performance, with Hetherington and Rudolph (2008) observing that levels of trust covary with economic outcomes. Many scholars have found significant effects of macroeconomic performance on political trust (e.g. Lipset & Schneider, 1983; Van Erkel & Van der Meer, 2016; Kroknes et al., 2015; Miller & Listhaug, 1999). Although some scholars have found no significant relationship (e.g. Dalton, 2004; Van der Meer, 2010; Van der Meer & Hakhverdian 2017), within-country, longitudinal analyses show consistent strong effects of macroeconomic performance on political trust while controlling for corruption. Van Erkel and Van der Meer (2016) analyse 21 waves of the Eurobarometer between 1999 and 2011 and find that changes such as growth, deficits, unemployment and inflation influence political trust.

Assuming, then, that economic performance is an important determinant of trust, how do individuals assess economic performance? Here, there are two competing accounts. First, some studies have found that wealthier individuals are more trusting. Evidence from the World Values Survey 2005-2007 indicates that higher levels of trust are expressed by society's winners who, in addition to being wealthy and of high socioeconomic status, are healthy, well-educated and satisfied with their life (Newton et al. 2018, p. 47). Alesina and La Ferrara similarly found that income and education are positively correlated with trust (2000, p. 8). By contrast, Brehm and Rahn (1997) found that although individuals who perceived significant positive changes in family finances were more confident about federal institutions, as individuals became wealthier, they lost confidence in the government.

Within the EU, poverty is higher in rural areas than in cities (DG Agriculture and Rural Development 2018). GDP per capita is also lower in rural areas than the EU average whereas it is higher than average in urban areas (DG Agriculture and Rural Development 2018).

> **H1** Low-income individuals will be less trusting of government than high income individuals, and more low-income individuals live in rural areas rather than urban areas as a percentage of the overall population.

However, a second account of assessing economic performance argues that an individual's economic position is less important than the economic circumstances of his or her community. Rather than look at an individual's economic position, we should instead consider the broader economic circumstances of the community that he or she inhabits. Under this view, individuals are not only motivated by their own economic wellbeing, but are also motivated by the economic situation facing their society. This *geotropic account* suggests that voter preferences are grounded in what Ganga and McNamara (2018, p. 5) refer to as a 'geographically scaled economic reality' which might override both individual and national perceptions. Here, the emphasis is on the larger social interactions that both mould our identities and provide meaning to the ways in which we make sense of our economic interests; Ganga and McNamara (2018) contend that geography has both social *and* material effects, with citizens formulating their views as part of a wider community that is grounded in a specific geographic location.

Reeves and Gimpel (2012, p. 509) likewise observe that the contextual environment in which voters are living and working allow them to 'make observations and form impressions as they conduct their daily lives, and these shade their attitudes toward the state of the national economy'. The authors' (2012) study of how voters assess the nation's economic performance found that the local economy shaped evaluations of the national economy. As Reeves and Gimpel (2012) note, individuals do not directly experience national economic conditions such as the GDP or national unemployment rate. However, individuals do experience localised economic conditions through conversations with friends and family, and by observing factory closings and home foreclosures.

Although the overall unemployment rate within the EU is higher in cities than rural areas, those trends are reversed for youth unemployment (DG Agriculture and Rural Development 2018). Additionally, as Jennings and Stoker (2017) observe, it is the citizens in cosmopolitan and metropolitan areas who are the beneficiaries of global growth and the knowledge economy; rural dwellers that are largely excluded from those opportunities may also believe that there is high unemployment.

> **H2** Individuals who live in rural areas are more likely to believe that unemployment is high and express dissatisfaction with the economy than individuals who live in urban areas.

Of course, the economy is not the only factor that individuals use to assess the performance of government, and their trust of it. A growing body of literature suggests that quality of government impacts trust. For example, Agerberg (2017, p. 582), highlights 'the importance of personal experience with the quality of state institutions in shaping political trust and political attitudes'. Agerberg (2017) contends that voter perceptions of low quality of government and local service delivery increase votes for populist parties. Low quality of government is linked to low levels of trust, and the anti-elite messages of populist parties are therefore more likely to appeal to voters who have experienced low quality of government. Morgeson and Petrescu (2011) reached similar conclusions in their study of trust of US federal government agencies, and found that citizens who were highly satisfied with a federal agency had greater trust in the federal government.

However, some scholars (Van de Walle & Bouckaert, 2003, p. 3) contend that the hypothesis 'that people do not trust government because administrations do not work properly' is flawed. The authors (2003) suggest that citizens' pre-existing trust (or distrust) of government may impact their perception of government performance; here, it is contemplated that citizens evaluate government performance negatively because their perception of government is negative. However, while these problems of causality exist, it is also important to note that the public administration literature also suggests that citizens *can* form accurate perceptions of government services that are directly and frequently experienced (Van Ryzin et al., 2007). Research also suggests that the quality of certain services, including education and healthcare, are particularly salient to citizen satisfaction with, and trust of, government (Christensen & Lægreid, 2005; Van Ryzin et al., 2004).

Urban and rural inequalities exist when it comes to the provision of services. Within the EU in 2015, Eurostat (2018) report that 4.2 per cent of the population living in rural areas reported unmet healthcare needs in the previous 12 months. The share in cities was 3.5 per cent of the population. Rural dwellers are also more likely than residents in cities to leave education and training early. For the EU's rural inhabitants, the early leavers' rate in 2015 for those aged 14 to 24 years peaked at 12.2% as opposed to only 9.8% of city dwellers.

> **H3** Individuals who live in rural areas are more likely to be dissatisfied with education and healthcare than individuals who live in urban areas.

Writing in the 1960s, Lipset and Rokkan (1967, p. 14) identified a 'conflict between *the central nation-building culture* and the increasing resistance of the ethnically, linguistically and religiously distinct *subject populations* in the provinces and the peripheries' [emphasis in original]. This conflict or clash of cultures may be underpinned by differing *values*, defined by Rokeach (1973, p. 5) as 'an enduring belief that a specific mode of conduct or end-state existence is personally or socially preferable to an opposite or converse mode of conduct or end-of-state existence'. Values express motivational goals such as safety, tolerance and religious commitment (Schwartz, 2007), and their convergence, or divergence, are relevant to *trust*: Tonkiss and Passey (1999, p. 272) found that 'trust is linked to shared values', and Beugelsdijk and Klasing's (2016, p. 523) observe that 'societies in which people hold diverse views regarding government intervention in markets and the need to redistribute income, have lower levels of trust'.

Jennings and Stoker (2019) note that urban values tend to be socially liberal and supportive of same sex marriage and immigration. By contrast, rural values often endorse traditional moral norms and oppose social welfare (Ashwood, 2018). Kalmijn and Kraaykamp (2007) used data from the European Values Survey to reveal that, relative to other occupations, farmers hold particularly conservative views relating to moral issues such as marriage, abortion and euthanasia. The authors also found that farmers are particularly opposed to economic redistribution, and hold stronger religious beliefs than non-farmers. An emerging body of qualitative research from the USA suggests that a perceived clash of values between rural dwellers, and urban lawmakers, has caused a breakdown in trust: Hochschild (2016) implies that the rural Louisiana participants of her study found it difficult to trust the far-off DC lawmakers, in part because of perceived dismissal of their conservative values, and Cramer (2016, p. 65) found that the rural Wisconsinites of her study held the view decision-making urbanites were unable to understand rural life and the economic concerns of its inhabitants. It is possible that urbanites are likely to possess values more aligned with those of lawmakers (who themselves tend to be city-dwellers). As alignment generates trust, those urbanites are therefore more likely to trust government bodies and decision-making processes than their rural counterparts, who hold more divergent values.

> **H4** Individuals with conservative values will be less trusting of government than voters with liberal values, and more individuals with conservative values

will live in rural areas than urban areas as a percentage of the overall population.

5.4 Data: The European Social Survey

To test our hypotheses we draw on data from the European Social Survey. This is a cross-sectional, representative survey for a large number of European countries. We use the cumulative data file for ESS waves 4-9, which for convenience we will refer to by year (although the ESS fieldwork often takes place over the subsequent year as well). This is a period which should include the financial crisis, subsequent Eurozone crises, and the period of austerity afterwards. We only include countries for which we have data in all periods, to prevent sample variation affecting our results. The 18 countries we include are Belgium, the Czech Republic, Estonia, Finland, France, Germany, Hungary, Ireland, Lithuania, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and the United Kingdom. Together these account for a total population of 433 million in 2016. We exclude those who are aged under 16, as their political views are unlikely to be fully formed, and remove a small number of individuals who have missing observations. The result is a final sample size of just over 125,000 individuals in 18 countries.[48]

Defining rural areas

There is no binary distinction between urban and rural areas. Instead, it is perhaps better to think of a spectrum ranging between the densest urban areas to the most isolated rural areas (Scala & Johnson, 2017), although even this ignores the great diversity of types of rural and urban areas (Geoetz et al., 2018). Our choice of indicator for this paper is limited by the data. The European Social Survey asks respondents to classify their own residence as one of five groups: a big city (18% of the sample), Suburbs or outskirts of big city (13%), Town or small city (32%), Country village (30%) and Farm or home in countryside (8%). This is self-reported rather than from an objective indicator, but we would argue this is an advantage in this case: self-reporting means that we are seeing perceptions. In our empirical work, we use this category as a five way-distinction. However, to ensure our results are clear we also run regressions using an urban / rural distinction, where rural is those living in country villages or farm or home in the countryside. While this is analytically simple, it means we cannot account for different

[48] We exclude missing observations and those who answer 'don't know' but this makes little substantive difference to the results.

types of rural or urban areas (for example, Scala et al. (2015) show there that different types of rural areas in the US tend to have different voter profiles).

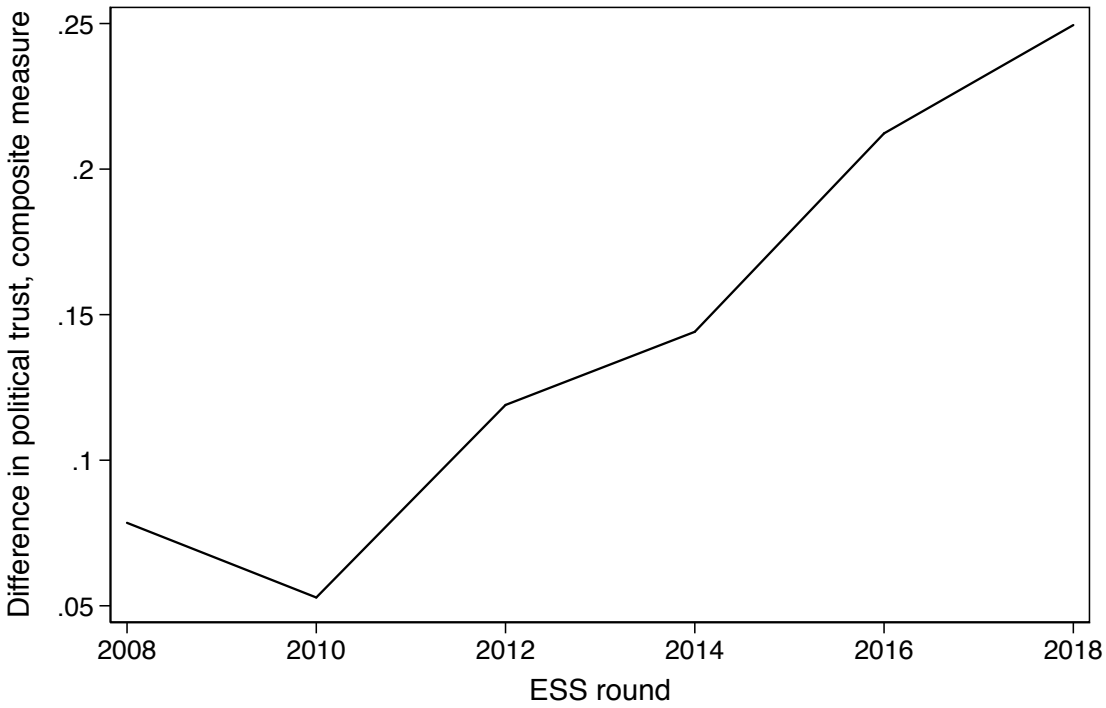
Trust in government

The European Social Survey has a large number of variables for trust in government. These are: (1) Trust in the country's parliament, (2) Trust in the legal system, (3) Trust in the police, (4) Trust in politicians, (5) Trust in political parties, (6) Trust in the European Parliament and (7) Trust in the United Nations. Each is measured on a Likert scale from 0 (little trust) to 10 (high trust). We experiment with principal component analysis and measures of neutral and political institutions, but because trust in government tends to be highly correlated, doing so makes little difference to our results so we opt for the simplest strategy possible. Our measure of political trust is simply the composite measure political trust calculated using the average score across all 7 indicators.

Trust in government over time

We focus on the divergence of trust in government between urban and rural areas. Figure 5.1 presents the simple difference between average levels of trust in urban and rural areas, by ESS year and according to three different measures of trust: the average of all indicators, neutral institutions, and political institutions. In 2008, roughly the period before the crisis, residents in rural areas had lower average trust rates than urban residents. In the subsequent wave, rural areas had seen their relative trust levels converge with those of urban dwellers. But the period since 2010 has seen a divergence of trust between urban and rural Europe. Whereas in 2010 average trust differed little, by 2018 there was a relatively large divergence.

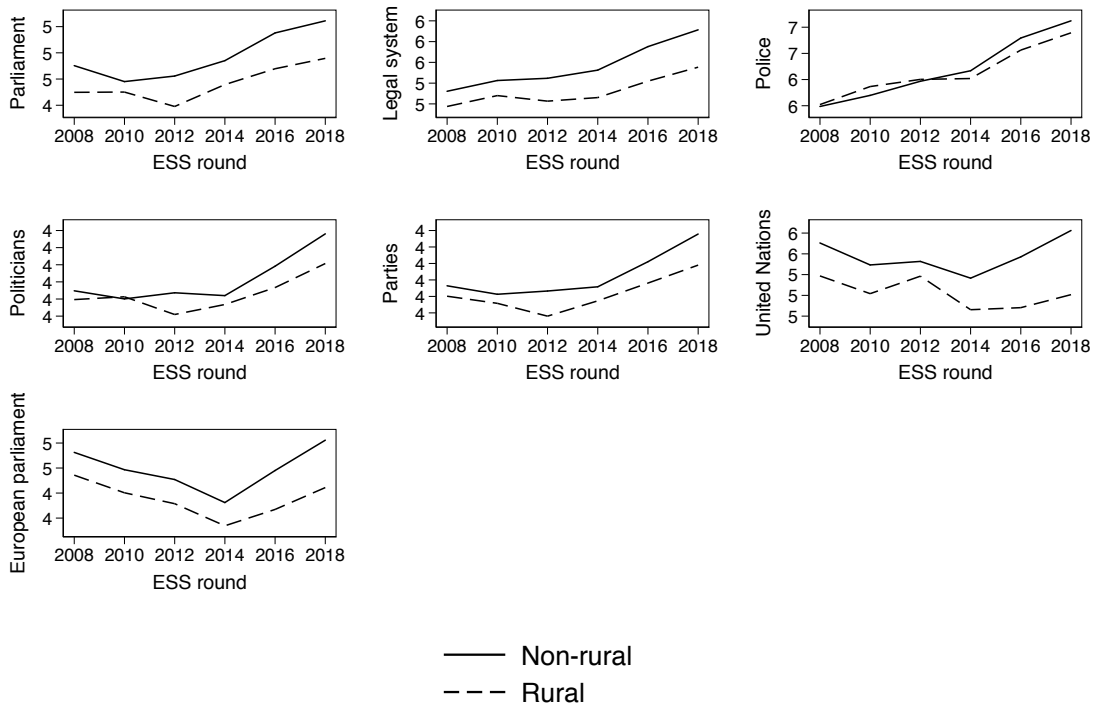
Figure 5.1 Difference in political trust between urban and rural Europe, 2008 – 2018



Note: Difference in political trust = trust in urban areas minus trust in rural areas.

We break this down in figure 5.2, which gives changes over time in the seven indicators and seven indicators of trust in government and that for general social trust. We show a similar pattern of diverging trust for country's parliaments and legal system, with a narrow gap in 2008 which has expanded since. Trust in police has followed a different pattern, starting with a wider gap as rural residents trust the police more but with a generally similar trend for both urban and rural areas. Trust in politicians has diverged, but only by a small amount. Trust in political parties has diverged, driven by a slower increase in the countryside. Trust in the UN changes little relatively. Trust in the European parliament was lowest in 2014, increasing since but with some divergence. In the remainder of this paper we set out to investigate these trends.

Figure 5.2 Change in individual trust variables in rural vs. non-rural, 2008-2018



5.5 Empirical strategy

The model

Trust in government will be influenced by the characteristics of the person, and so the geographical variation outlined above may simply be the result of a sorting of people with different characteristics or beliefs into rural areas (e.g. Rohla et al., 2018). To disentangle the effect of these individual characteristics from the effect of locating in a rural-area, we use a series of ordinal logit regression models which allow us to control for basic factors beyond locality which might influence trust. These take the basic form:

$$Trust_i = \alpha + \beta_1 Rural_i + \beta_2 Demographics_i + \beta_3 Economics_i + \beta_4 Values + \beta_5 Satisfaction + \varphi + \delta + \varepsilon$$

For individual 'i'. Where the variable 'Trust' is an indicator of trust in government and 'rural' is our main variable of interest, either a single binary variable for rurality or a series of binary variables which reflect the self-reported degree of urbanity of the respondent's residence. 'Demographics' are basic characteristics such as age, gender, qualifications and ethnicity; 'income' is the individual's position in the country's income distribution; and 'values' is a set of indicators of individual values around gay rights, lifestyle and so on. 'φ' is a set of country dummies which should control for country-specific factors; 'δ' is a set of year dummies designed to control for cyclical trends. Based on the existing literature, we envisage a horse-

race between individual characteristics, in particular the older populations of rural areas, their economic circumstances, and values.

Control variables

We identify four main groups of control variables, each of which is intended to remove one set of explanations for the divergence in political trust (summary statistics for these variables are given in appendix table A1). The first set are *individual demographics*. Trust in government is likely to vary by age, with generational effects meaning some generations trust government more than others (Citrin & Stoker, 2018). We include a variable for the respondent's age to account for this. Gender is also likely to matter, and we control for this with a simple binary variable. Two of the issues facing European policymakers have been migration and growing ethnic diversity, and these will impact on an individual level. We include one variable for whether an individual was born abroad, and one for whether they are an ethnic minority in the country in which they live. One of the largest political cleavages across Europe has been between those of different levels of education. We include six educational categories, each roughly equivalent to an ISCED category: these range from not having completed primary education to having a Master's or PhD degree. We expect better educated workers to have a greater faith in government.

Our second set of variables are for individual *economic* factors. Our first hypothesis (H1) suggests that richer respondents are more likely to feel the system is 'delivering for them' and so have more faith in government. The less affluent will, in contrast, be more sceptical about the merits of government. It might also be, however, that richer respondents are resentful of taxes and have less contact with the state. We secondly include a series of variables related to income. We are limited by the variables collected consistently in the ESS and incorporate dummy variables for each decile of the national income distribution each individual is in. We include participation in the labour market – a variable for unemployment and one for whether an individual is retired.

Third, to test H4, we include a series of variables for *values.* Qualitative research (Hochschild, 2016; Cramer, 2016) suggests that there are distinct values for rural residents relative to those in urban areas, and other studies (Tonkiss & Passey, 1999; Beugelsdijk & Klasing, 2016) observe that different values undermine trust. If urban and rural value differences exist, and governments are seen to act in accordance with urban values, then this may erode rural

residents' trust in government. To determine whether an urban/rural clash exists, we control for a battery of variables related to values. These include beliefs about redistribution (Government should reduce differences in income levels), homosexuality (Gays and lesbians free to life as they wish), immigration (Immigration bad or good for country's economy') and also a further 19 variables around values about the environment, hedonism and so on.[49] These beliefs were selected because we believe they tap attitudes related to moral issues (i.e., private behaviour), ethnic issues (i.e., beliefs about immigrants) and political-economic issues (i.e., views about government economic intervention) (see Kalmijn & Kraaykamp 2007), and also attitudes that underpin the emerging Green-Alternative-Libertarian and Traditional-Authoritarian-Nationalist cleavage (see Hooghe et al., 2002).

Summary statistics presented in the appendix show that there are statistically significant differences in values between urban and rural dwellers for the majority of these (17 of 22).

H3 suggests that political trust may also vary because of *satisfaction* with services. An urban focused growth model, as highlighted by Rodríguez-Pose (2018), may have led rural dwellers to lose faith in national government, feeling their public services are worse than those in urban areas. We include three variables: satisfaction with education services, healthcare, and the economy (note we are already controlling for individual economic experiences, so the latter must be a contextual effect). These three indicators are closely correlated and, we assume, connected in people's minds, so we include them together.

Political trust in urban and rural Europe

We begin by showing a clear relationship between our aggregate measures of political trust and urban location. Table 5.1 presents ordinal logit models of political trust with different sets

[49] These are: Important to think new ideas and being creative; Important to be rich, have money and expensive things; Important that people are treated equally and have equal opportunities; Important to show abilities and be admired; Important to live in secure and safe surroundings; Important to try new and different things in life; Important to do what is told and follow rules; Important to understand different people; Important to be humble and modest, not draw attention; Important to have a good time; Important to make own decisions and be free; Important to help people and care for others well-being; Important to be successful and that people recognize achievements; Important that government is strong and ensures safety; Important to seek adventures and have an exciting life; Important to behave properly; Important to get respect from others; Important to be loyal to friends and devote to people close; Important to care for nature and environment; Important to follow traditions and customs; Important to seek fun and things that give pleasure

of control variables. Our focus is on the five geographical dummies, with 'big city' as the reference category. Column 1 focuses on overall political trust with only country and ESS wave dummies; controls for demographics, economic situation, values, and satisfaction with services are added in the columns 1-5. Without controls, all four dummy variables are negative and statistically significant. The results without controls (column 1) show that living in a farm or home in the countryside is associated with a -0.3 point lower average trust in government. When including all controls this is much lower – only -0.16, but still statistically significant. In terms of magnitude, this is roughly the same as the gender difference in the same variable. This result remains in columns 2 – 5 as we include variables sequentially, with geographical variation in each successive model, albeit declining in magnitude.

We also note that in terms of adding to the fit of the regression, both, demographic controls and individual economic situation add little explanatory power; although values seem relatively important. These findings suggest limited support for H1, and some support for H4. Personal economic standing is therefore unlikely to be driving declining trust in rural areas, whereas personal values seem to partially explain the increasing divide.

By contrast, the largest jump in the pseudo R^2 by far is when Satisfaction variables are included in column 5. While much of the difference in trust between urban and rural Europe is driven by composition and individual values, not all of it is. Satisfaction with public services and the economy explain a relatively large proportion of the variance. This suggests that quality of government is an important factor underpinning trust in government, and provides support for H3. Additionally, because we control for individual income, the relatively higher rural economic dissatisfaction suggests a degree of support for H2's geotropic account.

Table 5.1 Political trust by geographical location – Ordinal Logit results

	(1)	(2)	(3)	(4)	(5)	(6)
Suburbs / outskirts of big city	-0.0699***	-0.0272	-0.0610***	-0.0342*	-0.0524***	0.0107
	(0.0203)	(0.0203)	(0.0203)	(0.0205)	(0.0204)	(0.0351)
Town or small city	-0.186***	-0.110***	-0.118***	-0.0574***	-0.0829***	-0.104***
	(0.0163)	(0.0164)	(0.0164)	(0.0166)	(0.0165)	(0.0288)

Country village	-0.270*** (0.0164)	-0.157*** (0.0167)	-0.172*** (0.0167)	-0.0978*** (0.0169)	-0.158*** (0.0169)	-0.131*** (0.0294)
Farm or home in countryside	-0.338*** (0.0246)	-0.191*** (0.0249)	-0.198*** (0.0250)	-0.0914*** (0.0248)	-0.145*** (0.0247)	-0.158*** (0.0433)
Country	X	X	X	X	X	X
ESS Wave	X	X	X	X	X	X
Demographics		X	X	X	X	X
Economic situation			X	X	X	X
Values				X	X	X
Satisfaction					X	X
Perceived unemployment						X
Obs.	125,164	125,164	125,164	125,164	125,164	42,199
Pseudo R^2	0.0216	0.0246	0.0267	0.0394	0.0730	0.0713

*Dependent variable = composition measure of political trust. Reference category: Big city. Controls are for Age, Foreign Birthplace, Ethnic Minority, Gender, 5 Education dummies, unemployed, employed, retired, income decile, values, country dummies, and ESS year. Robust standard errors included. *** p<0.01, ** p<0.05, * p<0.1. Source: European Social Survey rounds 5 – 8.*

We make one additional check of these results. One question – "Of every 100 people of working age how many are unemployed and looking for work" – provides a measure of perceived unemployment, which may provide an alternative environmental control, in addition to the variable which we already include on satisfaction with the national economy. Unfortunately, this is only available for the 2008 and 2016 waves. We include this variable in column 6, which includes it alongside all other variables included in column 5. This leads to relatively little change in the results. Controlling for perceived unemployment, there is no difference between big cities and suburbs. But towns, country villages, and farm or home in the countryside remain significantly less trusting of government. This aspect of our results therefore undermines the geotropic account of H2.

We also consider which types of political trust differ geographically in table 5.2, which consists of our fullest regression model (table 5.1, column 5) for each of seven sub-categories of trust. There is evidence of an urban-rural split for six of these (parliament, legal system, politicians, political parties, the European parliament, and the United Nations). There is little geographical variation in trust in the police, however. This overall implies that this is a generally lower faith in political institutions, rather than a more specific one with any particular type.

Table 5.2 Geography and political trust subcategories - Ordinal Logit results

Trust in:	(1) Country's parliament	(2) Legal system	(3) Police	(4) Politicians	(5) Political parties	(6) European Parliament	(7) United Nations
Suburbs / outskirts of big city	0.003	-0.089***	-0.029	-0.031	-0.049**	-0.059***	-0.019
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Town or small city	-0.093***	-0.083***	0.015	-0.039**	-0.066***	-0.095***	-0.046***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Country village	-0.151***	-0.136***	0.001	-0.081***	-0.114***	-0.193***	-0.095***
	(0.02)	(0.017)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Farm or home in countryside	-0.158***	-0.131***	0.027	-0.08***	-0.079***	-0.194***	-0.065***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Controls	Full	Full	Full	Full	Full	Full	Full
Observations	125,166	125,166	125,166	125,165	125,166	125,165	125,166
Pseudo R2	0.105	0.0987	0.0718	0.107	0.102	0.0612	0.0543

Reference category: Big city. Controls are for Age, Foreign Birthplace, Ethnic Minority, Gender, 5 Education dummies, unemployed, employed, retired, income decile, values, country dummies, and ESS year. Robust standard errors in parentheses.
**** p<0.01, ** p<0.05, * p<0.1*

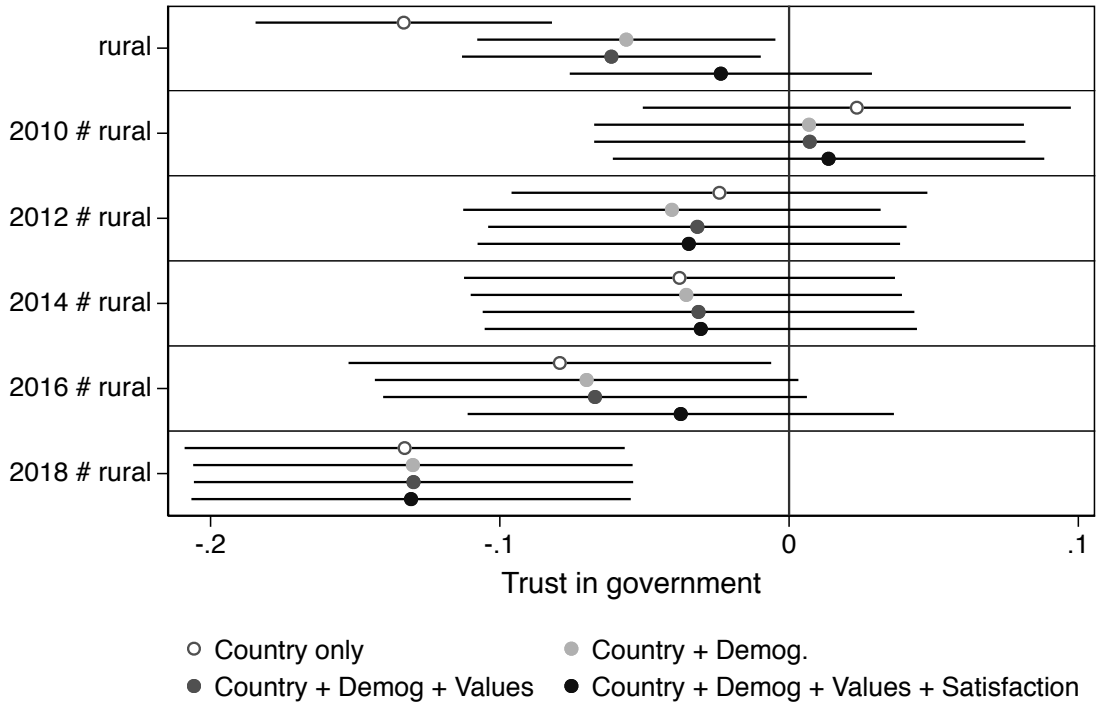
We conduct two robustness tests (both reported in Appendix Table C.2). The first is to estimate this result as a multilevel model. We are concerned about the problems of multilevel models as they are unreliable with too few groups (Bryan & Jenkins, 2016), but column 1 shows that using a multilevel model makes little difference to our results. Another concern is that our use of self-reported location variables means we are capturing perceived rather than actual variation. To address this, we run our basic regression using – where NUTS2 is given in the ESS – an indicator of NUTS2 population density. We also include a measure of local unemployment at this stage, to capture concerns that this will be biasing our results. The results show that population density is positively associated with political trust.

Trust in government in rural areas over time

We next consider whether these trends have been changing over time. We do this by interacting variables for ESS waves with a geographical dummy, but – for simplicity – we use a simple binary between those living in a country village or farm / home in the countryside and those in the other categories. To present our results clearly and with confidence intervals, we present this as a plots with confidence intervals in figure 5.3. In these interval plots, dots represent the beta coefficient, and lines give 95% confidence intervals. If these do not pass through the line

marking 0 we can be relatively confident the results are not driven by chance. As with table 1, we include controls sequentially – starting with country and ESS dummies, introducing demographics, economics, values, and finally satisfaction sequentially.

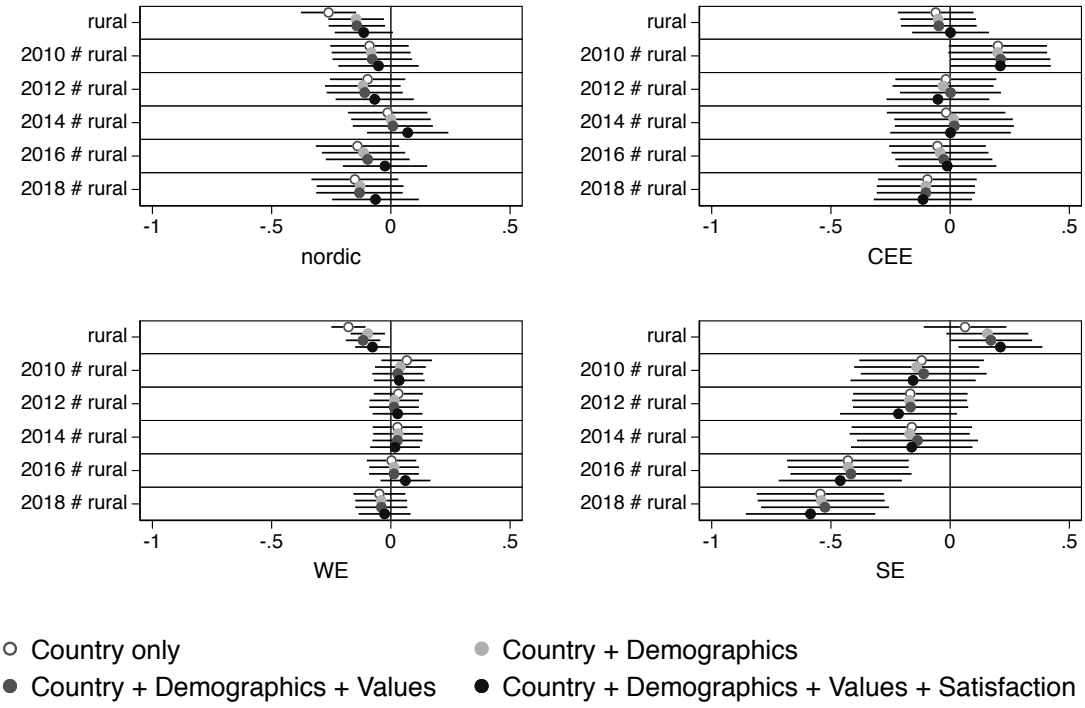
Figure 5.3 Coefficient plots: Interactions between ESS round and rurality



Note: Each line presents the interactions between each ESS round and rural residence in an ordinal logit regression where the dependent variable is the composite indicator of trust in government. Each coefficient is presented with four model specifications, with county dummies only, with country dummies along with controls for demographics and income (as in table 5.2), with country dummies, demographics, income and personal values. 95% Confidence intervals given by line either side of beta estimate. Source: European Social Survey rounds 5 – 8.

The results show a trend of growing distrust in government in rural areas. The rural variable, when not interacted with the time trend, is significant in three regressions – with no controls, demographic controls, as well as with demographic and value controls. Much of the effect, but by no means all, is driven by satisfaction with healthcare, education, and the economy. There is some variation of the time trend's statistical significance in all but the final column, but this is clearest in 2016, where it becomes statistically significant without controls, and 2018, where it is significant in all models.

Figure 5.4 Coefficient plots: Interactions between ESS round and rurality, by country type



Note: Each graph gives the coefficients of the interaction between ESS round and rurality in an ordinal logit regression where the dependent variable is the composite indicator of trust in government. Each coefficient is presented with four model specifications, with county dummies only, with country dummies along with controls for demographics and income and with country dummies, demographics, income and personal values, and including satisfaction with services. 95% Confidence intervals given by line either side of beta estimate. Source: European Social Survey rounds 5 – 8.

To see if this relationship holds across all different parts of Europe, we also consider if these trends differ across four different regions (Nordics; Western Europe; Southern Europe; Central and Eastern Europe). The division into regions is not just geographic but takes into account their related political and social environments and experiences of the past (Kołczyńska et al., 2020). Our regression results (Appendix Table C.3) show that a significant urban-rural difference in political trust can be observed in each of the four groups supporting our general finding of a urban-rural difference in political trust. In addition, as can be seen in figure 4, rural places show a downward trajectory in each of the four groups; however the overall trend is largely driven by rural places in Southern European countries (Spain and Portugal). In short, we show that the urban-rural division exists for most of Europe, but the divergence exists only for Southern Europe.

5.6 Discussion and conclusion

Despite widespread concern about political trust in the aftermath of the global financial crisis, there is little analysis of its geography. This paper has two central findings. First of all, the more rural the self-reported residence of the respondent, the lower their trust in government. This difference is only partially explained by the personal values of the respondents. Second, and perhaps of greater concern, we also report that this difference is increasing over time. It has reached a stage where, for the first time since 2008, there are clear and statistically significant differences between rural and urban areas in the extent to which their residents trust government; these trends being driven largely by Spain and Portugal. Third, we show that the most important determinant of the difference is satisfaction with healthcare, education, and the economy, although this do not account for the full trend. Given that we control for individual educational and economic outcomes, we interpret this as a contextual effect.

The significance of our results is that they tell us why rural areas are losing faith; we test hypotheses that suggest income and values affect trust and find little or no support for them. Instead, our results suggest that rural areas are becoming less trusting of the government because they perceive worse education, worse health, and worse economies than urban areas. In this respect, our results show a trend similar to that portrayed by Rodríguez-Pose (2018) in his work on the places that don't matter. Because we control for actual individual income and employment, our economic effect, at least, is contextual: it is not the personal effect which matters, but the effect on the local area. The effect we observe coming from healthcare and education is more likely to be the result of personal experience than the economy; this is both because we control for individual income and because, as Reeves and Gimpel (2012) observe, an individual does not experience *national* economic conditions but does experience *local* economic conditions. These results overall indicate an apparent dissatisfaction in rural areas which is leading to them losing faith in the urban focused growth model pursued in many countries (Rodríguez-Pose, 2018).

We believe it is no coincidence that these trends have worsened since the global financial crisis began in 2008. The aftermath of the most significant economic downturn in nearly a century saw the introduction of austerity measures that, at times, created greater urban/rural disparities. This is particularly the case in Southern European countries, such as Spain and Portugal, that were subjected to expenditure control that led to divestments in rural projects and infrastructure; here, austerity policies have resulted in rural dwellers feeling disconnected to urban processes and with reduced access to key services (Camarero & Olivia, 2019). Indeed,

our results show that the downward trend in political trust in rural areas is particularly pronounced in Southern European countries. Yet, even in countries such as the United Kingdom, where urban areas experienced the deepest cuts, austerity compounded pre-existing problems of rural poverty (May et al., 2020).

These results open up three key avenues for research. Firstly, we use indicators of urban-rural but do not control for wide differences between these categories: a rich rural area in affluent Southern Germany would show up the same as a deprived part of South Wales. More detail would help here. Future work may also want to focus on the extent to which this divergence of trust in shaping political change.

Second, political scientists should consider if rurality plays a unique role in what Ford and Jennings (2020) identify as '[t]he reawakening of centre-periphery conflicts' between prosperous major cities and 'declining hinterlands'. Within the United Kingdom, for example, scholarship in this area to date has typically focussed on post-industrial regions such as Barking and Dagenham (Gest, 2016), the North of England (Carreras, 2019), and traditional manufacturing areas (Colantone and Stanig, 2018). Because the countryside is not at the forefront of these analyses, it is unclear whether common causative factors underpin the centre-periphery conflict as it is manifested in post-industrial regions and rural areas.

Finally, policy makers should focus on how rural trust can be rebuilt. Here, attention should concentrate on ascertaining which services are particularly salient drivers of trust, and improving the quality of those services. This article has suggested that healthcare and education assume a prominent role in rural dissatisfaction; other research (Van Ryzin et al., 2004) suggests that police and transport play an outsized part in citizen (dis)satisfaction. Trust is hard won and easily lost; a failure to take timely action to stem rural dissatisfaction is likely to further erode trust and make remedial action increasingly onerous.

C Appendix

Appendix Table C.1 Variables and urban rural differences

Domain	Variable	Urban (mean)	Rural (mean)	T-test
Trust	Political trust	4.92	4.82	***
	Trust in country's parliament	4.76	4.60	***
	Trust in the legal system	5.54	5.34	***
	Trust in the polices	6.47	6.48	
	Trust in politicians	3.80	3.76	**
	Trust in political parties	3.80	3.73	***
	Trust in European Parliament	4.54	4.35	***
	Trust in the UN	5.47	5.32	***
Demographic	Age	48.28	50.00	***
	Born overseas	0.12	0.06	***
	Ethnic minority	0.06	0.03	***
	Female	0.52	0.50	***
	Education 1 (Low)	0.00	0.00	
	Education 2	0.08	0.11	***
	Education 3	0.13	0.17	***
	Education 4	0.37	0.40	***
	Education 5	0.06	0.06	**
	Education 6 (high)	0.36	0.26	***
Economic	Unemployed	0.06	0.05	***
	Employed	0.54	0.53	***
	Retired	0.23	0.24	***
	Income relative to nation (low)	0.10	0.10	
	Income 3	0.10	0.11	
	Income 4	0.11	0.12	***
	Income 5	0.11	0.11	**
	Income 6	0.10	0.11	***
	Income 7	0.10	0.11	***
	Income 8	0.10	0.10	
	Income 9	0.09	0.09	***
	Income 10	0.10	0.07	***
Value	Gov should reduce difference in income	2.18	2.14	***
	Gays and lesbians free to live life	1.92	2.00	***
	Immigration bad or good for economy	5.28	4.95	***
	Important to think new ideas and being creative	2.53	2.53	
	Important to be rich, have money and expensive things	4.24	4.34	***
	Important that people are treated equally	2.03	2.07	***

	Important to show abilities and be admired	3.27	3.32	***
	Important to live in secure and safe surroundings	2.46	2.41	***
	Important to try new and different things in life	2.92	2.98	***
	Important to do what is told and follow rules	3.27	3.20	***
	Important to understand different people	2.27	2.33	***
	Important to be humble and modest, not draw attention	2.72	2.59	***
	Important to have a good time	2.85	2.91	***
	Important to make own decisions and be free	2.13	2.17	***
	Important to help people and care for others well-being	2.14	2.11	***
	Important to be successful	3.28	3.35	***
	Important that government is strong and ensures safety	2.40	2.41	
	Important to seek adventures and have an exciting life	3.86	3.97	***
	Important to behave properly	2.70	2.64	***
	Important to get respect from others	3.32	3.31	
	Important to be loyal to friends and devote to people close	1.87	1.88	***
	Important to care for nature and environment	2.12	2.07	***
	Important to follow traditions and customs	2.90	2.73	***
	Important to seek fun and things that give pleasure	2.97	2.97	
Satisfaction	How satisfied with present state of economy in country	4.85	4.89	**
	State of education in country nowadays	5.82	6.01	***
	State of health services in country nowadays	5.71	5.78	***
	Of every 100 working age how many unemployed and looking for work	4.75	4.80	*

Appendix Table C.2 Robustness to alternative specifications

Method	(1) Multilevel model	(2) NUTS2 population density
Population density (ln)		0.0195***
		(0.00661)
Suburbs / outskirts of big city	-0.0427***	
	-0.0127	
Town or small city	-0.0642***	
	-0.0239	
Country village	-0.114***	
	-0.0292	
Farm or home in countryside	-0.108**	
	-0.0421	
Observations	125164	85403
Pseudo R-squared		0.0779
Controls	Full	Full

Dependent variable = composition measure of political trust. Reference category: Big city. Controls are for Age, Foreign Birthplace, Ethnic Minority, Gender, 5 Education dummies, unemployed, employed, retired, income decile, values, country dummies, and ESS year. Robust standard errors included.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: European Social Survey rounds 5 – 8; Eurostat.

We defined a new variable nuts2 by extracting information from the regional variable cregion about the Nuts level 2 code for all observations with regional codes that were either Nuts level 2 or Nuts level 3 codes. We converted the outdated Nuts 2013 codes used in ESS rounds 5-7 (2010, 2012, 2014) to the current standard Nuts 2016 codes according to official guidelines to changes published by Eurostat (https://ec.europa.eu/eurostat/documents/345175/629341/NUTS2013-NUTS2016.xlsx). Due to lack of information one Nuts level 2 region in Poland was excluded from the analysis (NUTS 2013: PL12) as it was split into two regions. Regional (contextual) data about population density and unemployment rates (in %) for the working age population at Nuts Level 2 from Eurostat were merged with the ESS dataset based on Nuts 2 level. ESS round 4 (2008) was excluded from the analysis as the regional information was largely missing from the ESS data. Respondents whose regional identifiers are too crude (i.e. Nuts level 1 or less) were excluded as well.

Appendix Table C.3 Rural location and different types of trust in government, by country groups – Ordinal Logit Results

Dependent variable:	Country's parliament	Legal system	Police	Politicians	Political parties	European Parliament	United Nations
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Nordic							
Rural	-0.153***	-0.134***	-0.0733***	-0.0734***	-0.0968***	-0.198***	-0.0435
	(0.0266)	(0.0270)	(0.0273)	(0.0271)	(0.0269)	(0.0268)	(0.0269)
Observations	23,984	23,984	23,984	23,984	23,984	23,984	23,984
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Central and Eastern							
Rural	-0.0539*	-0.0120	0.0304	-0.0229	-0.0556*	-0.106***	-0.0763**
	(0.0308)	(0.0314)	(0.0313)	(0.0314)	(0.0316)	(0.0305)	(0.0308)
	18,694	18,694	18,694	18,694	18,694	18,694	18,694
	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Western Europe							
Rural	-0.104***	-0.0768***	0.0409**	-0.0322*	-0.0457***	-0.130***	-0.0722***
	(0.0165)	(0.0168)	(0.0168)	(0.0166)	(0.0165)	(0.0167)	(0.0166)
Observations	61,571	61,571	61,571	61,571	61,571	61,571	61,571
	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Southern Europe Rural	-0.107***	-0.0816**	-0.0575	-0.141***	-0.107**	-0.0737*	-0.0579
	(0.0409)	(0.0404)	(0.0400)	(0.0429)	(0.0422)	(0.0410)	(0.0407)
Observations	10,742	10,742	10,742	10,742	10,742	10,742	10,742

Each column gives the coefficient for the rural dummy variable in a regression equation as in table 2, but with the sample split by regional grouping. Western Europe is Belgium, Switzerland, Germany, France, UK, Ireland, Netherlands. Eastern Europe: Czech Republic, Estonia, Hungary. Southern Europe: Portugal and Spain. Nordic: Finland, Norway, Sweden. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

6 Conclusion

The four papers have explored different aspects of the ongoing processes of technological change, regionalisation and polarisation as a consequence of the rise of the knowledge economy and globalisation. They address different topics and questions (and for expository purposes I have organised them as partially self-contained essays), but there are broad similarities in their approach and findings.

With increasing exposure to the economic geography literature I was struck by how focused the comparative political economy literature is on specific national models such as Varieties of Capitalism (Hall & Soskice, 2001) or 'Worlds of Welfare Capitalism' (Esping-Anderson, 1990). During my research I came to the realisation how misleading this focus had become. The papers examine the shift of economic activity towards certain regions, the pace of technological change and policies to reach net-zero: and a major concern of each of them is to understand how these developments have taken place in different regional institutional, political and market contexts, and to analyse the interrelated ways in which those contexts have evolved.

More explicitly, they all have redistributive consequences and are thus creating winners and losers. The increasing spatial concentration of knowledge economic activity has benefitted some German Länder more than others, and across Europe we see an increasing divergence in political trust between urban and rural places which see their socio-economic infrastructure as falling behind those in core areas. Young people with lower educational backgrounds at risk of being affected negatively by technological change are fearing for their social status and worry about the future, whereas their more educated peers do not, and their older peers are enjoying better policy securities. The shift to more renewable energy sources is causing relatively higher costs for rural places compared to urban ones. History tells us that economic transformations with strong distributive consequences are likely to create political upheaval (Eichengreen 2018, Boix 2019). Further research on how to effectively compensate the 'losers' is required, and to what extent the distinction between urban and rural is also one between low and high skills (Storper, 2018).

Three of the papers highlight the important role that perceptions play in the reactions to the developments and redistributive outcomes. Young people with a low educational background

in an occupation perceive automation risk as a threat, even though the training and upskilling regime seems to be mostly intact and for young cohorts the likelihood of redundancy is relatively low in Germany (Battisti et al., 2022). Rural places perceive their socio-economic infrastructure to be worse than those in urban areas, and similarly, rural places are also perceiving the cost of the green transition to be higher for them compared to urban areas. These perceptions are in some cases more justified than in others, but they have political consequences and thus should take them more seriously.

The collection of papers emphasises the important role of subnational units and spatial factors when studying the consequences of the rise of the knowledge economy. The field of political economy is still focused on the nation-state as its unit of analysis (for Germany see recent edited volumes by Hassel & Palier, 2021 and Baccaro, Blyth & Pontusson, 2022). However, globalisation and the rise of the knowledge economy have not led to the convergence of places, but instead increased the role played by regional and local factors in creating an ecosystem for economic actors increasingly focused on gaining a competitive edge via new innovations. It is not unusual to see economic performance indicators of successful countries being driven by just a few regions (Rodríguez-Pose & Crescenzi, 2008). The nature of how these processes have played out as well as effects of regional policies at different levels of governance is likely to be mediated by existing political systems and governance structures. The new economic reality has spill over effects into other areas of political economy and political science as well. Arguably, the concentration of specific socio-economic groups in a few core areas is increasing the spatial divides in society. This poses some essential questions that have received little attention so far, such as what role do different regional actors play in these processes and to what extent are the developments mediated by existing governance structures?

Avenues for future research

I intend to expand and build on several of the papers in this thesis emphasizing their spatial and regional aspects. One project building on the paper on automation risk will be to introduce a more regional approach to studying the effects of technological change. This future study would aggregate the automation risk measure at the local and regional level based on occupational make-up in order to study the geotropic effects of automation risk. So far, the majority of studies in the literature is limited to task-based measures of those active in the labour market (Acemoglu & Restrepo 2018; Caselli & Manning 2019, Goos et al., 2014). The

IAB has published an aggregated regional indicator based on the same risk measure which would help in further qualifying the automation risk effect channel independent on an individual's labour market situation. In other words, this would allow to explore the geotropic influence on different groups, e.g. those in an high or low risk occupation. This could shed light on a variety of questions, such as how people's ties to places and their context matters for their perceptions of the economic situation or their future outlook.

Both, the paper on automation risk and the paper on the expansion of green infrastructure are highlighting the problems for countries to build political coalitions in favour of moves towards 'technological innovation' or 'green' policies. As the findings of the studies show these decisions have distributional consequences but how to effectively compensate those negatively affected remains understudied (Gingrich, 2019; Sardaro et al., 2019). However, in the case of the 'green transition' the funding required over the coming decades will dwarf the consequences of wind turbines and solar farms and thus these political conflicts are likely to become more prevalent as well. The aim in a future project would be to create a new typology of the concentration of costs and perceptions of justice associated with different green policies. This could help in better understanding why some measures are facing more of a backlash than others, and how to address them.

The paper on the diverging political trust between rural and urban areas can be extended and further refined. In the study the different characteristics of rural areas in different countries were not properly accounted for. A rich rural area in affluent Southern Germany and a deprived rural part of South Wales might both be rural according to the used classification, but there are arguably other important differences between these places. Future work should try and incorporate more detail. Second, political scientists should consider if rurality plays a unique role in the re-emerging political cleavage between prosperous urban areas and places that are increasingly lagging behind. The places that do not matter are not just in rural areas but also located in post-industrial regions e.g. North of England. Hence, it is unclear whether common causative factors underpin the centre-periphery conflict.

The study of the diverging political economic landscape in Germany is the cornerstone for a large research project about better characterising the German regional innovation model in a comparative setting. The rapidly changing ICT revolution and digitisation seems to be mostly driven by tech firms from the US and China. Germany is increasingly trapped in a niche of

incremental manufacturing technological change, doubling down on the German manufacturing export-led growth regime which stands in contrast to the Nordic countries (Thelen, 2019). Germany as a federal republic allows for more regional differentiation in certain policy areas crucial to innovation-based competition, such as educational and regional industrial policies. This has resulted in different outcomes for different Länder even though Germany is considered a cooperative federal system. Building on the study on regional divergence a first step would be to study other German Länder, their adjustment to the knowledge economy and what measures different regional governments have taken over the last decades. Studying the individual states and national response in more detail would allow to explore if the decentralization and weakening of social partners did lead to liberalization or to more informal and decentralised corporatist interactions.

In addition to studying the aims and effects of policies at different levels of governance, there are also still open questions around the roles that firms play in the adjustment process. For example, are there differences between firms in terms of their corporate governance or finance structure which could make them more successful in adapting to the new competitive environment. For example, a high share of long-term or patient capital could help firms in the adjustment process. One form of corporate governance that seems to ensure patient capital are family controlled companies, which are especially prevalent in Southern Germany (Kauder, 2022). They have a higher R&D intensity compared to other businesses (Schmid et al., 2014) and are significantly more long term oriented compared to the rest of the private sector (Kappes & Schmid, 2013). Another category that tends to be more long-term oriented are foundation controlled companies. This form of corporate governance enables firms to make adjustments without too much internal resistance and incentivises firms to pursue long term strategies as well. In fact, there is often an overlap between family and foundation controlled firms (Block et al. 2020). These forms of funding could provide the security for long term adjustments and possibly also increases the security to employees which are both crucial for firms to become knowledge intensive and maintain a competitive edge. Similarly, the role of the economic sectoral composition– e.g. light versus heavy industry– could contribute to understanding and explaining the success of some companies and regions.

The focus on regions also allows for expanding the research comparatively to other countries. One approach to better understand the role of politics and policies would be to study and compare other countries to Germany. To study the role that the national political arrangements

play would be to compare Germany with countries that are relatively similar in terms of economic structure but have different governance structures such as Switzerland (with a more competitive style of federalism) or Austria (with stronger national corporatism). Similarly, how have different regions in countries with a more centralised political system such as the UK or Sweden adjusted and are there differences in the national policy approach compared to multilevel governance polities.

The fundamental message of the thesis is that the study of political economy should integrate the regional level within the national framework especially when considering questions of innovation and their consequences. This is not to say that the national level is losing significance. Taking regional institutional arrangements and actors seriously poses new questions about the distribution of roles between different levels of government, and why some issues are regarded as national and not regional.

7 Bibliography

Abou-Chadi, T., and Hix, S. 2021. "Brahmin Left versus Merchant Right? Education, Class, Multiparty Competition, and Redistribution in Western Europe." *The British Journal of Sociology* 72(1): 79–92. https://onlinelibrary.wiley.com/doi/10.1111/1468-4446.12834

Abrams, S., Iversen, T., and Soskice, D. 2011. "Informal Social Networks and Rational Voting." *British Journal of Political Science* 41(2): 229–57.

Abreu, M., and Öner, Ö. 2020. Disentangling the Brexit vote: The role of economic, social and cultural contexts in explaining the UK's EU referendum vote. *Environment and Planning A: Economy and Space*. https://doi.org/10.1177/0308518X20910752

Acemoglu, D., and Restrepo, P. 2018. The race between man and machine: implications of technology for growth, factor shares, and employment. *Am. Econ. Rev.* 108(6):1488–542

Achleitner, A., Block, J., and Strachwitz, R. (ed.). 2018. *Stiftungsunternehmen: Theorie und Praxis*. Springer Books, Springer, number 978-3-658-18990-7

Adler, D., and Ansell, B. 2020. "Housing and Populism." *West European Politics* 43(2): 344–65. https://www.tandfonline.com/doi/full/10.1080/01402382.2019.1615322

AfD Fraktion im Bundestag. 2018. Kamann: Digital-Gipfel wirft Schlaglicht auf kraft- und ideenlos agierende Bundesregierung. Press release, https://www.afdbundestag.de/kamann-digital-gipfel-wirft-schlaglicht-auf-kraft-und-ideenlos-agierende-bundesregierung/, date accessed: 04.05.2020.

AfD Kreisverband Halle (Saale). 2019. Staatsfinanzierte Europa-Cloud ist falsches Mittel für digitale Souveränität. Press release, http://www.afd-kvhalle.de/presse/pressemitteilungen/staatsfinanzierte-europa-cloud-ist-falsches-mittel-fuer-digitale-souveraenitaet.html, date accessed: 04.05.2020.

Agerberg, M. 2017. Failed expectations: Quality of government and support for populist parties in Europe. *European Journal of Political Research*, *56*, 578-600.

Alesina, A., and La Ferrara, E. 2000. The Determinants of Trust. *NBER Working Paper* No. 7621.

Amin A. and Thrift N., 1994. Globalization, institutional thickness and local prospects. *Revue d'Economie Regionale et Urbaine* 3, 405-427

Anderson, C. J., Blais, A., Bowler, S., Donovan, T., and Listhaug, O. 2005. *Losers' Consent: Elections and Democratic Legitimacy.* Oxford: Oxford University Press.

Anelli, M., Colantone, I., and Stanig, P. 2019. We Were The Robots: Automation and Voting Behavior in Western Europe. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3419966

Ansolabehere, S., and Konisky, D. M. 2009. "Public Attitudes Toward Construction of New Power Plants." *Public Opinion Quarterly* 73(3): 566–77. https://academic.oup.com/poq/article-lookup/doi/10.1093/poq/nfp041

Arndt, O., Freitag K., Karg, C., Knetsch, F., Heinze, R.G., Beckmann, F., and Hoose, F. 2015. Lehren aus dem Strukturwandel im Ruhrgebiet für die Regionalpolitik. *Endbericht im Auftrag des Bundesministeriums für Wirtschaft und Energie*. Bremen, Berlin, Bochum: Prognos AG; InWIS. https://www.bundesregierung.de/Content/Infomaterial/BMWI/lehren-strukturwandel-ruhrgebiet-regionalpolitik_309030.html?view=trackDownload. Accessed: 20.12.2022

Arndt, C., Halikiopoulou, D., and Vrakopoulos, C. 2022. "The Centre-Periphery Divide and Attitudes towards Climate Change Measures among Western Europeans." *Environmental Politics*: 1–26. https://www.tandfonline.com/doi/full/10.1080/09644016.2022.2075155

Arntz, M., Gregory, T., and Zierahn, U. 2016. The Risk of Automation for Jobs in OECD Countries - A Comparative Analysis, *OECD Social, Employment and Migration - Working Papers* No. 189.

Arntz, M., Gregory, T., and Zierahn, U. 2018. *Digitalisierung und die Zukunft der Arbeit: Makroökonomische Auswirkungen auf Beschäftigung, Arbeitslosigkeit und Löhne von morgen*, Bundesministerium für Forschung und Entwicklung (BMBF), Mannheim.

Artus, I., Röbenack, S., and Kraetsch, C. 2019. Betriebsräte ohne Gewerkschaften? Zur Praxis und Problematik gewerkschaftsferner betrieblicher Mitbestimmung, *Study No.428*, Hans-Böckler-Stiftung.

Arzheimer, K., and Berning, C. C. 2019. How the Alternative for Germany (AfD) and their voters veered to the radical right, 2013–2017. *Electoral Studies*, *60*, 102040. https://doi.org/10.1016/j.electstud.2019.04.004

Ashwood, L. 2018. Rural Conservatism or Anarchism? The Pro-state, Stateless, and Anti-state Positions. *Rural Sociology*, *83*(4): 717-748.

Autor, D. H., Levy, F., and Murnane, R. J. 2003. The Skill Content of Recent Technological Change: An Empirical Exploration. *The Quarterly Journal of Economics*, *118*(4), 1279–1333. https://doi.org/10.1162/003355303322552801

Baccaro, L., Blyth, M. and Pontusson, J. 2022. *Diminishing returns: The new politics of growth and stagnation*. Oxford University Press.

Baccaro, L., and Howell, C. 2017. "Trajectories of Neoliberal Transformation: European Industrial Relations since the 1970s." *Trajectories of Neoliberal Transformation: European Industrial Relations Since the 1970s*: 1–261. https://www.cambridge.org/core/books/trajectories-of-neoliberal-transformation/23D812E2CC6DD50EC043285A9C6576C7.

Baccini, L., and Leemann, L. 2020. "Do Natural Disasters Help the Environment? How Voters Respond and What That Means." *Political Science Research and Methods* 9(3): 468–84.

Baethge, M., and Wolter, A. 2015. Das deutsche Ausbildungsmodell im Umbruch: zwischen dualem Berufsbildungssystem und Hochschulstudium. *Journal for Labour Market Research*, *48*(2), 97–112. https://doi.org/10.1007/s12651-015-0181-x

Battisti, M., Dustmann, C., and Schönberg, U. 2022. "Technological and Organizational Change and the Careers of Workers." *SSRN Electronic Journal*. https://papers.ssrn.com/abstract=4301642.

Bechtel, M., Genovese, F., and Scheve, K. F. 2019. "Interests, Norms and Support for the Provision of Global Public Goods: The Case of Climate Co-Operation." *British Journal of Political Science* 49(4): 1333–55.

Bergquist, P., Mildenberger, M., and Stokes, L. 2020. "Combining Climate, Economic, and Social Policy Builds Public Support for Climate Action in the US." *Environmental Research Letters* 15(5): 054019.

Beugelsdijk, S., and Klasing, M. 2016. Diversity and trust: The role of shared values. *Journal of Comparative Economics*, *44*(3), 522-540.

BIBB. 2020. *BIBB / AusbildungPlus – Duales Studium in Zahlen 2019*. https://www.bibb.de/dienst/veroeffentlichungen/de/publication/show/16838 (January 23, 2023).

Birch, S. 2022. "The Electoral Benefits of Environmental Position-taking: Floods and Electoral Outcomes in England 2010–2019." *European Journal of Political Research*. https://onlinelibrary.wiley.com/doi/10.1111/1475-6765.12522.

Block, J., Jarchow, S., Kammerlander, N., Hosseini, F., and Achleitner, A. K. 2020. Performance of foundation-owned firms in Germany: The role of foundation purpose, stock market listing, and family involvement. *Journal of Family Business Strategy*, *11*(4), 100356. https://doi.org/10.1016/J.JFBS.2020.100356

Boix C. 2019. *Democratic Capitalism at the Crossroads: Technological Change and the Future of Politics*. Princeton, NJ: Princeton Univ. Press

Bonin, H., Gregory, T. and Zierahn, U. 2015. Übertragung der Studie von Frey/Osborne (2013) auf Deutschland, Mannheim.

Bouncken, R. B., Gast, J., Kraus, S. and Bogers, M. 2015. "Coopetition: A Systematic Review, Synthesis, and Future Research Directions." *Review of Managerial Science* 9(3): 577–601. https://link.springer.com/article/10.1007/s11846-015-0168-6

Boyer, P. 1992. *Urban masses and moral order in America, 1820-1920*. Harvard University Press.

Boyer, P. C., Delemotte, T., Gauthier, G., Rollet, V., and Schmutz, B. 2019. Les déterminants de la mobilisation des gilets jaunes. *CREST Working Paper Series* No 2019-06.

Breetz, H., Mildenberger, M., and Stokes, L. 2018. "The Political Logics of Clean Energy Transitions." *Business and Politics* 20(4): 492–522.

Brehm, J, and Rahn, W. (1997). Individual-Level Evidence for the Causes and Consequences of Social Capital. *American Journal of Political Science*, *41*(3), 999-1023.

Broekel, T., and Alfken, C. 2015. "Gone with the Wind? The Impact of Wind Turbines on Tourism Demand." *Energy Policy* 86: 506–19.

Bryan, M. L., & Jenkins, S. P. (2016). Multilevel Modelling of Country Effects: A Cautionary Tale, *European Sociological Review*, *32*(1), 3–22. https://doi.org/10.1093/esr/jcv059

Buchenau, M-W, and Nagel, L-M. 2018. "Aktionär Greift Den Aufsichtsrat Der Porsche-Familienholding An." *Handelsblatt*. https://www.handelsblatt.com/unternehmen/industrie/porsche-familienholding-angriff-auf-den-porsche-aufsichtsrat-ein-aktionaer-verklagt-die-familienholding/23594288.html

Buchenau, M. 2022. Autoindustrie: EBM Papst kühlt lieber Clouds statt Autos. *Handelsblatt*. https://www.handelsblatt.com/unternehmen/mittelstand/familienunternehmer/interview-mit-klaus-geissdoerfer-warum-ventilatoren-weltmarktfuehrer-ebm-papst-lieber-clouds-als-autos-kuehlt/28747784.html

Bündnis 90 / Die Grünen. 2021. Deutschland. Alles Ist Drin. Bundestagswahlprogramm 2021.

Camarero, L, and Oliva, J. 2019. Thinking in rural gap: mobility and social inequalities. *Palgrave Communications*, *5*(1), 1-7.

Carley, S., and Konisky, D. M. 2020. "The Justice and Equity Implications of the Clean Energy Transition." *Nature Energy* 5(8): 569–77.

Carlino G., Chatterjee S. and Hunt R. 2001. Knowledge spillovers and the new economy of cities. *Federal Reserve Bank of Philadelphia Working Paper* No. 01-14, mimeo.

Carreras, M. 2019. 'What do we have to lose?': Local economic decline, prospect theory, and support for Brexit. *Electoral Studies*, *62*, 102094.

Caselli F, Manning A. 2019. Robot arithmetic: new technology and wages. *Am. Econ. Rev.* Insights 1(1):1–12

Chetty, R., Hendren, N. and Katz, L.F. 2016. The effects of exposure to better neighborhoods on children: New evidence from the Moving to Opportunity experiment. *American Economic Review*, *106*(4), pp.855-902.

Christensen, T., and Lægreid, P. 2005. Trust in Government: The Relative Importance of Service Satisfaction, Political Factors and Demography. *Public Performance & Management Review*, *28*(4), 487-511.

Citrin, J., and Stoker, L. 2018. Political trust in a cynical age. *Annual Review of Political Science*, *21*, 49-70.

Colantone, I., and Stanig, P. 2018. Global Competition and Brexit. *American Political Science Review*, *112*(2), 201-218.

Colantone, I., and Stanig, P. 2018. The Economic Determinants of the "Cultural Backlash": Globalization and Attitudes in Western Europe. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3267139

Colantone, I., and Stanig, P. 2018. "The Trade Origins of Economic Nationalism: Import Competition and Voting Behavior in Western Europe." *American Journal of Political Science* 62(4): 936–53. https://onlinelibrary.wiley.com/doi/10.1111/ajps.12358

Coppola, G. 2017. BMW Self-Driving Coalition Adds Major Auto-Parts Supplier Magna. *Bloomberg*. https://www.bloomberg.com/news/articles/2017-10-10/bmw-self-driving-coalition-adds-major-auto-parts-supplier-magna

Cortes GM, Jaimovich N, and Siu HE. 2017. Disappearing routine jobs: who, how, and why? *J. Monetary Econ*. 91:69–87

Cortes, G. M. 2016. Where have the middle-wage workers gone? A study of polarization using panel data. *Journal of Labor Economics*, *34*(1), 63–105. https://doi.org/10.1086/682289

Cramer, K. J. 2016. *The Politics of Resentment: Rural Consciousness in Wisconsin and the Rise of Scott Walker*. Chicago: The University of Chicago Press.

Crescenzi R., Rodríguez-Pose A. and Storper M. 2007. The geographical processes behind innovation: A Europe-United States comparative analysis. *IMDEA Working Paper* No. 13.

Crozier, M., Huntington, S. P., and Watanuki, J. 1975. *The Crisis of Democracy*. New York: New York University Press.

Dalton, R. J. 2004. *Democratic Challenges, Democratic Choices: The Erosion of Political Support in Advanced Industrial Democracies*. Oxford University Press.

Dauth W, Findeisen S, Südekum J, and Wößner N. 2021. The adjustment of labour markets to robots. *J. Eur. Econ. Assoc*. 19:3104–53

De Vries, C. E., and Hobolt, S. B. 2020. *Political Entrepreneurs: The Rise of Challenger Parties in Europe*. Princeton University Press.

Demary, V., Kempermann, H., Krause, M., and Röhl, K-H. 2020. Die Bedeutung der Familienunternehmen für ländliche Räume – Beitrag zum Wohlstand und Zusammenhalt, Stiftung Familienunternehmen, München

Dengler, K., and Matthes, B. 2015. Folgen der Digitalisierung für die Arbeitswelt. Substituierbarkeitspotenziale von Berufen in Deutschland. *IAB-Forschungsbericht 11/2015*, 34. https://doi.org/10.1007/s10273-011-1262-2

Dengler, K., and Matthes, B. 2018. The impacts of digital transformation on the labour market: Substitution potentials of occupations in Germany. *Technological Forecasting and Social Change*, *137*, 304–316. https://doi.org/10.1016/j.techfore.2018.09.024

Dengler, K., and Matthes, B. 2020. Substituierbarkeitspotenziale von Berufen und die möglichen Folgen für die Gleichstellung auf dem Arbeitsmarkt. *Expertise für den Dritten Gleichstellungsbericht der Bundesregierung*. Berlin

DG Agriculture and Rural Development. 2018. *Rural areas and the primary sector in the EU* [Online] Available at: https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/eu-rural-areas-primary-sector_en.pdf Accessed 10 March, 2019.

Die Zeit. 2020. "Anreiz Auch Für Gemeinden: Akzeptanz Für Windkraft Soll Steigen - Mit 'Windbürgergeld'?" *Die Zeit*. https://www.zeit.de/news/2020-01/02/spd-groko-will-buerger-fuers-dulden-von-windraedern-belohnen

Diessner, S., Durazzi, N. and Hope, D. 2022. "Skill-Biased Liberalization: Germany's Transition to the Knowledge Economy." *Politics and Society* 50(1): 117–55. https://journals.sagepub.com/doi/full/10.1177/00323292211006563.

Dietz, T., Ostrom, E., and Stern, P.C. 2003. "The Struggle to Govern the Commons." Science 302(5652): 1907–12. https://www.science.org/doi/10.1126/science.1091015

Dohmen, F., and Hawranek, D. 2017. VW, Audi, Porsche, BMW und Daimler bildeten ein Kartell: Das Auto-Syndikat - DER SPIEGEL. *Der Spiegel*. https://www.spiegel.de/spiegel/vw-audi-porsche-bmw-und-daimler-bildeten-ein-kartell-das-auto-syndikat-a-1159389.html

Dröes, Martijn I., and Koster, H. 2021. "Wind Turbines, Solar Farms, and House Prices." *Energy Policy* 155.

Dungan, N. 2018. Far-right politics in Europe. *International Affairs*, *94*(1), 205–206. https://doi.org/10.1093/ia/iix266

Durazzi, N., and Benassi, C. 2018. "Going Up-Skill: Exploring the Transformation of the German Skill Formation System." *German Politics* 29(3): 319–38. https://www.tandfonline.com/doi/abs/10.1080/09644008.2018.1520840.

Eichengreen B. 2018. *The Populist Temptation: Economic Grievance and Political Reaction in the Modern Era*. Oxford, UK: Oxford Univ. Press

Einwiller, R. 2022. “Forschung und Entwicklung in Baden-Württemberg – Teil 4. Der Wirtschaftssektor.” *Statistisches Monatsheft Baden-Württemberg 6+7/2022: 37-48.* *https://www.statistik-bw.de/Service/Veroeff/Monatshefte/PDF/Beitrag22_07_05.pdf*

Ellguth, P., and Kohaut. S. 2019. “Tarifbindung Und Betriebliche Interessenvertretung: Ergebnisse Aus Dem IAB-Betriebspanel 2018.” *WSI-Mitteilungen* 72(4): 290–97. https://doi.org/10.5771/0342-300X-2019-4-290.

Ellguth, P., and Kohaut. S. 2022. “Tarifbindung Und Betriebliche Interessenvertretung: Ergebnisse Aus Dem IAB-Betriebspanel 2021.” *WSI-Mitteilungen* 75(4): 328–36.

Elsholz, U., Jaich, R., and Neu, A. 2018. *Folgen der Akademisierung der Arbeitswelt. Wechselwirkungen von Arbeits- und Betriebsorganisation, betrieblichen Qualifizierungsstrategien und Veränderungen im Bildungssystem* (Vol. 401).

Esaiasson, P. 2011. Electoral losers revisited–How citizens react to defeat at the ballot box. *Electoral Studies*, *30*(1), 102-113.

Esping-Andersen, Gøsta (1990). *The three worlds of welfare capitalism*. Princeton, New Jersey: Princeton University Press.

Euler, D., and Severing, E. 2017. *Welche Berufsausbildungen sind durch akademische Bildungsangebote gefährdet ?* Bertelsmann Stiftung (ed.) https://doi.org/10.11586/2017032

European Social Survey Cumulative File, ESS 1-9 (2020). Data file edition 1.0. NSD - Norwegian Centre for Research Data, Norway - Data Archive and distributor of ESS data for ESS ERIC. doi:10.21338/NSD-ESS-CUMULATIVE.

Eurostat (2020). Population density by NUTS 2 region. Data Code: TGS00024. Available at: https://ec.europa.eu/eurostat/databrowser/product/view/TGS00010?lang=en Accessed 2 December, 2020.

Eurostat (2020). Unemployment rate by NUTS 2 regions. Data Code: TGS00010. Available at: https://ec.europa.eu/eurostat/databrowser/product/view/TGS00010?lang=en Accessed 2 December, 2020.

Eurostat (2018). *Statistics on rural areas in the EU* [Online] Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_on_rural_areas_in_the_EU (Accessed 3 February, 2019)

Felice, E. 2018. “Regional Income Inequality in Italy in the Long Run (1871–2010) : Patterns and Determinants.” *The Economic Development of Europe’s Regions*: 177–203. https://www.taylorfrancis.com/chapters/edit/10.4324/9780429449789-9/regional-income-inequality-italy-long-run-1871–2010-emanuele-felice.

Finnegan, J. 2022. “Institutions, Climate Change, and the Foundations of Long-Term Policymaking.” *Comparative Political Studies* 55(7): 1198–1235. http://journals.sagepub.com/doi/10.1177/00104140211047416

Ford, R., and Jennings, W. 2020. The changing cleavage politics of Western Europe. *Annual Review of Political Science*, *23*, 295-314.

Franklin, M. N. 2004. *Voter turnout and the dynamics of electoral competition in established democracies since 1945*. *Voter Turnout and the Dynamics of Electoral Competition in Established Democracies since 1945*. Cambridge University Press. https://doi.org/10.1017/CBO9780511616884

Franzmann, S. T. 2016. Calling the ghost of populism: The AfD's strategic and tactical agendas until the EP election 2014. *German Politics*, *25*(4), 457–479. https://doi.org/10.1080/09644008.2016.1201075

Frey, C. B., and Osborne, M. A. 2017. The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, *114*, 254–280. https://doi.org/10.1016/j.techfore.2016.08.019

Frey, C. B., and Osborne, M.. 2017. "The Future of Employment: How Susceptible Are Jobs to Computerisation?" *Technological Forecasting and Social Change* 114: 254–80.

Friedman T. 2005. The world is flat: A brief history of Twenty-first Century. New York: Farrar, Straus, and Giroux

Frondel, M., Sommer, S., and Vance, C. 2015. "The Burden of Germany's Energy Transition: An Empirical Analysis of Distributional Effects." *Economic Analysis and Policy* 45: 89–99.

Funder, M. 2018. "Quo Vadis Betriebsrat? Entwicklungstrends Der Betrieblichen Mitbestimmung." *WSI-Mitteilungen* 71(6): 497–504.

Füner, L., Gottschalk, S., and Lubczyk, M. 2020. *Gründungen in Baden-Württemberg, Sonderauswertungen aus dem IAB/ZEW Gründungspanel*, L-Bank, Staatsbank für Baden-Württemberg, Mannheim

Furceri, D., Michael Ganslmeier, M., and Ostry, J. D. 2021. "Are Climate Change Policies Politically Costly?" IMF Working Paper No. 2021/156.

Gaikwad, N., Genovese, F., and Tingley, D. 2022. "Creating Climate Coalitions: Mass Preferences for Compensating Vulnerability in the World's Two Largest Democracies." American Political Science Review: 1–19. https://www.cambridge.org/core/product/identifier/S0003055422000223/type/journal_article

Gallego, A., and Kurer, T. 2022. Automation, Digitalization, and Artificial Intelligence in the Workplace: Implications for Political Behavior. *Annual Review of Political Science*, *25*, 463–484. https://doi.org/10.1146/ANNUREV-POLISCI-051120-104535

Ganga, P., and McNamara, K. 2018. 'Place Matters: Economic Geography and Populist Voting in France', *American Political Science Association Annual Meetings*. Boston, MA, August 29-2 September.

Germeshausen, R., Heim, S., and Wagner, U. 2021. "Support for Renewable Energy: The Case of Wind Power." *ZEW Discussion Papers*.

Gest, J. 2016. *The New Minority: White Working Class Politics in an Age of Immigration and Inequality*. New York: Oxford University Press.

Gidron N., and Hall, P.A. 2017. The politics of social status: economic and cultural roots of the populist right. *Br. J. Sociol.* 68(S1):S57–84

Gidron, N, and Hall, P. A.. 2020. "Populism as a Problem of Social Integration." Comparative Political Studies 53(7): 1027–59. https://doi.org/10.1177/0010414019879947

Gingrich, J. 2019. Did State Responses to Automation Matter for Voters? *Research and Politics*, *6*(1), 205316801983274. https://doi.org/10.1177/2053168019832745

Goerres, A., Spies, D. C., and Kumlin, S. 2018. The Electoral Supporter Base of the Alternative for Germany. *Swiss Political Science Review*, *24*(3), 246–269. https://doi.org/10.1111/spsr.12306

Goos M, Manning A, Salomons A. 2014. Explaining job polarization: routine-biased technological change and offshoring. *Am. Econ. Rev*. 104(8):2509–26

Gordon, I. R. 2018. In what sense left behind by globalisation? Looking for a less reductionist geography of the populist surge in Europe. *Cambridge Journal of Regions, Economy and Society*, *11*(1), 95-113.

Graf, L. 2018. "Combined Modes of Gradual Change: The Case of Academic Upgrading and Declining Collectivism in German Skill Formation." *Socio-Economic Review* 16(1): 185–205. https://academic.oup.com/ser/article/16/1/185/2888424.

Grant, Z. P., and Tilley, J. 2019. "Fertile Soil: Explaining Variation in the Success of Green Parties." *West European Politics* 42(3): 495–516. https://www.tandfonline.com/doi/full/10.1080/01402382.2018.1521673.

Greef, S. 2022. DGB-Gewerkschaften in Zahlen 2022, in: Bits & Pieces - Online, 4 (1), https://www.samuel-greef.de/gewerkschaften. Accessed: 16.01.2023

Greifenstein, R., Kißler, L., Lange, H. (2017). Trendreport Betriebsratswahlen 2014. Study 350 der Hans-Böckler-Stiftung, Düsseldorf.

Grigat, S. 2017. *AfD & FPÖ. Antisemitismus, völkischer Nationalismus und Geschlechterbilder*. (Grigat, S., Ed.). Nomos, Baden Baden.

Günther, W., and Höpner, M. 2022. "Why Does Germany Abstain from Statutory Bargaining Extensions? Explaining the Exceptional German Erosion of Collective Wage Bargaining." *https://doi.org/10.1177/0143831X211065783*. https://journals.sagepub.com/doi/10.1177/0143831X211065783.

Hägler, M. 2021. Autoindustrie: Wie Audi, BMW und Mercedes in die Zukunft gehen wollen - Wirtschaft - SZ.de. *Süddeutsche Zeitung*. https://www.sueddeutsche.de/wirtschaft/bmw-audi-mercedes-vergleich-1.5239979

Haipeter, T. 2020. "Digitalisation, Unions and Participation: The German Case of 'Industry 4.0.'" *Industrial Relations Journal* 51(3): 242–60. https://onlinelibrary.wiley.com/doi/full/10.1111/irj.12291.

Hall, P. A., and Soskice, D. (2001). *Varieties of Capitalism*. (P. A. Hall & D. Soskice, Eds.). Oxford University Press.

Hall, PA. Varieties of Capitalism and Inequality. In: Grusky D Social Stratification. Fifth Edition. London: Routledge ; Forthcoming.

Hankinson, M. 2018. "When Do Renters Behave Like Homeowners? High Rent, Price Anxiety, and NIMBYism." *American Political Science Review* 112(3): 473–93.

Hansen, M. A., and Olsen, J. 2019. Flesh of the Same Flesh: A Study of Voters for the Alternative for Germany (AfD) in the 2017 Federal Election. *German Politics*, *28*(1), 1–19. https://doi.org/10.1080/09644008.2018.1509312

Harteveld, E., and Ivarsflaten, E. 2018. Why Women Avoid the Radical Right: Internalized Norms and Party Reputations. *British Journal of Political Science, 48*(2), 369-384. doi:10.1017/S0007123415000745

Hassel, A. 1999. "The Erosion of the German System of Industrial Relations." *British Journal of Industrial Relations* 37(3): 483–505. https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8543.00138.

Herrigel, G., Voskamp, U., & Wittke, V. 2017. *Globale Qualitätsproduktion : transnationale Produktionssysteme in der Automobilzulieferindustrie und im Maschinenbau*. campus.

Herrigel, G., Voskamp, U. and Wittke. V. 2017. "Globale Qualitätsproduktion : Transnationale Produktionssysteme in Der Automobilzulieferindustrie Und Im Maschinenbau." : 250.

Herrigel, G. 1996. *Industrial Constructions: The Sources of German Industrial Power*. Cambridge University Press.

Herrigel, G. 2010. *Manufacturing Possibilities: Creative Action and Industrial Recomposition in the US, Germany and Japan.* Oxford University Press.

Herrigel, G. 2015. "Globalisierung Und Das Deutsche Modell Der Industrieproduktion." *Journal for Labour Market Research* 48(2): 133–49. https://labourmarketresearch.springeropen.com/articles/10.1007/s12651-014-0170-5.

Hetherington, M. J., and Rudolph, T. 2018. Political Trust and Polarization. In E. M. Uslaner (Ed.), *The Oxford Handbook of Social and Political Trust* (pp. 579-598). New York: Oxford University Press.

Hetherington, M. J., and Rudolph, T. J. 2008. Priming, Performance and the Dynamics of Political Trust. *The Journal of Politics*, *70*(2), 498-512.

Hilmer, R., Kohlrausch, B., Müller-Hilmer, R., and Gagné, J. 2017. Einstellung und soziale Lebenslage. Eine Spurensuche nach Gründen für rechtspopulistische Orientierung, auch unter Gewerkschaftsmitgliedern. *Working Paper Forschungsförderung*, (044), 1–48. https://doi.org/10.2139/ssrn.701181

Hobolt, S. 2016. The Brexit vote: a divided nation, a divided continent. *Journal of European Public Policy*, *23*(9), 1259-1277.

Hobolt, S., Leeper, T., and J. Tilley, 2018. "Divided by the Vote: Affective Polarization in the Wake of Brexit." Working Paper presented at the American Political Science Association, Boston, August 30 – September 2.

Hochschild, A.R. 2016. *Strangers in Their Own Land: Anger and Mourning on the American Right*. New York: The New Press.

Hocke, S. 2012. Konfliktlinien in Betriebsratsgremien. *Konflikte Im Betriebsrat Als Lernanlass*, 253–282. https://doi.org/10.1007/978-3-531-18693-1_8

Hooghe, L., Marks G., and Wilson, C.J. 2002. Does Left/Right Structure Party Positions on European Integration? *Comparative Political Studies*, *35*(8), 965-989.

Hooghe, M. 2018. Trust and Elections. In E. M. Uslaner (Ed.), *The Oxford Handbook of Social and Political Trust* (pp. 617-632). New York: Oxford University Press

Hope, D., and Martelli, A. 2019. The Transition to the Knowledge Economy, Labor Market Institutions, and Income Inequality in Advanced Democracies. *World Politics*, *71*(2), 236–288.

Höpner, M., and Krempel, L. 2004. "The Politics of the German Company Network." *http://dx.doi.org/10.1080/1024259042000304392* 8(4): 339–56. https://journals.sagepub.com/doi/10.1080/1024259042000304392.

Hospers, G. J. 2004. "Restructuring Europe's Rustbelt - The Case of the German Ruhrgebiet." *Intereconomics* 39(3): 147–56. https://link.springer.com/article/10.1007/BF02933582.

Hosseini-Görge, F. 2018. Foundation-owned firms in Germany: The impact of foundation-ownership on firm performance and corporate governance challenges. Dissertation am Fachbereich IV – Wirtschafts- und Sozialwissenschaften der Universität Trier. https://ubt.opus.hbz-nrw.de/opus45-ubtr/frontdoor/deliver/index/docId/991/file/Dissertation_FlorianHosseini_Foundation_owned_firms.pdf

Hottenrott, H., and Lopes-Bento, C. 2016. "R&D Partnerships and Innovation Performance: Can There Be Too Much of a Good Thing?" *Journal of Product Innovation Management* 33(6): 773–94. https://onlinelibrary.wiley.com/doi/full/10.1111/jpim.12311.

Huijsmans, T., Harteveld, E., van der Brug, W., and Lancee, B. 2021. "Are Cities Ever More Cosmopolitan? Studying Trends in Urban-Rural Divergence of Cultural Attitudes." *Political Geography* 86: 102353.

Im, Z. J., Mayer, N., Palier, B., and Rovny, J. 2019. The "losers of automation": A reservoir of votes for the radical right? *Research & Politics*, *6*(1), 205316801882239. https://doi.org/10.1177/2053168018822395

Inglehart, R., and Norris, P. 2017. Trump, Brexit, and the Rise of Populism: Economic Have-Nots and Cultural Backlash. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2818659

Inglehart, R. 1971. "The Silent Revolution in Europe: Intergenerational Change in Post-Industrial Societies." American Political Science Review 65(4): 991–1017.

Inglehart, Ronald. 1997. Modernization and Postmodernization: Cultural, Economic, and Political Change in 43 Societies. Princeton University Press.

IPCC. 2022. Climate Change 2022: Impacts, Adaptation, and Vulnerability.

Iversen, T., and Soskice, D.W. 2019. Democracy and Prosperity: Reinventing Capitalism through a Turbulent Century. Princeton University Press.

Jaimovich N, Saporta-Eksten I, Siu HE, Yedid-Levy Y. 2020. The macroeconomics of automation: data, theory and policy analysis. *NBER Work. Pap*. 27122

Jenkins-Smith, H. C., Silva, C. L., Nowlin, M., and deLozier. G. 2011. "Reversing Nuclear Opposition: Evolving Public Acceptance of a Permanent Nuclear Waste Disposal Facility." *Risk Analysis* 31(4): 629–44. https://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.2010.01543.x

Jennings, W., and Stoker, G. 2017. Tilting Towards the Cosmopolitan Axis? Political Change in England and the 2017 General Election. *The Political Quarterly, 88*, 359-369.

Jennings, W., and Stoker, G. 2019. The Divergent Dynamics of Cities and Towns: Geographical Polarisation and Brexit. *The Political Quarterly*, *90*, 155-166.

Joa, M. 2019. Technologischer Wandel im Kreis Germersheim: Brandenburg (FDP) verschweigt fatale Konsequenz für die Bürger. Retrieved online from: https://alternative-ger.de/2019/05/22/technologischer-wandel-im-kreis-germersheim-brandenburg-fdp-verschweigt-fatale-konsequenz-fuer-die-buerger/, date accessed: 06.05.2020.

Kaihovaara, A., and Im, Z. J. 2020. Jobs at risk? Task routineness, offshorability, and attitudes toward immigration. *European Political Science Review*. https://doi.org/10.1017/S1755773920000144

Kalemli-Ozcan, S., Papaioannou, E., and Peydro, J. L. 2013. Financial regulation, financial globalization, and the synchronization of economic activity. *The Journal of Finance*, *68*(3), 1179-1228.

Kalmijn, M., and Kraaykamp, G. 2007. Social stratification and attitudes: a comparative analysis of the effects of class and education in Europe1. *The British Journal of Sociology*, *58*, 547-576.

Kappes, I., and Schmid, T. 2013. The Effect of Family Governance on Corporate Time Horizons. *Corporate Governance: An International Review*, *21*(6), 547–566. https://doi.org/10.1111/CORG.12040

Kauder, B., 2022. Prägen Familienunternehmen das politische Wahlverhalten in Deutschland?. *IW-Trends-Vierteljahresschrift zur empirischen Wirtschaftsforschung*, *49*(3), pp.25-43.

Keller, B. 2022. Works councils: collective action within corporations, in: Matiaske, W./Alewell, D./ Leßmann, O. (eds): The 'Betrieb' as corporate actor. Management Revue. *Socio-economic studies*. Special issue, 227-249.

Kiese, M. 2019. "Structural Change 2.0: The Ruhr Area on the Way to a Knowledge-Based Economy." *Standort* 43(2): 69–75. https://link.springer.com/article/10.1007/s00548-019-00581-6.

Kögel R, and Berg, D. 2011. Die Unternehmensverfassung des Hauses Bosch als Grundlagenmodell der Doppelstiftung. *Zeitschrift für Familienunternehmen und Strategie* 11(1): 13-19.

Kohlrausch, B. 2018. *Fears of Social Decline in Germany. Magnitude and Causes in Times of Growing Right-Wing Populism.* Retrieved from www.boeckler.de

Kołczyńska, M., Bürkner, P., Kennedy, L., and Vehtari, A. 2020. Trust in state institutions in Europe, 1989-2019. *SocArXiv* Working Paper. https://doi.org/10.31235/osf.io/3v5g7

Konisky, D. M., Ansolabehere, S., and Carley, S. 2021. "Proximity, NIMBYism, and Public Support for Energy Infrastructure." *Public Opinion Quarterly* 84(2): 391–418. https://academic.oup.com/poq/article/84/2/391/5981974

Kono, D. Y. 2020. "Compensating for the Climate: Unemployment Insurance and Climate Change Votes." *Political Studies* 68(1): 167–86. http://journals.sagepub.com/doi/10.1177/0032321719836066

Kotthoff, and Hermann. 2013. "Betriebliche Mitbestimmung Im Spiegel Der Jüngeren Forschung." *Industrielle Beziehungen. Zeitschrift für Arbeit, Organisation und Management* 20(4). https://www.budrich-journals.de/index.php/indbez/article/view/27152.

Kotthoff, and Hermann. 2016. "Arbeit, Arbeitsbewusstsein Und Interessenorientierung von Hochqualifizierten Angestellten." *Industrielle Beziehungen. Zeitschrift für Arbeit, Organisation und Management* 23(4). https://www.budrich-journals.de/index.php/indbez/article/view/26471.

Kriegesmann, B., Böttcher, M., and Lippmann, T. 2016 Die regional- ökonomische Bedeutung der Wissenschaft für das Ruhrgebiet: Hochschulen und universitäre

Forschungseinrichtungen als Mo- toren der regionalen Entwicklung. *Standort Z Angew Geogr* 40(3):177–183

Kriesi, H., Grande, E., Lachat, R., Dolezal, M., Bornschier, S., and Frey, T. 2008. *West European politics in the age of globalization*. *West European Politics in the Age of Globalization* (Vol. 9780521895). Cambridge University Press. https://doi.org/10.1017/CBO9780511790720

Kroknes, V. F., Jakobsen, T. G., and Grönning, L. M. 2015. Economic performance and political trust: The impact of the financial crisis on European citizens. *European Societies, 17*(5), 700–723

Kropp, P., and Dengler, K. 2019. The Impact of Digital Transformation on Regional Labour Markets in Germany: Substitution Potentials of Occupational Tasks. In *Proceedings of the Weizenbaum Conference 2019 "Challenges of Digital Inequality - Digital Education, Digital Work, Digital Life"* (pp. 1-8). Berlin https://doi.org/10.34669/wi.cp/2.8

Krzywdzinski, M. 2019. "Globalisation, Decarbonisation and Technological Change. Challenges for the German and CEE Automotive Supplier Industry". In: Galgóczi, B. (Ed.): *Towards a Just Transition. Coal, Cars and the World of Work*. Brüssel: European Trade Union Institute, S. 215-241.

Krzywdzinski, M. 2021. "Automation, Digitalization, and Changes in Occupational Structures in the Automobile Industry in Germany, Japan, and the United States: A Brief History from the Early 1990s until 2018." *Industrial and Corporate Change* 30(3): 499–535. https://academic.oup.com/icc/article/30/3/499/6278429.

Kurer, T. 2020. The Declining Middle: Occupational Change, Social Status, and the Populist Right. *Comparative Political Studies*, 001041402091228. https://doi.org/10.1177/0010414020912283

Kurer, T., and Gallego, A. 2019. Distributional consequences of technological change: Worker-level evidence. *Research & Politics*, *6*(1). https://doi.org/10.1177/2053168018822142

Kurer, T., and Palier, B. 2019. Shrinking and shouting: the political revolt of the declining middle in times of employment polarization. *Research and Politics*, *6*(1), 205316801983116. https://doi.org/10.1177/2053168019831164

Lee, N. forthcoming. Innovation for the Masses: how to share the benefits of the high-tech economy. University of California Press.

Lee, N., Morris, K., and Kemeny, T. 2018. Immobility and the Brexit vote. *Cambridge Journal of Regions, Economy and Society*, *11*(1), 143–163. https://doi.org/10.1093/cjres/rsx027

Lehmann, C. 2011. Betriebsräte und ihr Einfluss auf arbeitgeberfinanzierte Weiterbildungsmaßnahmen. *Zeitschrift Für Personalforschung / German Journal of Research in Human Resource Management*, *25*(3), 225–246. http://www.jstor.org/stable/23279291

Lemb, W. (ed.). 2017. Industriepolitik in den Bundesländern. Perspektiven, Maßnahmen, Ziele. Campus Verlag.

Levi, M., and Stoker, L. 2000. Political trust and trustworthiness. *Annual Review of Political Science 3*(1), 475–507.

Lipset, S. M., and Rokkan, S. 1967. Cleavage Structures, Party Systems and Voter Alignments: An Introduction. In S. M. Lipset, & S. Rokkan, (Eds.), *Party Systems and Voter Alignments: Cross-National Perspectives*. New York: Free Press.

Lipset, S. M., and Schneider, W. 1983. The decline of confidence in American institutions. *Political Science Quarterly*, *98*(3), 379-402.

Listhaug, O. 1995. The dynamics of trust in politicians. In H. D. Klingemann, & D. Fuchs (Eds.), *Citizens and the State* (pp. 261–297). Oxford: Oxford University Press.

Listhaug, O., and Jakobsen, T. 2018. Foundations of Political Trust. In E. M. Uslaner (ed.), *The Oxford Handbook of Social and Political Trust* (pp. 559-578). New York: Oxford University Press.

LpB BW. 2022. "Bündnis 90/Die Grünen in Baden-Württemberg." Internetredaktion LpB BW. https://www.landeskunde-baden-wuerttemberg.de/gruene-bw#c86893 (May 25, 2022).

LUBW, and Umweltministerium Baden-Württemberg. "Energieatlas." https://www.energieatlas-bw.de/energieatlas (May 25, 2022).

Magazin, Manager. 2019. "Wolfgang Porsche Schießt Gegen VW-Betriebsrat." *Manager Magazin*. https://www.manager-magazin.de/unternehmen/autoindustrie/volkswagen-wolfgang-porsche-legt-sich-mit-vw-betriebsrat-an-a-1256367.html#ref=rss.

Magazin, Manager. 2021. "Porsche: Volkswagen-Eigentümerfamilien Spielen Szenarien Für Börsengang Durch." *Manager Magazin*. https://www.manager-magazin.de/unternehmen/autoindustrie/porsche-se-boersengang-vw-eigner-wollen-porsche-an-die-boerse-bringen-a-05fb37b3-dfb6-4cb4-b5ad-b2b39d5eb0b0.

Maier, T., Zika, G., Wolter, M. I., Kalinowski, M., Neuber-Pohl, C., Winnige, S., and Quack, L. 2016. Die Bevölkerung wächst–Engpässe bei fachlichen Tätigkeiten bleiben aber dennoch bestehen. *BIBB-Report*, *3*, 1–22. Retrieved from https://www.bibb.de/veroeffentlichungen/de/publication/show/8147

Manow, P. 2018. *Die Politische Ökonomie des Populismus*. Suhrkamp

Manow, P. and Schwander, H. 2022. Eine differenzierte Erklärung für den Erfolg der AfD in West- und Ostdeutschland, in Brinkmann, H. & Reuband, K.-H. (eds.) *Rechtspopulisms in Deutschland – Wahlverhalten in Zeiten politischer Polarisierung*. Springer. pp. 163-192

Măntoiu, D. S. et al. 2020. "Wildlife and Infrastructure: Impact of Wind Turbines on Bats in the Black Sea Coast Region." *European Journal of Wildlife Research* 66(3): 1–13.

Marble, W., and Nall, C. 2021. "Where Self-Interest Trumps Ideology: Liberal Homeowners and Local Opposition to Housing Development." *Journal of Politics* 83(4): 1747–63.

Margalit, Y. 2012. Lost in Globalization: International Economic Integration and the Sources of Popular Discontent. *International Studies Quarterly*, *56*(3), 484–500. https://doi.org/10.1111/j.1468-2478.2012.00747.x

Marien, S., and Hooghe, M. 2011. Does political trust matter? An empirical investigation into the relation between political trust and support for law compliance. *European Journal of Political Research*, *50*(2), 267-291.

Markkanen, S., and Anger-Kraavi, A. 2019. "Social Impacts of Climate Change Mitigation Policies and Their Implications for Inequality." *Climate Policy* 19(7): 827–44. https://www.tandfonline.com/doi/full/10.1080/14693062.2019.1596873

Marsden, D. 2015. "Die Zukunft Des Deutschen Modells Der Arbeitsbeziehungen." *Journal for Labour Market Research* 48(2): 169–87. https://labourmarketresearch.springeropen.com/articles/10.1007/s12651-015-0188-3.

Martin, M., and Islar, M. 2021. "The 'End of the World' vs. the 'End of the Month': Understanding Social Resistance to Sustainability Transition Agendas, a Lesson from the Yellow Vests in France." *Sustainability Science* 16(2): 601–14.

Martin, R., and Myers, D.L. 2005. "Public Response to Prison Siting." *Criminal Justice and Behavior* 32(2): 143–71. http://journals.sagepub.com/doi/10.1177/0093854804272890

Matthes, B., Meinken, H., and Neuhauser, P. 2015. Berufssektoren und Berufssegmente auf Grundlage der KldB 2010, in Bundesagentur für Arbeit Statistik (ed.) *Methodenbericht*.

Matti, J., and Zhou, Y. 2017. The political economy of Brexit: explaining the vote. *Applied Economics Letters*, *24*(16), 1131-1134.

Maxwell, R. 2019. "Cosmopolitan Immigration Attitudes in Large European Cities: Contextual or Compositional Effects?" *American Political Science Review*, Cambridge University Press, 456–74.

Maxwell, R. 2020. "Geographic Divides and Cosmopolitanism: Evidence From Switzerland." *Comparative Political Studies* 53(13): 2061–90. http://journals.sagepub.com/doi/10.1177/0010414020912289

May, J., Williams, A., Cloke, P., and Cherry, L. 2020. Still bleeding: The variegated geographies of austerity and food banking in rural England and Wales. *Journal of Rural Studies*, *79*, 409-424,

McNeil, A., and Haberstroh, C. 2022. "Intergenerational Social Mobility and the Brexit Vote: How Social Origins and Destinations Divide Britain." *European Journal of Political Research*. https://onlinelibrary.wiley.com/doi/10.1111/1475-6765.12526

Mehleb, R. I., Kallis, G., and Zografos, C. 2021. "A Discourse Analysis of Yellow-Vest Resistance against Carbon Taxes." *Environmental Innovation and Societal Transitions* 40: 382–94.

Miller, A. H., and Listhaug, O. 1999. Political performance and institutional trust. In P. Norris (Ed.), *Critical Citizens: Global Support for Democratic Government* (pp. 204–216). Oxford: Oxford University Press

Mitsch, F., Lee, N., and Ralph-Morrow, E.. 2021. "Faith No More? The Divergence of Political Trust between Urban and Rural Europe." *Political Geography* 89: 102426. https://www.sciencedirect.com/science/article/pii/S096262982100086X

Moretti, E., 2012. *The new geography of jobs*. Houghton Mifflin Harcourt.

Morgeson, F.V., and Petrescu, C. 2011. Do they all perform alike? An examination of perceived performance, citizen satisfaction and trust with US federal agencies. *International Review of Administrative Sciences*, *77*(3), 451-479.

Mudde, C. 2004. The Populist Zeitgeist. *Government and Opposition*. https://doi.org/10.1111/j.1477-7053.2004.00135.x

Mudde, C. 2007. *Populist radical right parties in Europe*. *Populist Radical Right Parties in Europe*. Cambridge University Press. https://doi.org/10.1017/CBO9780511492037

Müller-Jentsch, W. 2013. Zwanzig Jahre "Industrielle Beziehungen" — Rückblick und Bilanz. *Industrielle Beziehungen / The German Journal of Industrial Relations*, *20*(4), 258–284. http://www.jstor.org/stable/23608741

Nachtwey, O. 2016. *Die Abstiegsgesellschaft. Über das Aufbegehren in der regressiven Moderne*. Suhrkamp.

Neely, A. 2014. "Trends Towards Servitisation." In Bessant, J., Lehmann, C., and Moeslein, K. (eds.) *Driving Service Productivity*: 59–72. https://link.springer.com/chapter/10.1007/978-3-319-05975-4_4.

Newton, K., Stolle, D. and Zmerli, S. 2018. Social and Political Trust. In E. M. Uslaner (ed.), *The Oxford Handbook of Social and Political Trust* (pp. 37-56). New York: Oxford University Press.

Niedermayer, O., and Hofrichter, J. 2016. Die Wählerschaft der AfD: Wer ist sie, woher kommt sie und wie weit rechts steht sie? *Zeitschrift Für Parlamentsfragen*, *47*(2), 267–285. https://doi.org/10.5771/0340-1758-2016-2-267

Niedermayer, O., and Hofrichter, J. 2016. Die Wählerschaft der AfD: Wer ist sie, woher kommt sie und wie weit rechts steht sie? *Zeitschrift Für Parlamentsfragen*. Nomos Verlagsgesellschaft mbH. https://doi.org/10.2307/43977120

Nordbrandt, M. 2021. "Do Cross-Cutting Discussions Enhance pro-Environmental Attitudes? Testing Green Deliberative Theory in Practice." *Environmental Politics* 30(3): 326–56. https://www.tandfonline.com/doi/full/10.1080/09644016.2020.1787063

Norris, P., and Inglehart, R. 2019. *Cultural Backlash: Trump, Brexit, and Authoritarian Populism* (1st ed.). Cambridge University Press. https://doi.org/10.1017/9781108595841

O'Brien, R. 1992. *Global financial integration: The end of geography*. London: Royal Institute of International Affairs.

O'Grady, T. 2020. NIMBYism as Place-Protective Action: The Politics of Housebuilding. *SocArXiv*.

Obschonka, M., Stuetzer, M., Rentfrow, P.J., Lee, N., Potter, J., and Gosling, S.D. 2018. Fear, populism, and the geopolitical landscape: the "sleeper effect" of neurotic personality traits on regional voting behavior in the 2016 Brexit and Trump elections. *Social Psychological and Personality Science*, *9*(3), 285-298.

OECD (2015). Frascati Manual 2015, Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing. Paris, p. 44, http://dx.doi.org/10.1787/9789264239012-en

OECD (2022). Employment by education level (indicator). doi: 10.1787/26f676c7-en (Accessed on 21 December 2022)

Oesch, D. 2008. Explaining workers' support for right-wing populist parties in Western Europe: Evidence from Austria, Belgium, France, Norway, and Switzerland. *International Political Science Review*. https://doi.org/10.1177/0192512107088390

Oliver, J. E., and Rahn, W. M. 2016. Rise of the Trumpenvolk: Populism in the 2016 Election. *The Annals of the American Academy of Political and Social Science*, *667*(1), 189-206.

Onakpoya, I. J., O'Sullivan, J., Thompson, M. J., and Heneghan, C. 2015. "The Effect of Wind Turbine Noise on Sleep and Quality of Life: A Systematic Review and Meta-Analysis of Observational Studies." *Environment International* 82: 1–9.

Ortiz, M. 2013. *Varieties of innovation systems : the governance of knowledge transfer in europe*. Campus Verlag.

Ostrom, E. 1990. Governing the Commons Governing the Commons. Cambridge University Press.

Otteni, C., and Weisskircher, M. 2021. "Global Warming and Polarization. Wind Turbines and the Electoral Success of the Greens and the Populist Radical Right." *European Journal of Political Research*. https://onlinelibrary.wiley.com/doi/10.1111/1475-6765.12487 (May 25, 2022).

Paster, T., Nijhuis ,D., Kiecker, M. 2020) To extend or not to extend: Explaining the divergent use of statutory bargaining extensions in the Netherlands and Germany. *British Journal of Industrial Relations* 58(3): 532–557.

Rachman, G. 2018. Urban-rural splits have become the great global divider. *Financial Times,* July 30th 2018.

Radtke, J., Saßmannshausen, S., and Bohn, N. 2021. "Windkraft in Nordrhein-Westfalen: Einstellungen Zu Akzeptanz, Beteiligung Und Konfliktlösung." https://dspace.ub.uni-siegen.de/handle/ubsi/1997.

Reeves, A., and Gimpel, J. G. 2012. Ecologies of unease: Geographic context and national economic evaluations. *Political Behavior*, *34*(3), 507-534.

Rérolle, R. 2018. "« Gilets Jaunes » : « Les Élites Parlent de Fin Du Monde, Quand Nous, on Parle de Fin Du Mois »." Le Monde. https://www.lemonde.fr/politique/article/2018/11/24/gilets-jaunes-les-elites-parlent-de-fin-du-monde-quand-nous-on-parle-de-fin-du-mois_5387968_823448.html (May 25, 2022).

Reusswig, F. et al. 2016. "Against the Wind: Local Opposition to the German Energiewende." *Utilities Policy* 41: 214–27.

Ringe, W. G. 2015. "Changing Law and Ownership Patterns in Germany: Corporate Governance and the Erosion of Deutschland AG." *The American Journal of Comparative Law* 63(2): 493–538. https://academic.oup.com/ajcl/article/63/2/493/2572154.

Ringe, W. G. 2022. "Investor-Led Sustainability in Corporate Governance", *Annals of Corporate Governance*: Vol. 7: No. 2, pp 93-151. http://dx.doi.org/10.1561/109.00000038

Rodríguez-Pose A., and Crescenzi, R. 2008. Mountains in a flat world: why proximity still matters for the location of economic activity. *Cambridge Journal of Regions, Economy and Society* 1, 371-388.

Rodríguez-Pose, A. 2013. Do institutions matter for regional development?. *Regional studies*, *47*(7), 1034-1047.

Rodríguez-Pose, A. 2018. The revenge of the places that don't matter (and what to do about it). *Cambridge Journal of Regions, Economy and Society*, *11*(1), 189-209.

Rodrik, D. 2018. Populism and the economics of globalization. *Journal of International Business Policy*, *1*(1–2), 12–33. https://doi.org/10.1057/s42214-018-0001-4

Röhl, K-H., Burstedde, A., Engels, B., Geis, W., Kempermann, H., Niendorf, M., Puls, T., Thiele, C. 2018. Die Zukunft des Ruhrgebiets: Wirt- schaftliche Lage und Potenziale des größten deutschen Ballungs- raumes. *Gutachten im Auftrag der Unternehmer NRW*. IW Köln, Köln

Röhl, K-H. 2019. "The Ruhr Area: Structural Transformation and German Regional Policy." *Wirtschaftsdienst* 99: 49–55.

Rohla, R., Johnston, R., Jones, K., and Manley, D. 2018. Spatial scale and the geographical polarization of the American electorate. *Political Geography*, *65*, 117-122.

Rokeach, M. 1975. *The Nature of Human Values*. New York: Free Press.

Sardaro, R., Faccilongo, N. and Roselli, L. 2019. Wind farms, farmland occupation and compensation: Evidences from landowners' preferences through a stated choice survey in Italy. *Energy Policy*, *133*, p.110885.

Scala, D. J., and Johnson, K. M. 2017. Political polarization along the rural-urban continuum? The geography of the presidential vote, 2000–2016. *The ANNALS of the American Academy of Political and Social Science*, *672*(1), 162-184.

Scala, D. J., Johnson, K. M., and Rogers, L. T. 2015. Red rural, blue rural? Presidential voting patterns in a changing rural America. *Political Geography*, *48*, 108-118.

Schäfer, A. 2021. Cultural Backlash? How (Not) to Explain the Rise of Authoritarian Populism. *British Journal of Political Science*, 1–17.

Schenkenhofer, J., and Dominik, W. 2020. Fuelling Germany's Mittelstand with complementary human capital: the case of the Cooperative State University Baden-Württemberg, *European Journal of Higher Education*, 10:1, 72-92, DOI: 10.1080/21568235.2019.1694421

Scheytt, S., and Quadrino, K. 2009. *Der doppelte Bosch*. Hans-Böckler-Stiftung *Magazin Mitbestimmung*. https://www.boeckler.de/de/magazin-mitbestimmung-2744-der-doppelte-bosch-11011.htm

Schmid, T., Achleitner, A.-K., Ampenberger, M., Kaserer, C. 2014. Family firms and R&D behavior – New evidence from a large scale survey. *Research Policy*, 43, 233-244.

Schmitt-Beck, R. 2017. The 'alternative für deutschland in the electorate': Between single-issue and right-wing populist party. *German Politics*, *26*(1), 124–148. https://doi.org/10.1080/09644008.2016.1184650

Schöll, N., and Kurer, T. 2023. How technological change affects regional voting patterns. *Political Science Research and Methods,* 1-19. doi:10.1017/psrm.2022.62

Schöller, T., and Frank Matthias Spiegel. F. M. 2012. "Familienunternehmen Und Innovation-Untersuchungen Auf Regionen-, Unternehmens-Und Patentebene." Dissertation TU München.

Schroeder, W., and Hassel, A. 2021. Auswirkungen der Transformation auf die deutsche Sozialpartnerschaft, in Wolfgang Lemb (ed.) *Perspektiven eines Industriemodells der Zukunft*, pp. 127-142.

Schroeder, W., Munimus, B., and Rüdt, D. 2010: Seniorenpolitik im Wandel. Verbände und Gewerkschaften als Interessenvertreter der älteren Generation, Frankfurt am Main

Schroeder, W. and Greef, S. 2020. Unternehmerverbände und Gewerkschaften - Mitgliederstand und verbandspolitische Reichweite, in: bpb (Hrsg.): Dossier. Lange Wege der Deutschen Einheit, https://www.bpb.de/geschichte/deutsche-einheit/lange-wege-der-deutschen-einheit. Accessed: 05.11.2022.

Schwartz, S. H. 2007. Value orientations: measurement, antecedents and consequences across nations. In R. Jowell, C. Roberts, R. Fitzgerald, & G. Eva (Eds.), *Measuring Attitudes Cross-Nationally: Lessons from the European Social Survey* (pp. 169-203). London: SAGE Publications Ltd.

Schwarz-Kocher M., Krzywdzinski M., and Korflür, I. 2019. Standortperspektiven in der Automobilzulieferindustrie, Study No. 409, Hans-Böckler-Stiftung.

Sick, S. 2022. Schriftliche Stellungnahme. Ausschussdrucksache 20(11)239. Deutscher Bundestag, Ausschuss für Arbeit und Soziales.

Sick, S. 2020. "Erosion Als Herausforderung Für Die Unternehmensmitbestimmung." Hans-Böckler Stiftung *Magazin Mitbestimmung* https://www.mitbestimmung.de/html/erosion-als-herausforderung-fur-die-14188.html.

Specht, F. 2017. "Mitgliederzahlen Schrumpfen: Die Schwindende Macht Der Gewerkschaften." *Handelsblatt*. https://www.handelsblatt.com/politik/deutschland/mitgliederzahlen-schrumpfen-die-schwindende-macht-der-gewerkschaften/19328554.html.

Specht, F. 2021. "IG Metall Verliert in Der Coronakrise Mitglieder – Und Gibt Sich Trotzdem Kampfbereit." *Handelsblatt*. https://www.handelsblatt.com/politik/deutschland/gewerkschaft-ig-metall-verliert-in-der-coronakrise-mitglieder-und-gibt-sich-trotzdem-kampfbereit/26860538.html.

Steenvoorden, E., and Harteveld, E. 2018. The appeal of nostalgia: the influence of societal pessimism on support for populist radical right parties. *West European Politics*, *41*(1), 28–52. https://doi.org/10.1080/01402382.2017.1334138

Stein, J., Buck, M., and Bjørnå, H. 2019. The centre–periphery dimension and trust in politicians: the case of Norway. *Territory, Politics, Governance*, 1-19.

Stokes, L. C. 2016. "Electoral Backlash against Climate Policy: A Natural Experiment on Retrospective Voting and Local Resistance to Public Policy." *American Journal of Political Science* 60(4): 958–74. https://onlinelibrary.wiley.com/doi/10.1111/ajps.12220 (May 25, 2022).

Storper M., 1995. The resurgence of regional economies, ten years later: The region as a nexus of
untraded interdependencies. European Urban and Regional Studies 2, 191-221.

Storper M., 1997. The regional world: territorial development in a global economy. New York: The
Guilford Press.

Storper, M. 2018. Separate Worlds? Explaining the current wave of regional economic polarization, *Journal of Economic Geography*, Volume 18, Issue 2, March 2018, Pages 247–270, https://doi.org/10.1093/jeg/lby011

Storper, M. 1997. The Regional World. Territorial Development in a Global Economy. Guilford Press.

Storper, M., 2013. *Keys to the city: How economics, institutions, social interaction, and politics shape development*. Princeton University Press.

Storper, M., 2018. Separate Worlds? Explaining the current wave of regional economic polarization, *Journal of Economic Geography*, Volume 18, Issue 2, Pages 247–270, https://doi.org/10.1093/jeg/lby011

Streeck, W. 1997. Beneficial Constraints: On the Economic Limits of Rational Voluntarism. In J. Hollingsworth & R. Boyer (Eds.), *Contemporary Capitalism: The Embeddedness of Institutions* (Cambridge Studies in Comparative Politics, pp. 197-219). Cambridge: Cambridge University Press. doi:10.1017/CBO9781139174701.008

Streeck, W., and Thelen, K. (eds.). 2005. *Beyond continuity: institutional change in advanced political economies*. Oxford University Press

Sturm, R. 2015. *Der deutsche Föderalismus. Grundlagen - Reformen – Perspektiven.* Baden-Baden: Nomos. ISBN: 978-3-8487-1651-7

The Economist. 2019a. "Germany's long expansion comes under threat", in The Economist 09.02.2019, accessed at https://www.economist.com/finance-and-economics/2019/02/09/germanys-long-expansion-comes-under-threat

The Economist. 2019b. "Is Germany's golden decade coming to an end?", in The Economist 26.01.2019, accessed at https://www.economist.com/europe/2019/01/26/is-germanys-golden-decade-coming-to-an-end

The Economist. 2021. "Solar Power's NIMBY Problem." The Economist. https://www.economist.com/britain/2021/02/20/solar-powers-nimby-problem (May 25, 2022).

Thelen, K. 2014. *Varieties of liberalization and the new politics of social solidarity*. *Varieties of Liberalization and the New Politics of Social Solidarity*. Cambridge University Press. https://doi.org/10.1017/CBO9781107282001

Thelen, K. 2019. Transitions to the Knowledge Economy in Germany, Sweden, and the Netherlands. *Comparative Politics*, *51*(2), 295–315.

Thelen, Kathleen. 2004. *How Institutions Evolve: The Political Economy of Skills in Germany, Britain, the United States, and Japan* (Cambridge Studies in Comparative Politics). Cambridge: Cambridge University Press. doi:10.1017/CBO9780511790997

Tonkiss, F., and Passey, A. 1999. Trust, confidence and voluntary organisations: between values and institutions. *Sociology*, *33*(2), 257-274.

Tribbitt, M. 2020. *Mercedes Will Use Nvidia Technology in All Cars From 2024*. Bloomberg. https://www.bloomberg.com/news/articles/2020-06-23/mercedes-will-use-nvidia-technology-in-all-cars-from-2024?leadSource=uverify%20wall

Tutić, A., and von Hermanni, H. 2018. Socioeconomic Status, Deprivation, and the Affinity for the AfD—A Note. *Kolner Zeitschrift Fur Soziologie Und Sozialpsychologie*, *70*(2), 275–294. https://doi.org/10.1007/s11577-018-0523-0

Uji, A., Prakash, A., and Song, J. 2021. "Does the 'NIMBY Syndrome' Undermine Public Support for Nuclear Power in Japan?" *Energy Policy* 148: 111944.

Umit, R., and Schaffer, L. M. 2022. "Wind Turbines, Public Acceptance, and Electoral Outcomes." *Swiss Political Science Review*. https://onlinelibrary.wiley.com/doi/10.1111/spsr.12521

Umit, R. 2021. "Solar Panels and Political Attitudes." *Political Studies Review*: 147892992110448. http://journals.sagepub.com/doi/10.1177/14789299211044868

Uslaner, E. 2018. The Study of Trust. In E. M. Uslaner (Ed.), *The Oxford Handbook of Social and Political Trust*. New York: Oxford University Press.

Valero, D. E. 2021. "From Brexit to VOX: Populist Policy Narratives about Rurality in Europe and the Populist Challenges for the Rural-Urban Divide*." *Rural Sociology*. https://onlinelibrary.wiley.com/doi/10.1111/ruso.12410

Van de Walle, S., and Bouckaert, G. 2003. Public Service Performance and Trust in Government: The Problem of Causality, *International Journal of Public Administration*, *26*(8-9), 891-913.

Van der Meer, T. W. 2010. In what we trust? A multi-level study into trust in parliament as an evaluation of state characteristics. *International review of administrative sciences*, *76*(3), 517-536.

Van der Meer, T. W., and Hakhverdian, A. 2017. Political Trust as the Evaluation of Process and Performance: A Cross-National Study of 42 European Countries. *Political Studies*, *65*(1), 81-102.

Van Erkel, P.F., and Van der Meer, T.W. 2016. Macroeconomic performance, political trust and the Great Recession: A multilevel analysis of the effects of within-country fluctuations in macroeconomic performance on political trust in 15 EU countries, 1999–2011. *European Journal of Political Research*, *55*(1), 177-197.

Van Ryzin, G.G. 2007. Pieces of a Puzzle: Linking Government Performance, Citizen Satisfaction, and Trust. *Public Performance & Management Review*, *30*(4), 521-535.

Van Ryzin, G.G., Muzzio, D., Immerwahr, S., Gulick, L., and Martinez, E. 2004. Drivers and Consequences of Citizen Satisfaction: An Application of the American Customer Satisfaction Index Model to New York City. *Public Administration Review*, *64*(3), 331-341.

Veer, T., Lorenz, A., and Blind, K. 2016. “How Open Is Too Open? The Mitigating Role of Appropriation Mechanisms in R&D Cooperation Settings.” *R&D Management* 46(S3): 1113–28. https://onlinelibrary.wiley.com/doi/full/10.1111/radm.12232.

Vlandas, T., and Halikiopoulou, D. 2021. Welfare state policies and far right party support: Moderating ‘insecurity effects’ among different social groups. *West European Politics*, 1–26. https://doi.org/10.1080/01402382.2021.1886498

Weisstanner, D. 2021. Technological change and labour market policy preferences. In *Handbook of Labour Market Policy in Rich Democracies*, ed. D Clegg, N Durazzi. Cheltenham, UK: Edward Elgar. In press

Weßels, B. 2014. Entkoppelung von Parlament und organisierten Interessen?. In: von Winter, T., von Blumenthal, J. (eds*) Interessengruppen und Parlamente. Schriften der DVPW-Sektion Regierungssystem und Regieren in der Bundesrepublik Deutschland*. Springer VS, Wiesbaden. https://doi.org/10.1007/978-3-531-19161-4_6

YouGov. 2020. “Drei Viertel Der Deutschen Befürworten Windenergie.” https://yougov.de/news/2020/01/23/drei-viertel-der-deutschen-befurworten-windenergie/ (May 25, 2022).

Zika, G., Helmrich, R., Maier, T., Weber, E., and Wolter, M. I. 2018. Arbeitsmarkteffekte der Digitalisierung bis 2035 - Regionale Branchenstruktur spielt eine wichtige Rolle. *IAB-Kurzbericht*, 1–12.

Zmerli, S., and Van Der Meer, T. W. G. (Eds.). 2017. *Handbook on Political Trust.* London: Edward Elgar.