Nijmegen School of Management
Department of Economics and Business Economics
Master's Thesis Economics (MAN-MTHEC)

Regional sectoral dependence and the Brexit Vote: A case study of the British Automotive industry

By Lisa Lanius (s1107955)

Nijmegen, 30 June 2023

Program: Master's Program in Economics
Specialisation: International Political Economy
Supervisor: Vincent Delabastita

Radboud Universiteit

Abstract

The British referendum in June 2016 on whether to remain or leave the European Union initiated an unprecedented process of trade disintegration. Leaving the Union raised numerous questions, including the consequences for the British economy.

The present study was devoted to an in-depth analysis of the British automotive industry as an exemplary case study for regional and sectoral Brexit-related vulnerabilities. The objective of the study was to examine to what extent this sector might be exposed to the possible (negative) effects of withdrawing from the Union. In addition, the question was raised if the electorate might have voted against their own economic interests, i.e. the continued success of the automotive industry.

Drawing upon a literature review, comprised of qualitative and quantitative studies, sufficient evidence could be gathered to suggest that the automotive sector exhibits a potentially increased vulnerability to Brexit-related impacts. Conducting a multivariate regression to determine the potential influence of automotive employment on the Leave vote did not yield statistically significant evidence. Consequently, the voters presumably did not vote *against* their own economic interests. Yet at the same time, there was no statistical evidence found that they voted *in favour* of their economic interests either.

Table of Contents

Tables of Figures and Tables

Table of Abbreviations

CES	Constant Elasticity of Substitution
CGE	Constant General Equilibrium
ECJ	European Court of Justice
EEA	European Economic Area
EEC	European Economic Community
EFTA	European Free Trade Association
EU	European Union
EV	Electric Vehicle
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GVCs	Global Value Chains
G7	Group of Seven
IO	Input-Output
JIT	Just-in-Time
JLR	Jaguar Land Rover
MFN	most-favoured-nation
MNEs	Multi-National Enterprises
MP	Members of Parliament
OEM	Original Equipment Manufacturer
OLS	Ordinary Least Squares
PE	Partial Equilibrium
PM	Prime Minister
RTA	Regional Trade Agreement
SMEs	Small and Medium Enterprises
SMMT	Society of Motor Manufacturers and Traders
TCA	Trade and Association Agreement
UK	United Kingdom
UKIP	United Kingdom Independence Party

USA	United States of America
WTO	World Trade Organisation

1 Introduction

In October 2022, Rishi Sunak became Prime Minister (PM) of the United Kingdom (UK) (BBC, 2022). He was by this time the third person to take office in 10 Downing Street that year. Before Sunak, both Boris Johnson and Liz Truss held the position, both of whom were forced to step down from their posts for different reasons (Walker et al., 2022; Amos, 2022). The volatility of the Prime Ministers almost seemed to echo a country experiencing political and economic turbulent times. After all, the UK is the only nation in the Group of Seven (G7) whose gross domestic product (GDP) had yet to return to pre-pandemic levels (Partington, 2023). Its peers such as Germany or the United States of America (USA), although equally exposed to the pandemic-induced GDP drops, proved to recover much faster in comparison (Partington, 2023).

The turbulence in which the Kingdom found itself in 2022 was by no means solely caused by the pandemic or the ever-changing PMs. Rather, the foundation for this was laid much earlier. On the 23rd of June 2016, the people of the United Kingdom — by a narrow majority of 52 per cent — voted in favour of leaving the European Union (EU) (Clarke et al., 2017; Hobolt, 2016). Marking the birth of a process that would henceforth be known as "*Brexit*". This decision launched what was to become an entirely unprecedented process of trade disintegration (Dhingra and Sampson, 2022). Raising not only the question of how to unravel almost half a century of trade integration — but equally the issue of how to dissolve the political and legal ties that came along with that (Sampson, 2017; McCann, 2018).

Thus, the *Leave* vote created a conundrum that needed to be solved. An issue that neither the British government nor the *Leave* campaign seemed to have considered (Wallace, 2016). In the absence of a contingency plan, public debates ensued about what shape precisely such an exit from the Union should take. Various options with titles such as 'hard' and 'soft' Brexit were put forward. In the meantime, the government and parliament grew increasingly divided over the matter (Bailey and Budd, 2019). Almost overnight, the United Kingdom transformed into a country that would be shaped by political and economic uncertainty.

These developments at the highest political levels by no means left the British economy unscathed. British businesses were equally confronted with the question of what the future relationship with the EU might look like. With nearly 50 per cent of goods and services exports heading to one of the European member states, continental Europe represented a significant trading partner for the Kingdom (Office for National Statistics, 2018).

Concerns over what a UK outside the EU might mean for their sector were particularly prevalent throughout the automotive industry. Even prior to the eventual choice to exit the Union, British automotive companies took a clear position in favour of remaining in the bloc (SMMT, 2016). Following the referendum, car industry leaders continued to publicly caution against the effects of a 'hard' Brexit (SMMT, 2018b). Moreover, the ambassador for Japan, a country that had been heavily involved in the British automotive industry for decades, voiced concerns about the imminent exit (Helm, 2018). After all, many of these investments were inter alia made thanks to Britain's access to the European Single Market — otherwise known as the "Gateway to Europe" (Helm, 2018).

This "gateway" would finally come to an end with the signing of the Trade and Association Agreement (TCA) in 2021 - nearly 5 years after the initiation of the Brexit process (Igwe, 2022). In the meantime, the Japanese car manufacturer Honda announced its intention to eventually cease production at its plant in Swindon (Jolly, 2019). At the same time, over the course of the last 5 years, exports of British-made cars have dropped by a quarter (although one should keep in mind that the pandemic fell into this time frame) (Office for National Statistics, 2023). It, therefore, comes as no surprise that, even after the ratification of the TCA, representatives of the British vehicle industry kept pushing the government to return to the negotiating table with the EU. (SMMT, 2021; O'Carroll and Jolly, 2023).

The response of the British car industry to Brexit creates the impression that the exit almost constitutes some kind of existential crisis for the sector, which raises a few questions. Does the car manufacturers' reaction reflect the actual reality of the situation? Is the British automotive industry particularly exposed to the potential consequences of leaving the Union? How will this affect the large number of people employed in the industry? Could employment in the car industry have possibly influenced their voting behaviour during the referendum? And what about the British economy as a whole? How and to what degree is it vulnerable to the referendum outcome?

The conscious choice of a developed country like the UK to leave the largest trading block in the world — unitedly representing the second largest economy in the world — offers researchers a plentiful enigma to analyse and model (Schäfer and Kämmerer, 2021). Once again bringing up the perennial question: *„What is the cost of non-Europe?* “. Only this time academia is provided with a very real case study. Questions about the possible economic impact, the consequences for global value chains (GVCs), the reasoning behind voting for *Leave* or *Remain*, the rise of nationalism and the impact of immigration, to name a few, were the focus of much discussion.

This work aims to touch upon several of these ongoing topics. In particular, the aforementioned British automotive industry will be examined in more detail. First, the (long) road to Brexit is recounted to trace the ambivalent relationship that has existed between the European Union and the Kingdom over the past decades. This section further aims to demonstrate the continuous back and forth that marked the Withdrawal and trade negotiations, leading to substantial uncertainty. The second section complements the recounting with a review of the existing literature examining the why and who behind the *Leave* vote. Delving into the various socio-economic, identity and demographic-related findings behind the referendum. The paper then turns to the emerging body of literature on the potential impact of the referendum — with a predominant focus on the British economy. Covering country-wide, regional and industry ramifications identified by numerous scholars through a multitude of approaches. Subsequently, a more in-depth analysis of the British automotive sector will be undertaken. This case study aims to address, for one, the existing evidence regarding a potential sectoral vulnerability vis-à-vis Brexit and, for another, to provide some insights into voting behaviour with a special focus on automotive employment. Trying to answer the question: *Did the electorates cast their vote against their economic self-interest?*

2 The (long) Road to Brexit

2.1 Lead-up to the impending Referendum

Dating back to the very beginning, the UK has maintained an ambivalent attitude towards the European Union (and its predecessor organisations). Initially preferring to be part of the (less integrated) European Free Trade Association (EFTA), the Kingdom only tried to accede to the European Economic Community (EEC) in 1963 (Loth, 2015). Yet this first membership application failed when French President Charles De Gaulle vetoed the British admission (Clarke et al., 2017). In the following year, the election of a Labour government under PM Harold Wilson seemed to move the British membership in the EEC even further into the future (Loth, 2015). Traditionally, the Labour Party stood in opposition to joining the European project (Bailey and Budd, 2019). However, the ongoing decline of the British economy in combination with the emancipation of many Commonwealth states eventually lead to a change of heart and the initiation of renewed negotiations with the Six (Loth, 2015; Campos and Coricelli, 2017).

It would still take another ten years since the first failed attempt at admission for Britain to join. When membership negotiations resumed in 1967, they were once again overshadowed by France's unwillingness to welcome Britain into the community (Loth, 2015). Unfortunately for the British delegation, de Gaulle still resided in the Elysée Palace and had not changed his mind on the British question — blocking the British membership, yet again, with his veto (Troitiño et al., 2018; Loth, 2015). It wasn't until changes in both the French and British governments, that the Kingdom at long was last able to join the EEC in 1973 under a Conservative government (Dhingra et al., 2017a).

Welcoming Britain into the EEC by no means marked a decline in the internal debates surrounding the long-fought membership. In his attempts to regain office in 10 Downing Street, former PM

Harold Wilson pledged to give his voters a chance to cast their ballots on whether or not to remain in the Community (Loth, 2015). And so it came about that only two years after accession — in 1975 — the UK was already holding a referendum on remaining within the European Economic Community or not (Igwe, 2022). In a two-to-one vote, the majority of the electoral expressed their agreement *„that the United Kingdom should stay in the European Community "* (Loth, 2015; Clarke et al., 2017).

Despite the referendum's outcome, for decades the domestic support for the withdrawal of the Kingdom from the European membership persisted to be high (Graziano et al., 2020). Yet it was not only the population that was divided on this issue — the lines also cut through the political parties. Although it was originally the Labour Party that had voiced scepticism towards the European project, over the years the dividing lines more and more prominently featured within the Conservative Party. At the same time, the United Kingdom Independence Party (UKIP) with its main goal to leave the EU began to rise in favour (Clarke et al., 2017). Ultimately, the internal disagreement among the Conservatives about belonging to the EU and the worries around a strengthening UKIP potentially capturing Eurosceptic Conservative voters peaked in 2013 (Wallace, 2016; Clarke et al., 2017). Leading PM and party leader David Cameron to promise re-negotiations with the EU about the British role within it and a subsequent referendum on the European question in his pledge for re-election (Hobolt, 2016; Graziano et al., 2020).

The re-election of a Conservative government under David Cameron in 2015, ushered in the countdown to the now infamous second referendum (Clarke et al., 2017). However, before the referendum, Cameron sought to redefine the relationship between the EU and London. At the beginning of 2016, Cameron returned from negations in Brussels with a deal including the limitation of EU migrants' work benefits, an opt-out of the *"ever closer union"* and the ability of the UK to trigger a so-called ‚emergency safeguard '(Hobolt, 2016). With this deal in the pocket, the British government set the date for the referendum for June 23rd, 2016 (Clarke et al., 2017).

2.2 The struggle for votes — the *Leave* and *Remain* Campaigns

In light of UKIP becoming the third strongest party in the election (with 12.6%), frustrations with certain aspects of the negotiated deal and the strong public demand for immigration reform, both campaigns had their work cut out for them (Harris and Charlton, 2016; Clarke et al., 2017). Either camp depicted a deeply heterogeneous and diverse picture of fellow campaigners — respectively uniting people from all over the political spectrum (Clarke et al., 2017). As much as the campaigns gathered individuals across political affiliations around the same goal, as much were the campaigns divided within themselves on how to approach this goal. The line of division also went right through the government and the Conservative Party as a whole. Whilst Cameron himself, as the PM, was campaigning for the UK to stay within the EU, other members of his government were rallying for the other side (Clarke et al., 2017). Thus, practically splitting the Conservative Party and the government (Wallace, 2016).

Although, it was not only the Conservative Party that put on a lacklustre performance mobilising voters for the *Remain* camp. At the time, the head of the Labour Party, Jeremy Corbyn, similarly experienced difficulties pursuing people of his pro-European stance after previously voicing his Euroscepticism in pertinent blog posts (Clarke et al., 2017). *Leave*, on the other hand, had two very animated leaders overseeing their “Vote Leave” and “Leave.EU” campaigns — former Londoner major and Conservative Boris Johnson and the symbol of UKIP Nigel Farage (Clarke et al., 2017). Nevertheless, the *Leave* camp was still at odds with one another. Whereas the operation spearheaded by Farage positioned migration at the centre of their campaign, the more ‚traditional’ side under Johnson choose to highlight the fiscal burden associated with being a member of the Union (Becker et al., 2017).

Albeit the leave slogan *“Take Back Control”* in equal parts meant regaining national sovereignty over law-making and financial decisions as well as borders and restricting immigration, it quickly became apparent that immigration would still eventually overshadow any other topic during the run-up to the referendum (Hobolt, 2016; Igwe, 2022). After the Eastern enlargement of the European Union in 2004, the UK was one of the first and only one of three member countries, allowing full access to their labour market from the get-go (Schäfer and Kämmerer, 2021). In over two decades — spanning from 1993 to 2017 — the share of EU-born citizens almost quadrupled, rising from roughly 1 million to 3.7 million (Dennison and Geddes, 2018). Especially the influx coming from ex-socialist states exceeded the expected numbers (Schäfer and Kämmerer, 2021). Although the inflow of labour led to an overall positive effect on the British economy, the burden on the social welfare system and the downward pressure on low-skilled wages increasingly became a reason for widespread discontent with immigration (Schäfer and Kämmerer, 2021). Around the same time, the European Refugee crisis, the terrorist attack in Paris in 2015 and the incident in Cologne during New Year 2016, further fuelled growing concerns about migration in the British public (Clarke et al., 2017). The *Leave* campaign and especially the camp surrounding Farage were able to actively instrumentalise those concerns and employed a considerable amount of campaign resources to augment them in their favour (Dennison and Geddes, 2018; Goodwin and Milazzo, 2017).

Simultaneously, the *Remain* camp and their constant warnings about economic uncertainty quickly got the epithet *"Project fear"* (Clarke et al., 2017). Embarking on a negative media campaign consisting of dire warnings about an uncertain economic future outside the EU, the camp around Cameron seldomly highlighted the benefits of remaining (Clarke et al., 2017). This message however was not only driven by British politicians. Political heavyweights such as the then US President Barack Obama, many Britain's business leaders, the Bank of England and the likes of the investment bank Goldman Sachs time and time again doubled down on the alleged "disastrous" consequences leaving would have on the economy on a whole as well as the security of employment (Clarke et al., 2017). Some employers, for instance, Siemens and Rolls-Royce, even went so far as to send letters to their employees urging them to cast their vote in favour of *Remain* (Clarke et al., 2017).

With D-day in June fast approaching, polls were still split between *Remain* and *Leave*. Some forecasted a Remain win with a small margin, while others predicted a win for *Leave*. Finally, on the 23.06.2016 with a turnout of 72.2 per cent of the electoral — the highest level of political participation in almost 20 years — 51.9 per cent of the voters decided to cast their ballot in favour of leaving the EU (Clarke et al., 2017; Hobolt, 2016).

2.3 The aftermath of the referendum — negotiating a Divorce

The outcome of the referendum marked the beginning of a time of uncertainty. In the days after, the pound and the value of the stock market plunged (Clarke et al., 2017). The government (as well as the *Leave* camp) were almost completely unprepared for this outcome, lacking a coherent contingency plan (Wallace, 2016). Within the next month, David Cameron resigned as PM and Theresa May took office (Campos and Coricelli, 2017). As one of her first official acts, May created a new government department "Exiting the European Union" and put three prominent Eurosceptics —one of them being Boris Johnson — in charge of finding a suitable strategy (Clarke et al., 2017).

May might have been repeatedly saying *"Brexit means Brexit*", but nobody knew what exactly that entailed (Cowburn, 2016). Different scenarios ranged from a so-called 'soft' Brexit, in which the UK would remain part of the European Single Market, to a so-called 'hard' Brexit, in which the EU and the UK would trade according to the established World Trade Organisation (WTO) rules, were discussed (Gasiorek et al., 2019). Due to the fact that the British government wanted to limit the free movement of people and was further opposed to the role of the European Court of Justice (ECJ), a 'soft' Brexit was quickly eliminated as a viable option (Schäfer and Kämmerer, 2021). Almost six months after the referendum had set the wheels in motion, May announced plans for the UK to opt out of the Single Market and aim to strike a new trade agreement with the Union (Sampson, 2017). Moreover, Great Britain would withdraw from the Customs Union in a bid to independently negotiate any new trade treaties with non-EU nations (Sampson, 2017). This element aligned with the government's declared vision of a *"Global Britain"* (Brakman et al., 2017). An idea centred around offsetting potential trade losses — occurring due to leaving the EU — through the intensification of trade with other countries (Brakman et al., 2017).

In March 2017 May formally triggered the enactment of Article 50 of the Lisbon Treaty — officially notifying the EU of Britain's intentions to leave the Union and thereby kickstarting the countdown for the two-year negotiation period between both parties (Sampson, 2017). Seeking support for the outlined proposal May scheduled general elections for June 2017 (Sampson, 2017). Although the Conservatives won the most seats, they lost the parliament majority (Sampson, 2017). As a result, May sought out a partnership with members of Parliament (MP) from the conservative Democratic Unionist Party of Northern Ireland — known advocates of a 'hard' Brexit — to assure a functioning governing majority (Jones, 2020).

Albeit set out to take place within a two-year period, the Brexit negotiations would take more time and political leverage than some had initially expected. One of the reasons for that was the widespread narrative that the UK would enjoy a monopoly position in the trade bargaining process as it was running an import surplus with the EU (McCann, 2018). Another reason for the extended amount of time necessary was the aforementioned lack of plan. May's government might have set out to formulate 'red lines', however, it failed to form an otherwise cohesive negotiating position before the talks with the European institutions and member states began (Jones, 2020).

From the very outset, the European Union presented itself as a cohesive and powerful line against the British delegation (Bailey and Budd, 2019). Curbing some Britons' narrative about their bargaining position and outlining a negotiation plan (Jones, 2020). In sharp contrast to the cohesive stance the EU took, stood the British government and parliament. They were deeply conflicted about what a British exit from the Union should look like (Jones, 2020). Against the preferences of some members of the British government to simultaneously negotiate the Withdrawal Agreement and outline the new trade relationship between the two parties, the EU proved itself to be a hard negotiation partner and argued for a separation of the two (Jones, 2020; Bachmann and Sidaway, 2016). Arguing that the UK would be able to veto the new agreement whilst still being a member of the Union, the EU ultimately made the UK yield to their demands (Jones, 2020; Bachmann and Sidaway, 2016).

Adopting the Withdrawal Agreement required greater time than originally anticipated and was subject to several rounds of renegotiation as a result of the enduring disagreement between the British government and parliament (Jones, 2020). In October 2018, the negotiating parties reached a preliminary agreement which was to be presented to the respective parliaments for approval (Moradlou et al., 2021). However, just two months later, this draft was rejected by the British Parliament and forced the parties to return to the drawing board (Moradlou et al., 2021). Once again, the UK Parliament dismissed the revised agreement, thereby pushing for an extension of the Brexit deadline until October 2019 (Biermann and Jagdhuber, 2022). It was the unwillingness of the UK Parliament to consent to the Withdrawal Agreement that eventually led Theresa May to resign in May 2019 (Igwe, 2022).

Her successor, avid Brexiter Boris Johnson, vowed to *"Get Brexit done"* (Adam, 2019). Before this could be achieved, however, the deadline had to be extended yet again — this time to the beginning of 2020 (Moradlou et al., 2021). To ensure that his agreement with the EU would not likewise fail at the hands of the British House of Commons, Johnson scheduled general elections for December 2019. Backed by one of the Conservatives' biggest election victories in decades, the British parliament finally passed the revised Withdrawal Agreement (Roscoe et al., 2020). Brexit was done. On January 31, 2020, after nearly 50 years of membership, the United Kingdom exited the European Union (Jones, 2020).

With the adoption of the Withdrawal Agreement, the countdown towards a trade agreement commenced, to be reached within a one-year transition period (Jones, 2020). In what can only be described as a political drama, representatives of the British government and the EU institutions engaged in almost twelve months of negotiations to no avail (Boffey and Stewart, 2020). The relationship between the negotiating parties became more and more strained due to inter alia unrealistic expectations held by members of the British delegation or moves made by the British government to circumvent parts of the Withdrawal Agreement (Usherwood, 2021). At times this even led to a discontinuation of the negotiations and preparations being made by both sides for trading under WTO conditions (Boffey, 2020; Boffey and Stewart, 2020). It was only just before the impending deadline that a deal was reached on 24 December 2020 (Schäfer and Kämmerer, 2021). On the 1st of January 2021, the Trade and Cooperation Agreement between the UK and the EU took effect (Igwe, 2022). While all tariffs were lifted, the new trade arrangement nevertheless included non-tariff barriers as an inherent characteristic (Bailey et al., 2023).

This brief recounting of the European-British relationship prior to the referendum, the referendum campaign itself and the lengthy negotiations over a political divorce, illustrates both the environment in which the Brexit vote took place as well as the politically and economically turbulent times that ensued. Moreover, the brief historical background indicates that the precise nature of the new relationship between the UK and the EU's member states remained unclear over a long period of time — a circumstance that surely contributed to a high level of uncertainty.

3 The Forgotten Majority? — Who voted and why?

Although the Brexit polls seemed tight from the very outset, the world was still left puzzled by the result. This led to a wide array of different angles and possible explanations, trying to explain the, for some surprising, vote against the status quo. What were the dominant characteristics people who voted *Leave* or *Remain* shared? How did the referendum outcome relate to the prevalent socio-economic circumstances in the country? What was the role of the respective themes the campaigns highlighted? Immigration and economic uncertainty dominated the Brexit debate, but could they explain the preference for leaving the EU (Hobolt and Wratil, 2016)? In the following relations between the socio-economic, demographic, and cultural determinants and the Brexit vote are explored.

3.1 A divided country? — Who voted in favour of *Remain* and *Leave*?

Initial voting maps and reports already pointed towards the heterogeneity of votes across the United Kingdom, which was later further fledged out by more in-depth analysis. Figure 1 provides an illustration of the *Leave* share in per cent across local authority areas in the referendum for every country of the United Kingdom besides Northern Ireland (Becker et al., 2017, p. 612). As illustrated in Figure 1, whilst England and Wales predominantly voted in favour of leaving the Union, Scotland, and Northern Ireland (which is not included in the image), on the other hand, cast their votes in the other direction — expressing their preference for remaining (Henderson et al., 2021). Due to the fact that the majority of British citizens and therefore eligible voters reside in England, the majorities in Scotland and Northern Ireland were easily offset by an English opposing choice (Henderson et al., 2021). Nonetheless, England likewise did not present a homogenous picture. As many expected, especially the Greater London area acted as an outlier in this otherwise predominately *Leave* favouring part of the country. The English countryside, however, and constituencies like the West and East Midlands showcased strong support for exiting the EU (Hobolt, 2016; Harris and Charlton, 2016). Highlighting the discrepancy between the rural areas of England (and likely the country as a whole) and the bigger cities.

After viewing the evident underlying geographical determinators for casting the vote in one or the other direction, it seems important to delve deeper into the common socio-economic characteristics behind the who. A ‚regular' *Leave* vote was predicted to be associated with older age, low levels of education and high unemployment (or as some call it ‚lack of local employment opportunities) (Becker et al., 2017; Alabrese et al., 2019; Dijkstra et al., 2020). In contrast, voting in favour of *Remain* was predominantly linked to younger age, higher education, like a university degree, and employment (Ashcroft, 2016). Characteristics often found in university towns or metropolitan London, which would trace back to the higher observed *Remain* shares in those areas (Clarke et al., 2017).

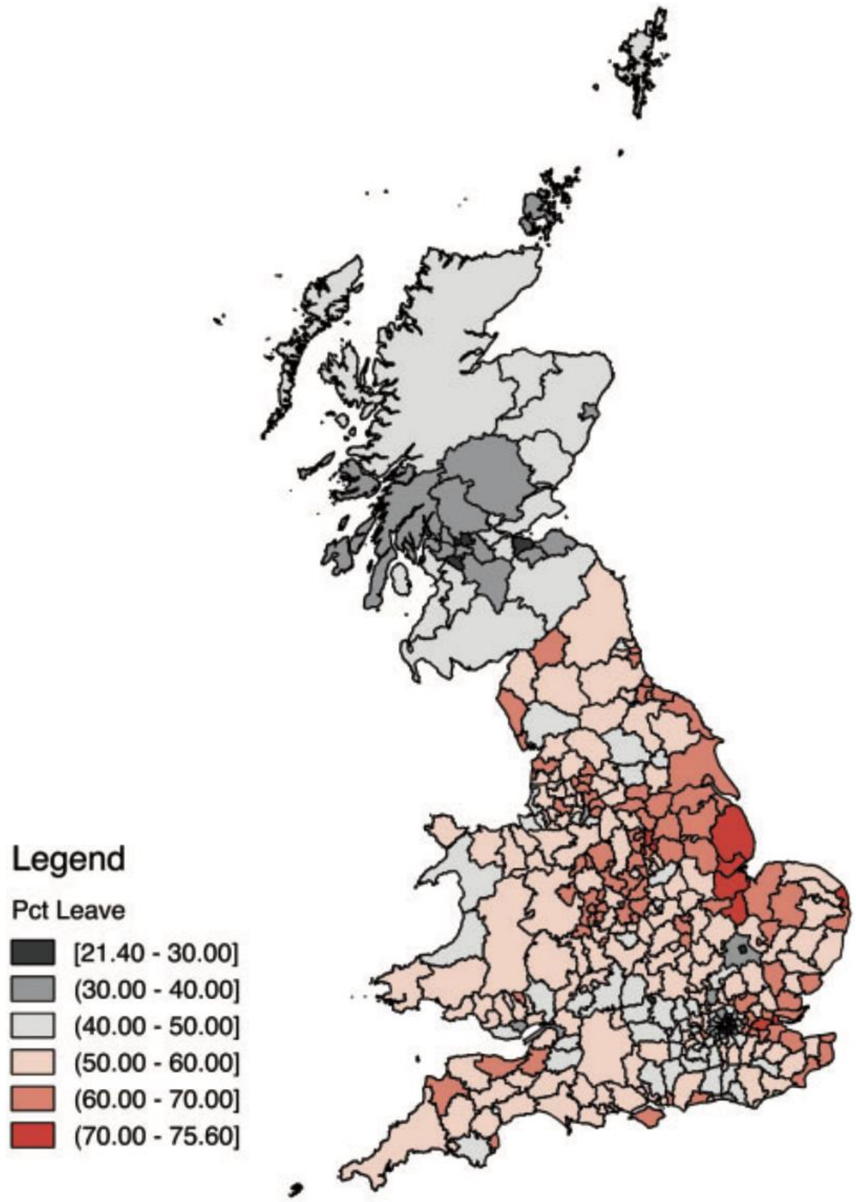

FIGURE 1 MAP OF THE LEAVE SHARE (IN %) ACROSS LOCAL AUTHORITY AREAS IN THE 2016 EU REFERENDUM (BECKER ET AL., 2017, P.612)

3.2 Identity, Immigration, and the Economy — Reasons behind the Referendum Vote

Ever since the referendum, answering the why question that hides behind the more tangible geographical and socio-economic characteristics has preoccupied many researchers. In part, the distinctive dominant themes present in the surrounding research are linked to the topics dominating the referendum itself — immigration and the economy — and in part to the more elusive, abstract concept of identity.

Since the accession of Middle and Eastern European member states, the already-mentioned streams of migration from those countries more and more became a topic of increasing concern for the British public and politicians alike. Increasing evidence suggests that the perceptions and worries regarding migration certainly played a role in influencing people's voting behaviour in the referendum (Hobolt, 2016; Goodwin and Milazzo, 2017; Becker et al., 2017). Thus, serving as an indicator that a negative attitude concerning immigration functions as a quite robust predictor for choosing to favour *Leave* in June 2016 (Henderson et al., 2021). Further, individuals, who voiced the belief that leaving the EU would result in the reclamation of control over immigration, were more likely to vote for *Leave* (Hobolt, 2016; Goodwin and Milazzo, 2017). However, when specifically evaluating communities which had experienced rapid growth in the foreign-born population, models created by Goodwin and Milazzo (2017), as well as Carreras and his co-authors (2019), draw different conclusions. Whilst the former did detect a positive and statistical impact on the vote, Carreras et al. (2019) did not find evidence for higher *Leave* support in those communities. Furthermore, one should be aware that foreign-born does not equal European-born, rather it encompasses other world regions as well. This distinction is highlighted by the results presented in Sascha O. Becker, Thiemo Fetzer and Dennis Novy's (2017) work. Here, Becker and his co-authors documented that only migration from predominately Eastern Europe is positively associated with voting *Leave* (Becker et al., 2017). The gathered findings suggest that attitude towards immigration, to a certain extent, played are role for individuals when confronted with the question of whether to *leave* the EU or *remain* (Hobolt, 2016; Goodwin and Milazzo, 2017; Henderson et al., 2021). An exact specification of the impact is conditional to the data and model utilised and therefore devoid of a universal claim.

Alongside the partially identifiable effect that migration exerted on the referendum result, taking the underlying national identities into account proved to be just as important (Hobolt, 2016; Goodwin and Milazzo, 2017). Since the very beginning of the Kingdom's membership in the EU (and its predecessor organisations), the British population somewhat struggled to embrace a 'European' identity for themselves (Curtice, 2017). Retaining the lowest levels of such an association across the European community over decades (besides Greece that is) (Curtice, 2017). So, albeit evidence implies that a European identity is associated with favouring *Remain*, it is not surprising that due to the lower amount of people embracing this identity, it did not necessarily sway the referendum towards *Remain* (Goodwin and Milazzo, 2017; Hobolt, 2016). Comparatively, the national identity 'Britishness' or at least what individuals associate with it, exhibited a stronger association with opting to vote in favour of leaving the EU (Goodwin and Milazzo, 2017; Hobolt, 2016). When it comes to the concept of Britishness it seems important to point out that there is no cohesive Britishness — it differs. Across the UK the British identity is tied to varying political beliefs and attitudes (Henderson et al., 2021). In contrast to the broader national identity of 'British' stood the sub-state identity (Henderson et al., 2021). Whereas people with an affinity to either a Scottish or Welsh identity displayed a higher likelihood of casting their ballot in favour of *Remain*, the opposite was true for the individuals demonstrating an English identity (Henderson et al., 2021). Just like the overarching national identity is associated with a stronger *Leave* vote so is the sub-national identity of English (Hobolt, 2016; Goodwin and Milazzo, 2017; Henderson et al., 2021). A detail worth mentioning in this regard is the lack of data for Northern Ireland, thus leading to no available conclusion about its influence on voting behaviour. Furthermore, most studies heavily focus on the English part of the United Kingdom and hence data collected on British identity is strongly linked to the perceptions related to it for this part of the country (Henderson et al., 2017). Nonetheless, the evidence gathered here reveals a strong predictive power of the national identities for the decision to vote *Leave* or *Remain*.

How does the economy fit in the puzzle between concerns about immigration and strong attachments to national and sub-national identities? Whilst *Remain* voters named the economy as one of the main matters swaying their vote, such concerns were not shared by the majority —

the *Leave* voters (Hobolt and Wratil, 2016; Gartzou-Katsouyanni et al., 2021). However, just because individuals did not name the economy as one of the drivers affecting their choice to favour *Leave*, it does not mean it was not underpinning it. Evidence collected after the referendum, indeed points towards an economic element being present (but it might have been more subconscious for individuals questioned about their choice) (Carreras et al., 2019; Los et al., 2017; Harris and Charlton, 2016). Not in the sense that economic conditions affect the individual directly, for example through their unemployment, but rather that the economic conditions of the environment, the region in which they live, influence their decision (Becker et al., 2017). The findings obtained by Sascha O. Becker and his co-authors (2017) even imply that the local economic conditions were the most integral voting pattern driver engaging with the characteristics of the people who form the locality. Regions exhibiting a higher proportion of less qualified or manual employment, a stronger historic manufacturing presence as well as a greater unemployment share all voted with a strong likelihood in favour of leaving the Union (Becker et al., 2017). As the geography of the referendum already alluded to, it was mostly the industrial declining and disadvantaged rural areas of the North and East of England that favoured the withdrawal from the EU (Rodríguez-Pose, 2018).

Another factor in the mix of the general economic environment is governmental austerity. From the beginning of the last decade until 2015 the British government chose to adopt the strategy of fiscal austerity (Dhingra and Sampson, 2022). In the process slashing an average of over 20 per cent of the welfare payments per person, including housing and child benefits (Dhingra and Sampson, 2022). Traditionally, those transfer payments were used to even out inequalities arising — among other things — from payment discrepancies or low-skilled employment (Fetzer, 2019). Therefore, a fiscal policy, which aims to reduce such compensation payments, potentially jeopardises this (social) balance. A study conducted by Thiemo Fetzer (2019) investigated a hypothetical linkage between austerity and the unexpected *Leave* victory. Indeed, gathering evidence that the widespread austerity measures undertaken by the British government estranged voters from the dominant political parties and lead to an increased endorsement of

UKIP (Fetzer, 2019). Further, the findings suggest that the welfare reforms acted as one of the original drivers for the referendum to even take place.

All these elements by no means stand on their own, nor do they exist in a vacuum. Instead, some of these elements may contribute to others. There is evidence supporting the hypothesis that economic factors shape the values and attitudes of the people (Carreras et al., 2019). Therefore, individuals exposed to a long-term economic decline could be more inclined to develop cultural grievances and an anti-immigration as well as a Eurosceptic stance (Carreras et al., 2019). This particular combination in turn would make people from the rural, industrial declining areas more prone to vote *Leave* (Carreras et al., 2019). Showcasing that it is not either immigration, identity, or economy, but rather an interplay of all those elements (inter alia) that decipher the underlying why of the British electorate's choice to leave the EU.

As Richard Harris and Martin Charlton (2016, p.2127) stated in their paper Brexit might be *„ […] a story of industrial decline and growing social and economic inequality, overlapping with nationalism and political beliefs […] “.* Thus, it was not a single isolated factor, such as an individual's employment status, which led to this majority vote for *Leave*. Concluding it can be detected that the economic environment has played a role in the choice of whether or not to continue British membership in the European Union.

4 Literature Review — Quantifying the economic implications of leaving the EU

When the British people made the decision to leave the EU on 23 June 2016, they implicitly decided to undo some of the deep economic ties binding them to their largest trading partners. In the year of the referendum, the Union accounted for 48 per cent of the Kingdom's total goods exports - 7.4 per cent of the total GDP for that year (Office for National Statistics, 2018). So, how has and will the unravelling of deep trade integration between the UK and the rest of the EU member states impact this relationship? Moreover, what possible effect might Brexit have on the prosperity of the British economy?

Before these questions will be explored in greater detail, it seems important to take a closer look at the distinctive features of the European Union, which extends far beyond any 'traditional' Regional Trade Agreement (RTA) (Mayer et al., 2019). The European Customs Union, for one, ensures common external tariffs, whereas the Single Market grants four so-called 'fundamental freedoms' (Dhingra and Sampson, 2022). Those freedoms include the free movement of people, capital, goods, and services across member states (Dhingra and Sampson, 2022). Beyond the Customs Union and the Single Market, the mutual recognition principle allows for a significant reduction in harmonisation costs — well beyond the common level of product harmonisation (Mayer et al., 2019). Moreover, the current and future mutual recognition of norms and standards is safeguarded by the ECJ (Mayer et al., 2019). These characteristics, inter alia, serve to demonstrate that EU integration went far beyond the mere elimination of trade barriers, and through deeper integration allowed for the removal of underlying non-tariff barriers and their associated costs.

Although Brexit embodies a caesura in a world where trade tends to integrate and not disintegrate, for scholars it simultaneously represented a unique opportunity to explore the impact of it — "the costs of non-Europe" — on a real-life case study. Yet these 'costs' extend far beyond purely monetary ones. After nearly half a century of integration, the European Union increasingly spread into political, cultural, and legal dimensions as well. While these are surely important aspects of the EU and therefore of interest in the sphere of Brexit, they largely will be excluded in the following analysis. The primary focus, as already indicated in the questions posed at the beginning, will instead rest on the anticipated ramifications arising from Brexit on the British economy.

Within the body of literature reviewed here, there appears to be a wide consensus that the *Leave* vote might potentially lead to adverse implications for the UK economy. The models adopted for this purpose offer perspectives into the economic implications that extend beyond the mere re-establishment of trade barriers. Rather, elements such as — inter alia —the geographical vicinity of the two parties, the drain of European labour or even the ongoing uncertainties triggered by the referendum are addressed in a number of theoretical approaches. These various methods will be reflected in the following review of the country-wide impact. In addition, the issue of the sectoral and regional dispersion of potential adverse effects across the Kingdom will further be considered. It is worth mentioning that most of the current literature covers a period between the initial referendum and prior to the signing of the TCA, thus the current trade relationship has not yet been explicitly explored.

4.1 Country-wide Economic Impact

Evidence gathered through classical economic modelling on the influence Brexit might have on the UK economy affirms the overarching trend — namely, the adverse consequences. Employing variations of a global Input-Output (IO) model of trade, academics showcased the UK's exceptional exposure to the economic consequences compared to its European counterparts (Vandenbussche et al., 2022; Chen et al., 2017; Giammetti, 2020). In many cases, the numerous possibilities for structuring the new trade agreement were additionally considered. This means that the anticipated contraction in GDP, for instance in Giammetti's model (2020), fluctuated between 5.98 per cent in the case of a 'hard' Brexit and 2.57 in the case of a 'soft' Brexit. As one might expect, almost all models reinforce the finding by Giammetti (2020) that a 'soft' Brexit leads to substantially lower declines in GDP and welfare losses compared to a 'hard' Brexit scenario (Born et al., 2019; Hosoe, 2018; Henkel and Seidel, 2018). Such differentiation can be attributed to the different degrees of trade integration under both scenarios. Whereas integration remains relatively strong under a 'soft' Brexit scenario, with Britain remaining part of the Single Market, integration increasingly deteriorates into disintegration in the case of a 'hard' Brexit, which means trading under WTO rules. However, no matter the scenario, the models predict a negative economic development triggered by the withdrawal from the EU.

Only roughly 30 Kilometres separate the British Islands and continental Europe in the narrowest part of the British Channel. A bit more than the distance between Rotterdam and Den Haag in the Netherlands. Of course, there is also the immediate border with the Republic of Ireland, directly contacting the UK to an EU member state. Many scholars have delved into the connection between geographical proximity and trade intensity to understand international trade (Egger et al., 2015). Employing so-called gravity models to depict *"a positive relationship between geographical proximity and economic size of two trading partners and the volume of trade between them"* (Siles-Brügge, 2019, p.427). Given the stated vicinity of the UK and continental Europe, gravity models were utilised to predict possible outcomes of the imminent trade disintegration. Throughout a variety of gravity models, researchers consistently arrived back the same conclusion — a highly likely negative impact of Brexit on the British economy (Mayer et al., 2019; Felbermayr et al., 2021; Brakman et al., 2017).

For instance, Thierry Mayer and his co-authors (2019) used gravity estimates of EU effects to simulate different scenarios of EU disintegration. Once again assuming two different scenarios of an after-Brexit trade relationship (Mayer et al., 2019). In the 'soft' exit simulation Britain and the EU enter a European Economic Area (EEA) type of relationship, similar to the one Switzerland enjoys. Here, the projected GDP loss is 1.1 per cent (Mayer et al., 2019). In the 'hard' Brexit illustration the trade between Kingdom and the Union is governed by the WTO rules, leading to an estimated GDP drop of 2.8 per cent (Mayer et al., 2019). The authors furthermore investigated the impact of possible new trade agreements with the USA, Canada, and Australia. Whilst the model finds evidence for benefits from a deepening trade with the English-speaking countries, they did not offset the *Leave* vote ramifications (Mayer et al., 2019). Pinpointing the fact that the government's ambitious “Global Britain” plan might not be able to perform as intended. Interestingly enough in the paper by Mayer and his co-authors (2019), 85 per cent of the GDP losses can be explained by leaving the Single Market and not by instating tariff barriers. Evidence that links back to a previous statement made that describes the unique depth of the European Union compared to other RTAs.

An aspect that previously shone through in the outlined negotiations as well as surrounding political debates regarding Britain's departure from the Union might also have ramifications for the economy — uncertainty. For around six years uncertainties were attached to the outcome of the trade negotiations between both parties as well as the effect this would have on governmental policies (Hill et al., 2019). Bearing the question: how did those uncertainties influence the British economy? By no means was the influence on intra-European trade flows only observable after the referendum. On the contrary, even an increase in the likelihood of a Brexit appeared to have caused a decline in trade between Great Britain and the rest of the EU27 (Graziano et al., 2020; Douch and Edwards, 2021). Adopting a more firm-specific view Paula Hill, Adriana Korczak, and Piotr Korczak (2019) highlight the importance of company orientation when it comes to Brexit-related uncertainties. For instance, internationally diversified companies — i.e., operating outside the single market — are expected to be less exposed to Brexit uncertainties (Hill et al., 2019). In contrast to that Joseph B. Steinberg (2019) could only quantify a limited economic impact of the uncertainty linked to the exit from the EU. However, he found evidence of substantial economic consequences for the United Kingdom in the long run. Beyond the ramifications uncertainties are predicted to have on trade flows, the evidence further points towards the importance of it for investment decisions (Moradlou et al., 2021). Analyses of investment activity together with Brexit-related uncertainty suggest that the rise in uncertainty has resulted in a reduced propensity to invest (Moradlou et al., 2021). The gathered evidence showcases the substantial multifaceted impact uncertainty induced by policy decisions (or rather the lack thereof) has had and likely continues to have on the British economy.

Likewise connected to the political sphere and debate is immigration, which presents a recurring theme. Identified as one reason for many Britons to vote *Leave*, its influence is not just limited to the perception of the electorate and its weaponization by politicians — it further affects the economy. As Jonathan Portes concludes in his paper *"immigration appears to have a positive [large] impact on productivity growth"* (2022, p.91). For the last decade, immigration acted as one of the key development drivers in the British labour market (Portes and Springford, 2023). The anticipated decline in labour streams coming from European — especially Eastern European — countries, due to Britain leaving the Single Market, is expected to impact the labour availability across the country (Gartzou-Katsouyanni et al., 2021; Jafari and Britz, 2020). This shortage in labour availability is expected to cause a GDP loss and an even more significant loss in GDP per capita for Great Britain (Portes and Forte, 2017). Though the shortage in labour supply is very likely not equally distributed across the various sectors and firms. Evidence suggests that Brexit possibly enhances skill shortages and obstacles in the acquisition of employees, particularly for small and medium enterprises (SMEs) (Tiwasing, 2021). Furthermore, industries like construction and food manufacturing, traditionally a domain for more low-skilled employees, are identified as sectors vulnerable to worker shortages triggered by the *Leave* vote due to their heavy dependence on European workers (Brown et al., 2019).

A less obvious politics-related channel of the economic impact are Global Value Chains. Over the last century value chains have become more and more fragmented (Ijtsma et al., 2018). Splitting up the production of final goods with intermediates made in different locations all over the globe (Ijtsma et al., 2018). The absence of tariffs, origin, and regulatory checks at intra-EU borders, leading to shorter transportation times and lower trade costs, made spreading production facilities all over members of the EU comparatively more attractive (Gasiorek et al., 2019). Often those intermediate inputs would cross intra-European borders several times until eventually sold as a final product (Giammetti, 2020). Resulting in more pan-European value chains rather than truly global ones. This is reflected in the fact that intermediate goods and services make up the majority of the British in- and exports from the EU (Ijtsma et al., 2018; Davies and Studnicka, 2018). Reinstating trade barriers, including customs checks, as a result of the trade disintegration is therefore likely to mark the British economy. Aware of those circumstances, several scholars, like the aforementioned Mayer and his co-authors (2019), use value-added for tracing trade flows to account for that. Besides accounting for intra-European intermediate trade when looking at the overall economic implications for Britain, some researchers further delve into firms and the decisions as well as vulnerabilities they are encountering due to the looming exit from the Union. Conducting a Delphi study on Brexit Hamid Moradlou, Hendrik Reefke and Heather Skipworth (2021) collected evidence that over three-quarters of the questioned Multi-National Enterprises (MNEs) choose to offshore production to mainland Europe. These considerations and decisions align with other gathered outcomes, indicating that firms with value chains heavily oriented towards Europe perform worse; likewise, firms depending on imported intermediates also yield poorer performance (Davies and Studnicka, 2018).

Given the nature of the long-winded withdrawal and trade negotiations, it is not surprising that most of the literature, as of right now, focuses on the possible scenarios and not on the newly instated TCA. Nonetheless, some researchers already started examining the experienced consequences of the TCA over the last couple of years. Consisting of a considerable increase in fixed costs for exporting to the EU, primarily due to custom declaration forms, the TCA showcased an immediate and sizeable change for the UK-EU trade relations (Freeman et al., 2022; Du et al., 2023). Although an initial drop in exports from the UK to the EU appeared to be non-permanent in its size, the loss of good variety seems to be (Du et al., 2023; Freeman et al., 2022). Estimations for the product variety loss range from 20 up to 42 per cent for the first year after the TCA took effect, indicating an accelerated concentration of export values on fewer products (Du et al., 2023, p.15). For some perhaps contra-intuitively, evidence points towards a higher and persistent decrease in imports from the EU to the UK (Freeman et al., 2022).

All the literature presented in this section, focusing on the overall economic implications of Great Britain's departure from the European Union, provides compelling evidence that the UK will have to reckon with a decline in GDP. Several factors, such as immigration and geographic proximity, which go well beyond the mere re-establishment of trade barriers, will likely play a pronounced role in that.

4.2 Evidence for Regional and Industry Heterogeneity

Like many countries, the United Kingdom is not an economically homogenous nation. Rather, there are parts of the country that are economically thriving, such as London, and others that have lagged behind for decades, for instance, various areas in Northern England (The Economist, 2020). It, therefore, seems unlikely that the previously discussed adverse economic consequences arising from the UK's divorce from the EU will be uniformly distributed. Even before any form of (free) trade agreement had been signed, Britain was described as *“exceptionally unbalanced”* on a regional level (The Economist, 2020). Compared to its industrial advanced peers like the USA, France or Germany, Britain displays the highest interregional disparity (McCann, 2018). Precisely this regional disparity is likely to become more prominent with the withdrawal from the European Union. Furthermore, a correlation between certain industries and regions can frequently be observed. Conventionally, component suppliers tend to cluster around the companies they supply, thus forming this interconnection between region and industry. Thus, if a given industry is considered to be especially vulnerable to the projected implications of the referendum, this would, conversely, translate into the linked region becoming similarly exposed.

4.2.1 *Sectoral Implications*

Identifying specific sectors more severely exposed to trade disintegration varied across the compiled body of literature as a result of different models, underlying assumptions, and available data. Indeed, the mere framework of a redefined trade relationship between the UK and the remaining EU member states has a significant influence on the outcome. Should the two parties opt to trade under WTO guidelines, for example, various product categories would be subject to differing tariffs. This is one of the reasons why, on the one hand, the (financial) service sector and, on the other, manufacturing has been highlighted as the sectors potentially most vulnerable to the negative effects (Vandenbussche et al., 2022; Giammetti et al., 2020; Hill et al., 2019; Hosoe, 2018; Moradlou et al., 2021).

With respect to the service sector, namely the administrative and support activities as well as financial services were identified as especially exposed to the referendum (Vandenbussche et al., 2022; Giammetti et al., 2020; Campos and Coricelli, 2017). Beyond identifying the specific industries, evidence suggests that the service sector is specifically sensitive to the eventual trade relationship that is established between the UK and the EU (Giammetti et al., 2020). To some extent, this can be ascribed to the concession of passporting rights to the UK or the denial of the same (Dhingra et al., 2017a; Ringe, 2021). Passporting allows firms, among other things, to open subsidiaries (or similar) in other EU member states and enables them to offer cross-border services, including financial ones (Dhingra et al., 2017a; Ringe, 2021). A deal excluding such rights would have severely hindered the UK service sector's ability from extending its business into the EU.

In quite a different manner, the manufacturing sector would be affected. Here, the aforementioned supply chains take on a crucial role. Depending on each industry's level of integration into the pan-European supply chains, they may in future be exposed to non-tariff barriers leading to increasing trade costs. Particularly the contraction of the automotive and chemical sectors is emphasised in this regard (Hosoe, 2018; Thissen et al., 2020; Jafari and Britz, 2020). For those, the evidence further suggests that their exposure to European manufacturing could lead to a comparatively greater likelihood of production relocation (Moradlou et al., 2021). Similarly, to the automotive and chemical sectors, food production, healthcare and aerospace firms are predicted to do the same, although one should keep in mind that such conclusions are based on qualitative research (Moradlou et al., 2021).

4.2.2 *Regional Implications*

It has already been noted earlier that the heterogeneity of the economic impact of leaving the EU extends to the British regions as well. As such, the projected economic decline is spread diversely throughout the regions (Fingleton, 2020). Once again, due to the utilisation of varying models, underlying assumptions and data, evidence predicts regions with opposite characteristics. On the one hand, there is stress on the Greater London area as the region is possibly subject to particularly large adverse consequences arising from the referendum (Dhingra et al. 2017b; Fingleton, 2020). Conversely, evidence is also presented in favour of the non-core regions — the periphery — some of which are estimated to suffer welfare losses that are up to three times greater than those of the core regions (Chen et al., 2017; Henkel and Seidel, 2018).

In their model, Chen, and his co-authors (2017) determined that the non-core regions of the Midlands, West and East that is, as well as the North of England, is likely to be most vulnerable to the economic consequences of the *Leave* vote. This spatial specification allows for the establishment of the aforementioned link between regions and industries. Historically, the Midlands and the North of England are regions particularly relying on the manufacturing sectors. Some regional results were already showcasing that particularly the automotive sector is a potentially vulnerable industry to the disintegration from Europe (Hosoe, 2018, Thissen et al., 2020; HMSO, 2018). Therefore, it seems to be indicated that the regions where this sector is concentrated, the Midlands and the North of England, are further expected to experience the comparatively highest GDP losses.

The same logic can be followed for the indication of the Greater London area (Dhingra et al., 2017b; Fingleton, 2020). Here, manufacturing is not as important, the economy is rather specialised in providing services (including financial ones). Several previously discussed results obtained about the sectoral vulnerability to Brexit regarded the service sector as particularly exposed (Vandenbussche et al., 2022; Giammetti et al., 2020). Once again, if the service sector is exposed to ramifications, it can be inferred that the service hub in London will also especially suffer from the consequences.

4.2.3 *Economic Vulnerability and voting behaviour in the Referendum 2016*

Applying the contradictory regional and sectoral findings to the local election results yields equally opposing conclusions. Either the citizens cast their votes contrary to their economic interests or precisely in favour of them. For instance, a widely cited paper by Bart Los, Philip McCann, John Springford and Mark Thissen (2017) argues that the *Leave* vote contradicted the electorate's economic self-interest. Based on regional exposure to trade data, they showcase that manufacturing is at times five times more dependent on the European markets compared to services. According to Los and his co-authors (2017), it is indeed manufacturing's deep integration into European value chains instead of global ones that leads to the higher exposure and vulnerability to Brexit repercussions. Based on this the authors find a positive correlation between the proportion of leave voters and the share of local GDP fuelled by investment and consumption demand from the rest of the EU (Los et al., 2017). Leading to the rather ironic conclusion that it was in fact the citizens that are potentially way less negatively impacted by Brexit who were more inclined to vote in favour of remaining.

Directly contradicting the findings from Los and his co-authors (2017) is the evidence compiled by Swati Dhingra, Stephen Machin, and Henry Overman (2017b). Instead of resting their arguments on the European supply chains' dependence on the British manufacturing sector, they rather focus on explanations showcasing how the service sectors are comparatively more adversely affected. As of the time of the referendum, trade was concentrated in the areas around the South and East costs, which the authors claim will change once trade shifts away from the EU, resulting in these areas experiencing major losses. Furthermore, Dhingra and his co-authors (2017b) argue that the trade pattern will — as a result of a new trade agreement — change. Pointing towards the fact that, traditionally, services are exposed to higher trade barriers than other sectors. Grounded in those assumptions, they depict evidence that it is exactly these Local Authorities, in which the service sectors are concentrated, that are predicted to be most adversely impacted by leaving the European Union. Thus, in conclusion, for Dhingra, Machin and Overman (2017), countering Los et al.'s (2017) results, the *Remain* vote was higher in areas, which are expected to be most adversely affected by Brexit. Signalling that, in fact, British citizens voted *in favour* of their economic interests instead of *against* them.

4.3 Preliminary Conclusion: The Economic Consequences of Leaving the EU

A review of the extensive Brexit literature offers a first indication of the anticipated consequences of the referendum on the British economy. Through a variety of modelling approaches, scholars have mapped the potential adverse implications of the withdrawal (Vandenbussche et al., 2022; Chen et al., 2017; Giammmetti, 2020; Dhingra et al., 2017a). Of course, these projected consequences are not necessarily identical in their scope and nature. Indeed, variations are evident in the range of possibilities regarding the post-Brexit trade relationship between the EU and the UK. In particular, the so-called 'hard' Brexit, trading under the barest WTO rules, has been predicted to lead to significant GDP and welfare reductions (Dhingra et al., 2017a; Mayer et al., 2019).

The fact that the European Union does not represent a classic RTA has already been mentioned at the beginning (Dhingra and Sampson, 2022; Mayer et al., 2019). It is therefore not surprising that the unfavourable economic implications are not solely rooted in the reintroduction of tariffs. After all, the Single Market guaranteed, inter alia, the free movement of persons and goods among its members (Dhingra and Sampson, 2022). The suspension of these fundamental freedoms, researchers argue, could exert an influence on the labour supply, due to the shrinking stream of workers from Europe, as well as on the pan-European supply chains, within which the UK has been a significant actor (Portes and Forte, 2017; Portes and Springford, 2023; Gasiorek et al., 2019; Giammetti, 2020). These consequences are projected to spill over to the wider British economy (Portes and Forte, 2017; Gasiorek et al., 2019).

The increasingly tense negotiations between the Union and Britain, initially around the withdrawal agreement and thereafter over the new trade deal, might likewise have exerted an influence on the economy. Indeed, the uncertainties that businesses experienced as a response to the referendum were considerable — and they were not ameliorated by the protracted negotiations. Even before the final decision to withdraw from the European project via the referendum, a reduction in trade flows between the EU and the UK was already noticeable because of the ensuing uncertainty (Graziano et al., 2020; Douch and Edwards, 2021). This once again demonstrates the link between the economy and politics.

It is highly doubtful that the predicted economic reductions will be evenly distributed throughout the Kingdom's various regions and industries. A fact that seems particularly troublesome given the existing pronounced levels of inequality in the country (McCann, 2018). Given that many industries are closely tied to specific regions, due to their tendency to settle in local clusters, a potential sectoral vulnerability — to leaving the Union — implies a regional one as well. However, the identification of the single industry or region that is most affected by the adverse effects is impossible based on several theoretically driven models, offering opposing answers. While the financial services sector, and thus Greater London, is often singled out as particularly sensitive, other scholars instead point to the manufacturing sectors, often combined with the Midlands and the North of England (Vandenbussche et al., 2022; Giammetti et al., 2020; Hosoe, 2018; Thissen et al., 2020).

These contrary results give rise to an interesting implication, which has previously been addressed by Los et al. (2017) and Dhingra et al. (2017b): *"Did people vote against their own economic interest when casting their vote in favour of Leave?"* This question will be revisited hereafter in relation to the UK automotive industry and its related areas. Frequently explicitly marked as the sector which, due to its characteristics, presents particular sensitivities to the *Leave* vote, the British automotive industry in combination with its regional implications offers the basis for an intriguing case study (Thissen et al., 2020).

5 Case Study — the British Car Industry

Even before the eventual agreement was struck between Great Britain and the EU, redefining the trade relations, the Society of Motor Manufacturers and Traders consistently voiced concerns about Brexit itself and later on about its nature (SMMT, 2016; SMMT, 2018b). Representing one of Britain's largest trade associations, SMMT published an industry survey amidst the negotiations in 2018 revealing a widespread fear of a “no deal” scenario among its members (SMMT, 2018a; SMMT, 2018b). At this point, the trade association was already observing a decline in investment, employment, and car sales (SMMT, 2018a). Mike Hawes, SMMT chief executive, found the following words to describe the situation the automotive industry found itself in: *"Frictionless trade as part of the EU single market and customs union has driven the success of the UK automotive industry so the fact we are leaving is already painful, and already causing damage. “(*SMMT, 2018b).

Although the automotive industry has decreased in significance in the course of the last century, it nevertheless remains a sector of considerable economic importance. Therefore, such statements from industry representatives ought to be of interest. After all, the UK automotive industry directly employed 169,000 people in 2018 (Haynes, 2020). Given that the automotive sector is increasingly characterised by complex and fragmented supply chains, the fact that the number of people indirectly employed by the industry reaches almost 800,000, is not surprising (Bailey and De Propris, 2017; SMMT, 2019). However, the role of the sector within the British economy is not limited to that of an employer — the automotive sector contributes substantially to its success. Figures from 2018 suggest that the industry contributed 0.8% of total economic output, with the share of manufacturing output being even higher at 8.5% (Rhodes, 2019).

Simultaneously, the importance of the European Union to the success of British manufacturers is not to be underestimated. More than half of British-made cars found their way to one of the EU member states in 2018 (SMMT, 2019). This makes the export of cars and parts to the Union the largest single product group in terms of its value to the UK (Office for National Statistics, 2018). As such, in the year of the referendum, the total value of cars exported to the EU amounted to

£18 billion (Office for National Statistics, 2018). Yet the significance of the EU is not limited to its importance as a destination for British-made cars. Due to the prevailing globalisation tendency in the automotive industry, the suppliers of the numerous individual parts are increasingly scattered across the globe (Ijtsma et al., 2018). The UK-based part of the industry has not remained untouched by this development. However, in the case of the United Kingdom, the supply chains established over the past few decades are not necessarily of a global dimension, but rather of a pan-European nature (Bailey et al., 2022a; Ijtsma et al., 2018).

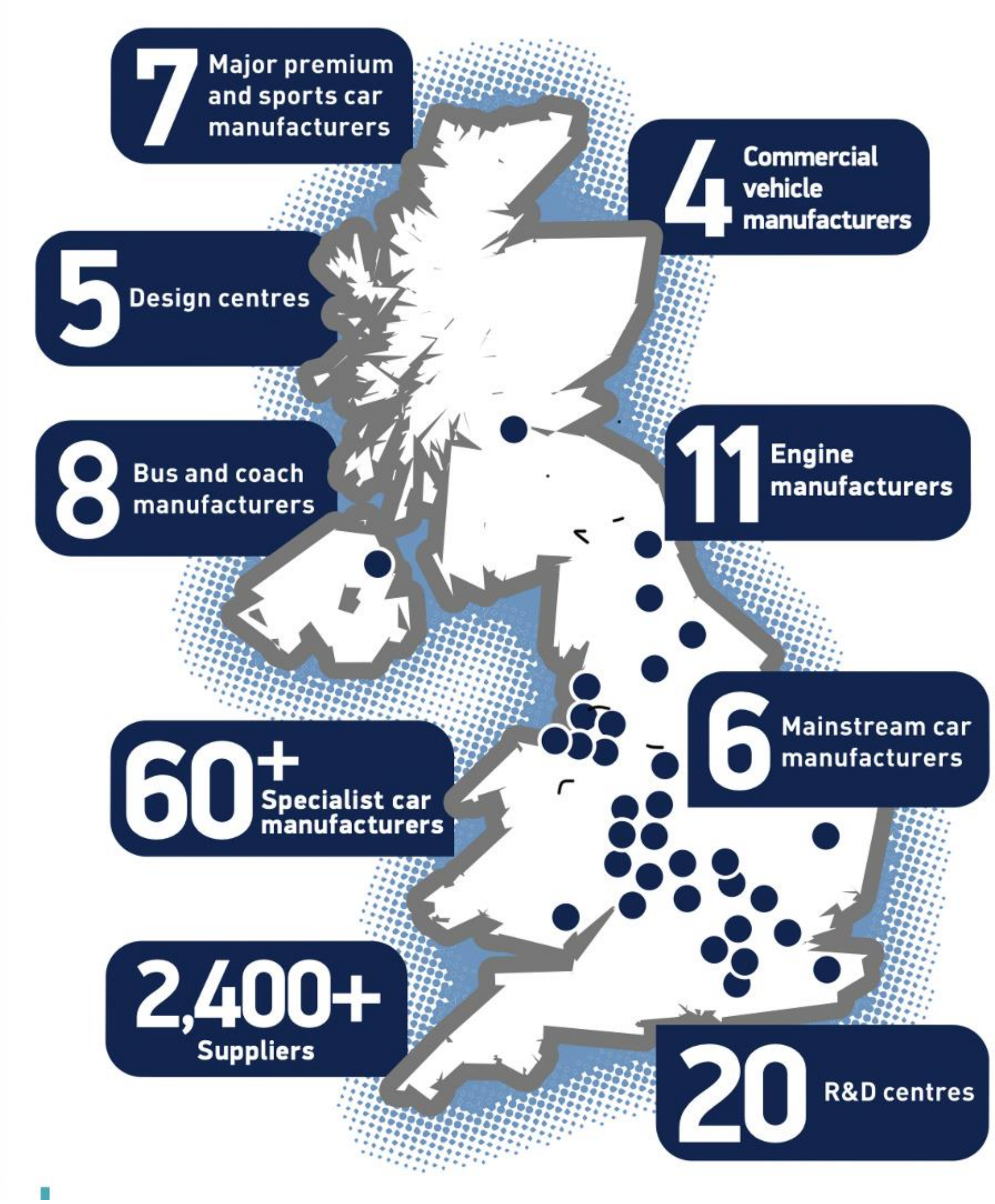

FIGURE 2 UK AUTOMOTIVE AT A GLANCE (SMMT, 2020)

As previously noted on several occasions, the UK automotive sector is by no means spread homogeneously across the country. As Figure 2, taken from SMMT (2020), visualises, production and research and development (R&D) activities are concentrated in certain areas. Over 2,400 suppliers are clustered around major car manufacturers, such as the BMW/Mini plants in Oxford and Cowley. It is equally apparent from Figure 2 that is primarily business concentration in England, with only a few exceptions in Wales, Scotland, and Northern Ireland. Here, the regions of the West Midlands, with the highest number of manufacturing sites in Birmingham and Converty, Meyerside, recognisable as a distinct cluster around Liverpool, the North East, visible by its cluster in Sunderland, and the North East, with operations in Knowsley, are of particular importance (Qamar et al., 2022; Thissen et al., 2020; Itjsma et al., 2018).

In the remainder of this part, the historical significance of the British automotive industry for regional prosperity is briefly outlined by looking at the West Midlands as an example. This is followed by a deeper analysis of the sectoral vulnerability to the UK's exit from the EU. Inspired by the work of Los et al. (2017) and Dhingra et al. (2017b), the question of whether the electorate voted against its economic interests is addressed. Finally, the evidence is discussed and summarised.

5.1 The British Car Industry — Economic Motor and Problem for the West Midlands

For more than a century, the British automotive industry has served as one of the pillars of the national economy. This has been particularly true in the West Midlands region, which includes the metropolitan area of Birmingham. As late as the 1950s, the British automotive sector was still a pioneer in car production in Europe and, after the USA, even globally (The Economist, 2023). Reflecting this, in the early 1960s, the West Midlands was the most prosperous region in the UK second only to the South East (Donnelly et al., 2016). Within the same period, the engine of British manufacturing was about to falter (Donnelly et al., 2016). In the span of a decade, the West Midlands changed from being the second fastest-growing economic area in the country to experiencing the slowest economic growth (Donnelly et al., 2016). Firms such as British Leyland

and Chrysler were collapsing and shutting down their plants (Donnelly et al., 2005). Thus, the West Midlands was officially in the grip of a deep recession (Donnelly et al., 2016).

The contraction of the car manufacturing sector was accompanied by a period of economic decline and high unemployment in the West Midlands, driven by the high dependency on the industry. By the early 1980s, the West Midlands recorded the largest increase in unemployment and the highest long-term unemployment rate among all English regions (Donnelly et al., 2005).

With the onset of globalisation within the car industry, the prospects began to shift. Due to flexible labour laws, existing domestic engineering prowess and entry to the European market, the UK, and thus the West Midlands started to attract foreign direct investments (FDI) (The Economist, 2023). Starting in the 1980s Toyota and Nissan, both Japanese companies, and the French brand Peugeot started to set up plants on the Isles (The Economist, 2023). British heritage-rich brands like Jaguar, Land Rover and Aston Martin were acquired by Ford (Donnelly et al., 2005).

Yet the troubles of the automotive industry in the UK — and in the West Midlands — were not over. Having most of the formerly British-owned companies in the hands of multinationals exposed the industry and the region to vulnerability and dependency on foreign investment decisions (The Economist, 2023). Similarly, the drop in volume production posed a challenge and exacerbated the reliance on luxury manufacturing, as exemplified by Aston Martin (Donnelly et al., 2005). As volume output dwindled, so did jobs in the West Midlands. The 2005 demise of MG Rover, under the leadership of BMW, further contributed to the destruction of jobs (Donnelly et al., 2005; Donnelly et al., 2016).

With the sale of both Jaguar and Land Rover to the Indian company Tata Motors, the region's most important plants in Solihull and Castle Bromwich once again switched ownership (Donnelly et al., 2016). Simultaneously, the automotive industry appeared to be undergoing a renaissance. Between the years 2010 and 2016, a strong increase in British car production could be observed

(Qamar et al., 2021). By 2016, the UK was ranked 13th in the car-making league (The Economist, 2023).

This brief historical overview of the British car manufacturing industry, focusing specifically on its origins in the West Midlands provides an exemplary illustration of the fact that the sector’s fate is irrevocably tied to the region's fate. The evolution observed in the West Midlands is likewise relevant for the purpose of analysing voting behaviour. After all, according to the findings of Becker and his co-authors (2017), it is precisely these places which are traditionally tied to manufacturing, and which have undergone an economic decline in recent decades which tended to be more inclined to vote in favour of exiting the EU. If the sector were to suffer any economic losses as a result of Brexit, it would be another blow to a region that has endured de-industrialisation and only in recent years begun to recover, much like the industry on which it relies upon.

5.2 Quantifying the Economic Impact of Brexit on the British Car Industry

Representatives of the motor vehicle industry publicly voiced their concerns even prior to the ratification of a new trade agreement with the EU (BBC, 2017; SMMT, 2018b). In particular, a so-called 'hard' Brexit, which would revive tariffs and non-tariff barriers, raised a number of issues (SMMT, 2018a; SMMT, 2018b). Like many other companies, automotive companies and their suppliers faced considerable uncertainty in the wake of the referendum and the drawn-out renegotiation of the Withdrawal Agreement as well as the new Trade Agreement. Yet even though the ink is dry on the TCA, industry voices are growing louder once again. In 2024, a transition period will expire, after which stricter post-Brexit rules will apply. In particular, the stricter rules-of-origin requirements, which would have a severe impact on electric vehicle (EV) production, have raised some red flags for businesses (Holton and Carry, 2023). For example, Vellantis, which among others owns the affiliates Ford and Peugeot, indicated to members of parliament that the previous commitment to manufacturing EVs in Britain might have to be suspended under the current TCA conditions (Hughes, 2023). The world's third-largest carmaker thus joins a growing number of calls within the automotive industry to renegotiate the TCA provisions (Holton and Carry, 2023; Hughes, 2023).

Given these recent developments, the question arises as to whether the industry's threat perception is legitimate and what precisely makes the UK automotive industry so vulnerable to the terms of the TCA. To address this question in more detail, a mix-method approach is used to review existing evidence drawn from qualitative and quantitative research examining the car industry in light of the implications arising from the *Leave* vote. Once again, the vast majority of the research articles cover the period before the signing of the incumbent TCA. Nevertheless, thanks to the fact that most of the studies examine several Brexit scenarios, it is possible to draw certain conclusions regarding the degree of vulnerability experienced by the industry.

Several points underpin the argument for a high burden on the UK car industry arising from the decision to leave the EU and the subsequent redefinition of trade relations. For one, there are the deeply embedded pan-European supply chains, tailored to the sector's just-in-time manufacturing system (Ijtsma et al., 2018). Further, the Union, with its 27 remaining members, constitutes the largest customer of UK-produced vehicles (SMMT, 2019). Moreover, businesses are highly likely to face an overall rise in expenses as a result of the implementation of tariffs and excise duties (Vandenbussche et al., 2022). Moreover, the automotive sector and its network of component suppliers have benefited from the frictionless inflow of EU labour over the past few years and are thus potentially reliant on this stream in the future (Bailey et al., 2022a). Suspending the fundamental freedom of movement of people anchored in the Single Market might disrupt this. As the historic development in the West Midlands has demonstrated, the British automotive sphere is a sector which has enjoyed high levels of FDI, yet at the same time, of course, is reliant on foreign investment (Bailey et al., 2019). One of the frequently cited motives behind these investments has been to secure entry into the European market (Li et al., 2019). Meanwhile, a widespread contraction of the UK economy — highly likely according to several modelling approaches outlined earlier — could have consequences for the domestic market. Thus, the slowdown of the economy in general, could lead to a decrease in sales of automotive domestically and thereby to a slowdown of the UK automotive industry (Bailey and De Propris, 2017). The combination of several of these elements, such as pan-European supply chains and access to needed European labour, in the worst-case scenario, may trigger employment losses or the closure of entire plants in the UK (Bailey and De Propris, 2017). Subsequently, the available body of literature that supports or refutes this argument is reviewed.

5.2.1 *Pan-European supply chains and Just-In-Time Networks*

To first provide a better understanding and visualisation of the pan-European supply chains Figure 3 derived from the work by Los and his co-authors (2015) is consulted. The diagram represents a (simplified) internationally dispersed value chain. Based on this diagram, Ijtsma et al. (2018) created an example for the automotive sector, which is modified below to specifically suit the British branch of the industry. For simplicity reasons, the supply chain is organised into three different countries. Country 3 represents the UK. In order for them to produce the final good, i.e., the car, British capital and labour are utilised, thereby creating value added for the Kingdom. A portion of the required intermediate goods, be it the engine or the tyres, are directly manufactured in the country itself. Once again, British labour and capital are invested — yet again creating value added for the UK. Other input materials are sourced from other countries by the British car industry. For instance, Country B, let it be Germany, provides the UK with the necessary semiconductors needed for car manufacturing. This time, German labour and capital are translated into value added for Germany. Much like the United Kingdom does for their final product, the car, Germany will most likely source the required input from several countries for their semiconductor production. Such a country is symbolised by Country A. In reality, these value chains are more complex in nature, and the UK often assumes several different roles in the network simultaneously. Thus, Country A or B might also be Great Britain. This illustration and example are intended to provide some insight into how complicated and deeply embedded the value chains of the UK car industry are — particularly in pan-European terms.

In addition to this pan-European supply chain nexus, another element is worth noting considering the trade disintegration and possible re-emergence of trade barriers. The cross-national supply chains have more and more transformed into Just-in-Time (JIT) networks. This implies that inputs

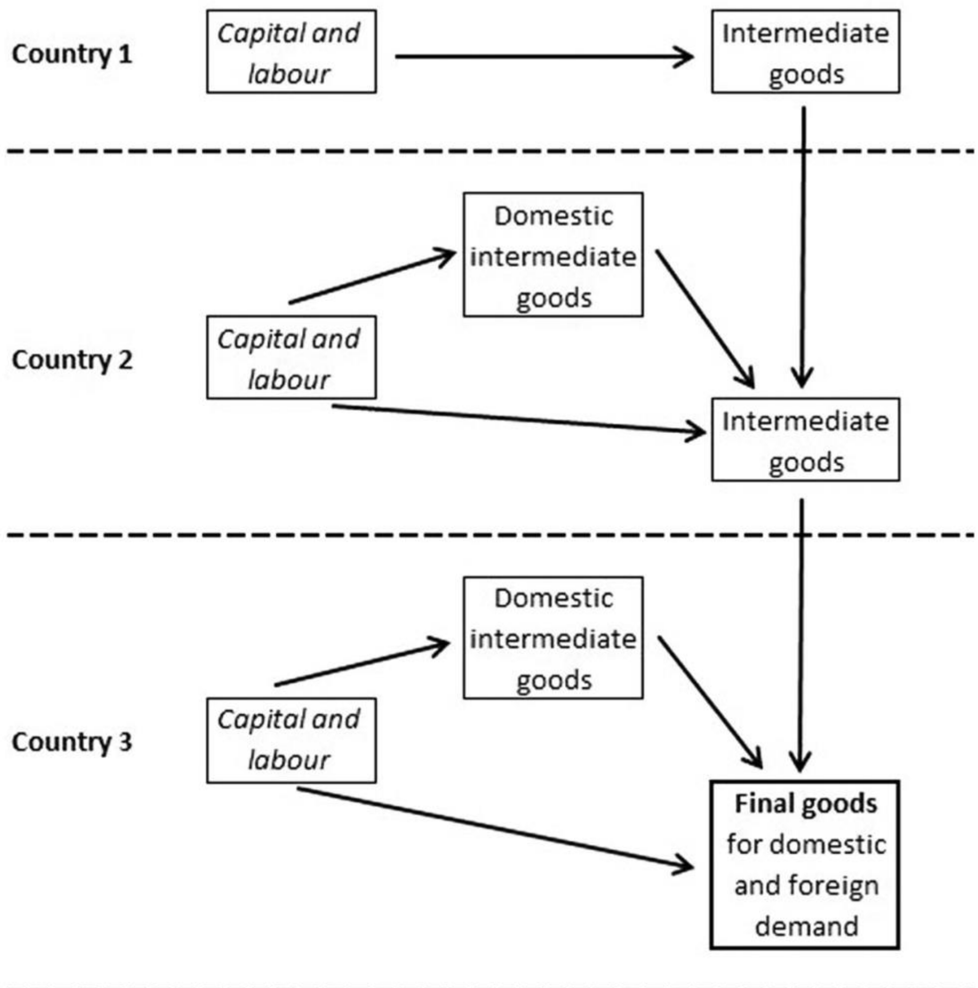

FIGURE 3 STYLIZED REPRESENTATION OF AN INTERNATIONALLY FRAGMENTED VALUE CHAIN (LOS ET AL., 2015, P.70)

are shipped to the production sites at precisely the right time and in low quantities (Bailey et al., 2019). Only as much as is needed for the next work step — practically shifting the warehouse to the road. An advantage of such a strategy is, inter alia, the reduction of warehouse costs as well as an increase in production quality (Rhodes, 2019). On the other hand, it is time-sensitive; in the worst case, delayed deliveries might lead to a temporary suspension of production (Bailey et al., 2023). The free movement of goods between the members of the European Single Market and the Union plays a crucial part in the functioning of the system (Bailey et al., 2019). Rendering customs checks on goods as basically obsolete — thereby ensuring the smooth and frictionless flow of goods and commodities among its members (Bailey et al., 2019). Withdrawing from the EU without maintaining membership in the Single Market puts this in jeopardy (Bailey and Budd, 2019). It is not only by the erection of tariffs but more so by the re-emergence of non-tariff barriers. Rules-of-origin checks, other customs controls, and the continued necessity to comply with European production standards (despite no longer having a voice in determining them) are among the potential elements that compromise both JIT and low supply costs (Ijtsma et al., 2018). For instance, findings by Ijtsma and co-authors (2018) suggest that the costs of manufacturing inputs, including car inputs, are expected to increase substantially in the event of a trade agreement which does not eliminate non-tariff barriers. Several of the concerns, i.e., rules-of-origin checks and customs controls, became a reality with the signature of the TCA.

Results obtained by Mark Thissen, Frank van Oort, Philip McCann, Raquel Ortega-Argilés and Trond Husby (2020) highlight the European orientation of supply chain and sales. Opting to analyse regional-industry-specific competitive weaknesses and opportunities possibly arising from the referendum, Thissen and his co-authors (2020) identified both the British vehicle industry and its affiliated geographical locations as severely affected. Indeed, the frequently mentioned West Midlands, Meyerside and East Riding were determined as areas likely to be most vulnerable to the adverse implications of the *Leave* vote. In this context, the fact that the authors simultaneously identify a place which is similarly linked to the car industry — Cheshire — as an area exhibiting potential competitive opportunities, presents an interesting twist. According to the researchers, this is owed to the reality of the district's sales and supply chain composition. Instead of relying on pan-European supply chains and demand like its counterparts, like for example Meyerside or East Riding, the car sector here is predominantly UK-oriented (Thissen et al., 2020). Vice versa implying that the other locations are vulnerable precisely due to their EU orientation. Since the signing of the EU-UK TCA, which is more akin to a 'hard' Brexit in nature, it can further be observed that the non-tariff barrier costs that Thissen and co-authors (2020) imposed in their model do not deviate too far from reality (Bailey et al., 2022a).

Similarly, the focus on national and regional adverse implications presented by Wen Chen, Bart Los, Philip McCann, Mark Thissen and Frank van Oort (2017) permits the drawing of some implications for the automotive industry. In their model based on the World Input-Output

Database, the authors account for all effects associated with the geographical fragmentation of production processes throughout countries and regions (Chen et al., 2017). Thereby, Chen and his co-authors (2017) detect a high degree of GDP exposure in the regions of the Midlands and the North of England. In particular, the West Midlands, the North East and North West included in this group are all areas representing a large share of the UK's automotive industry (Rhodes, 2019). In addition, the regions outside the UK mentioned are of equal interest. For instance, the south of Germany, and in particular Stuttgart, were found to have a comparatively higher potential GDP exposure (Chen et al., 2017). Major German car manufacturers such as BMW, Audi and Porsche are located in the South of Germany, along with associated large suppliers such as Bosch (Schäfer, 2020). These regional findings indicate possible negative consequences for certain English regions arising from Brexit, in part reflecting their ties to the British automotive industry.

In addition to these quantitative findings, several researchers have interviewed members of the automotive and manufacturing sectors, largely throughout the supply chain in the West (and East) Midlands (Li et al., 2019; Bailey et al., 2022a; Bailey et al., 2023). The results from these interviews unanimously suggest a general tendency to increase inventories in preparation for the exit (Li et al., 2019; Bailey et al., 2022a). For example, 89% of a sample of 100 respondents in a survey administered by Bailey and fellow researchers (2022a) stated that they had increased their stockpiles. This is confirmed by the data gathered by the Office for National Statistics (2021). Indeed, the fourth quarter of 2020 recorded a significant increase in imported goods, which supports the existence of stockpiling in anticipation of the transition period coming to an end in early 2021. Thus, the sector undertook a temporary shift from JIT manufacturing to just-in-case manufacturing (Bailey et al., 2023). Overall, the respondents indicate a sector that is aware of its role in the pan-European supply chain along with the possibly resulting Brexit vulnerability. For instance, one respondent — a manager of an automotive original equipment manufacturer (OEM) — commented on Brexit as follows: *"[...]a disaster for the economy and for the country and for our business. As a company, we are very much UK concentrated in terms of our geographical, manufacturing and other supporting services footprint"* (Li et al., 2019, p.5).

At the same time, however, a concrete plan on how to tackle the potential disruption arising from leaving the Union frequently remained lacking (Li et al., 2019; Bailey et al., 2022a). Subjects in the various studies often referred to a perceived absence of clear government communication, which on the one hand complicated their planning and on the other exacerbated Brexit uncertainties (Li et al., 2019; Bailey et al., 2022b). Exemplary evidence exists for the impact of these uncertainties on production and the supply chain. In the lead-up to several Brexit deadlines, JLR as well as Toyota and BMW temporarily suspended their assembly operations in April and October 2019 (Bailey et al., 2022b). Just for JLR, this translated into production downtime at four different sites — Solihull, Castle Bromwich, Wolverhampton, and Halewood (Bailey et al., 2022b). Yet, beyond this exemplary evidence, there is no further data on the costs and other factors involved.

Meanwhile, the conceptualisation of the supply chain, when confronted with disruption, impacts the choice of location. Once again, the Delphi Study approach by Hamid Moradlou, Hendrik Reefke and Heather Skipworth (2021) offers insights into the manufacturing production site selection. On the basis of four interview rounds, Moradlou and his co-authors (2021) deduce that the automotive industry is most likely to be affected by a change in the location of production sites, suppliers, and distribution sites. *“Delays in product delivery due to new border control"* and *"higher costs through new tariffs for imports/exports to the EU"* are widely cited reasons for such a potential shift in manufacturing location directly correlated to the supply chain (Moradlou et al., 2020, p. 118). The same considerations for supply chain relocation are reflected in the survey responses presented by Li et al. (2019) and Bailey et al. (2023). There is indeed some anecdotal evidence of a shift in production in this case as well. First-tier supplier GKN, for instance, has chosen to move its production from Birmingham towards Poland, France, and Italy (Bailey et al., 2023). A decision that was accompanied by the loss of some 800 British jobs (Bailey et al., 2023). In the long run, many scholars believe that the exit from the EU will be associated with a restructuring of supply chains (Ke et al., 2022; Bailey et al., 2023). Whether this means that British car manufacturers switch to other, more global partners or a (partial) relocation of their production in favour of other countries in the EU remains to be open.

5.2.2 *Output*

As in any other industry, the production of car companies is tied to demand. The event of a withdrawal from the European Union accompanied by the reintroduction of tariffs and non-tariff barriers might, theoretically, lead to two opposing forces exerting an impulse on production. For one, British consumers could substitute European-made cars with domestically manufactured cars (Head and Mayer, 2019). Whilst this would have a beneficial effect on the production output of the industry, at the same time the Britons themselves would suffer a decrease in variation (Head and Mayer, 2019). Then again, with the new trade barriers, European customers, representing an important proportion of British sales, could decrease their consumption of British products (Bailey and De Propris, 2017). Moreover, this is enhanced by the aforementioned argument of general economic contraction. As a result, domestic customers would in turn require fewer British-manufactured cars (Bailey and De Propris, 2017).

The question of the consequences for both the British producer and the domestic consumer accompanying a trade policy shock such as Brexit — and the ensuing resurgence of tariff and non-tariff barriers — was posed by Keith Head and Thierry Mayer (2019). Using a double constant elasticity of substitution (CES) multinational production model, the authors conclude that any shape of departure, be it a 'hard' or 'soft' Brexit, will have negative ramifications for the British car industry as well as consumers (Head and Mayer, 2019). Whereas under a 'hard' Brexit the output loss would de facto be lower (73,000 cars) compared to a 'soft' Brexit (83,000 cars) (Head and Mayer, 2019).

A perhaps better insight into potential export losses to the EU27 is provided by the Constant General Equilibrium (CGE) models of Nobuhiro Hosoe (2018). According to this analysis, the expected export loss of the automotive industry is estimated to be around 20 per cent. This is partly due to the comparatively high expected most-favoured-nation (MFN) tariff barriers coupled with an estimated 2.1 per cent increase in non-tariff barriers, denominated in tariff equivalents, that the sector faces (Hosoe, 2018).

One element not yet addressed in the automotive industry is likely to be of importance as well — Research and Development activities. In a multi-market partial equilibrium (PE) model for the UK manufacturing industry and sectors, Gasiorek, Serwicka and Smith (2019) incorporated a sample of 122 different manufacturing industries. Thereby, the researchers observed indications that R&D-intensive groups in particular would face a decline in output under all considered post-Brexit trade scenarios. Arguably, one such sector is the British automotive industry. Indeed, the number of R&D centres for the year 2020 was indicated to be twenty for Great Britain (SMMT, 2020).

5.2.3 *Labour and Immigration*

Two different dimensions emerge for the issue of labour in the car industry. Firstly, a decline in demand for labour is imaginable based upon the potential decline in demand and relocation of production facilities described earlier. As illustrated in Figure 2, the distribution of employees in the car industry is by no means uniform across the different regions of the UK. For instance, the West Midlands region of England alone accounts for almost a third of the total (direct) employment in the UK automotive industry, equivalent to 2 per cent of its total workforce (Rhodes, 2019). As a result, just as predicted in the previous regional analysis, certain parts of the UK would be hit disproportionately harder by employment losses than others. On the other hand, the automotive industry, like many other sectors, over the past few years prior to the referendum has benefited from an influx of workers coming from other European nations (Rhodes, 2019). Under the red tape outlined by the British government, this influx would be undermined due to the suspension of single-market liberties. It is therefore questionable to what extent the automotive industry would be confronted with a labour supply problem.

Once again, the findings of the aforementioned 122 manufacturing industries encompassing model by Gasiorek, Serwicka and Smith (2019) are of renewed interest. Table 1 shows the impact of two different scenarios, namely no deal trading or trading under EEA conditions, on the manufacturing employment of local authorities. It is particularly noticeable that a number of local authorities with strong ties to the UK car industry are among them. For example, Solihull, Sunderland, Knowsley, and Stratford-on-Avon are home to factories run by various car

TABLE 1 IMPACT OF NO TRADE DEALS AND EEA BREXIT SCENARIOS ON MANUFACTURING EMPLOYMENT: BOTTOM TEN LOCAL AUTHORITY DISTRICTS (GASIOREK, SERWICKA AND SMITH, 2019, P.43)

Scenario: No Trade Deals		**Scenario: EEA**	
	change in employment		**change in employment**
10 local authority districts with largest decrease in employment (per 100,000 economically active population)			
Scottish Borders	−1,085	Sunderland	−378
Solihull	−1,142	Knowsley	−395
Halton	−1,156	Halton	−425
Sunderland	−1,288	Flinshire	−427
Knowsley	−1,337	Leicester	−438
City of London	−1,457	Neath Port Talbot	−446
Leicester	−1,548	Stratford-on-Avon	−471
Stratford-on-Avon	−1,761	City of London	−484
Fylde	−2,227	Fylde	−655
Copeland	−10,651	Copeland	−2,421

manufacturers and suppliers. According to Gasiorek and his co-authors (2019), this is attributable to the fact that many of these locations exhibit higher job dependency upon sectors that are predicted to be most vulnerable to the ramifications of the *Leave* vote. Additionally, the research suggests that the North East and the West Midlands, the latter of which is home to Solihull and Stratford-on-Avon featured in Table 1, will be significantly challenged by a decline in the demand for medium-skilled workers (Gasiorek et al., 2019). Yet again, areas where many companies and suppliers to the automotive industry are concentrated.

Beyond the quantitative evidence provided by Gasiorek and his colleagues (2019), there is some anecdotal evidence of factories shutting down. For example, the multinational Honda already in 2019 announced its decision to close its manufacturing plant in Swindon, located in the south-west of England, scheduled for 2021 (Jolly, 2019). It is estimated that 3,500 jobs will be directly affected and a further 3,5000 will be indirectly impacted by this decision (Jolly, 2019). Another instance is the aforementioned closure of the historic GKN plant in Birmingham, which resulted in approximately 800 people being laid off from their jobs (Bailey et al., 2023). Yet these examples are of limited validity — precisely by virtue of the fact that they are only exemplary instances that cannot serve as a general source of evidence.

Adequate quantitative evidence is currently scarce as to the impact that intra-European immigration may have had on the sector and the possible consequences of terminating this supply of labour under a new immigration scheme. There are, however, some indications emerging from qualitative research, relating at least to the significance of EU workers for the industry. A survey by Bailey and de Ruyter along with their co-authors Hearne and Ortega-Argilés (2022a) revealed a high reliance on European workers along the automotive supply chain in the Midlands. According to the study, a total of 30.6 per cent of employees were natives of other EU countries, whereby very large and large companies in particular portrayed a much stronger dependency relative to medium and small companies (Bailey et al., 2022a). Moreover, this reliance appears to be primarily centred around high-skilled labour inflows (Bailey et al., 2022a). Though other sources put the share of EU nationals active within the sector at 'just' 7 to 10 per cent (Bailey and Rajic, 2022). According to study participants uncertainties surrounding what exactly the referendum outcome meant for the European workforce in the British manufacturing sector posed problems for firms and created anxiety among European employees (Bailey et al., 2022b). As one participant put it: *"Initially, when the referendum went through, we certainly saw a lot of our expatriate EU people get really quite destabilised by it. [...] there was very little, you know, that we knew what they knew about their status and what they would be."* (Bailey et al., 2022b, p.477). Another respondent in a separate study carried out after the introduction of the TCA and the new immigration regime expressed a similar view (Bailey et al., 2023). When describing the labour demand situation facing their firm, they said: *"[W]e [are] just trying to catch up with the skill demand that we need [...] because we've got"* (Bailey et al., 2023, p.11).

In January 2021, coinciding with the signing of the TCA, the new British migration system was launched (Portes and Springford, 2023). De facto ending the free movement. Under the revised visa scheme, individuals can apply for a “Skilled Worker Visa” provided they can produce evidence of a job offer with a salary and skill level exceeding a certain threshold (Portes and Springford, 2023). In fact, this new arrangement appears to be more liberal than many of its continental European counterparts (Portes and Springford, 2023). In a descriptive assessment of the labour market data collected since then, the manufacturing and transport sectors, inter alia, reveal an apparent fall in the number of workers of EU origin, substituted only partially by an increase in the number of employees coming from non-European countries (Portes and Springford, 2023). While this does not allow any definite conclusions to be reached for the automotive sector, it does allow for some indications to be derived. Given that the automotive sector is listed under manufacturing in statistical surveys, theoretically the automotive sector also constitutes a portion of this outflow of labour. If these employees are not replaced, positions potentially remain vacant — in the wake of this, the firm will be unable to realise its full production potential. Furthermore, in conjunction with the pan-European JIT supply chains, it is interesting to note that labour shortages will likely also affect the transport sector (Portes and Springford, 2023). These very labour capacity constraints may potentially adversely affect the JIT supply chains.

5.2.4 *Foreign Direct Investment (FDI)*

Over the course of the last decades, inward FDI has emerged as a key driver for the UK economy (Bailey et al., 2018). Next to the US and China, the UK is the third largest recipient of inward FDI, with 50 per cent originating from its (former) European partners (Jafari and Britz, 2020). The appeal of the British Isles for non-European investors lay, inter alia, in the fact that the UK represented a gateway to the European single market (Jafari and Britz, 2020; Campos and Coricelli, 2017). For European investors, both direct access to the UK market and the coordination of supply chains across different locations certainly mattered (Bailey et al., 2019). In this respect, the British automotive industry is no exception — it is equally dominated by foreign investors (Bailey et al., 2019). Indeed, many traditional British manufacturers such as Jaguar, Bentley and Aston Martin are owned by large multinationals while others such as BMW, Toyota and Nissan maintain plants in the British Isles (The Economist, 2023). Withdrawing from the European Union poses a potential threat to the vital investments made in the automotive industry.

Theoretically, several elements may contribute to this. In particular, the loss of the attractive Single Market access could trigger a chain reaction. Not only could this cause the intricate pan-

European supply chains to become increasingly more complicated and harder to manage, something that has previously been explored in depth, but it could further exacerbate the coordination between multinational headquarters and their British production sites (Bailey et al., 2019, Dhingra et al., 2017a). Within this increase in coordination, the transfer of key members of the firm between locations may prove more difficult (Dhingra et al., 2017a). Another element mentioned on numerous occasions earlier in this paper is the uncertainty that investors may have faced about the future trading relationship in the wake of the referendum verdict (Dhingra et al., 2017a). All these circumstances have the potential to influence the location and production strategies that are undertaken in the company headquarters for the British automotive industry (Head and Mayer, 2019). Many multinationals active in the UK automotive industry operate sites in various EU member states, all of which still enjoy the benefits of such a membership (Head and Mayer, 2019; Bailey and Rajic, 2022). Relocating production away from the United Kingdom to other continental European countries might thus represent a viable option for them.

A distinctive characteristic of FDI in the automotive industry is that any changes in such investment decisions may not be immediately noticeable. After all, firms have made significant prior investments in the UK (so-called sunk costs), which may make them more inclined to retain the UK production location (Bailey et al., 2022a). That said, it is common practice in the industry to decide location decisions for new product lines in a four-year cycle (Driffield and Karaglou, 2019). In other words, the location decision for 2027 will be decided in 2023. Hence, the mere absence of new capital investment would create a similar outcome as an actual reduction of investment and thereby constitute a de facto delocalisation of such FDI flows away from the UK (Driffield and Karoglou, 2019).

According to some estimates, Brexit may trigger an overall reduction of around 22 per cent in the amount of FDI entering the UK (Dhingra et al., 2017a). Others observed a gradual decline in investment since the *Leave* vote (Born et al., 2019). However, all this evidence extends solely to the UK economy as a whole. Extensive quantitative evaluations of FDI movements into the car industry are missing. Claims made by Bailey and his co-authors (2022b) that the capital investment in the automotive industry due to Brexit-related economic and political uncertainty in the period between 2016 and 2021, can partially be substantiated by estimates made available by the Office for National Statistics. According to their data, investments by UK car manufacturers underwent a spell of volatility between 2016 and 2018, registering an investment decline of 11.4 per cent for 2018 (Haynes, 2020). However, beyond this, there is a lack of comprehensive evidence covering the investment flows specifically into the car manufacturing sector.

5.2.5 *Preliminary Conclusion: Vulnerability of the British Car Industry to Brexit*

The review of the available literature and indicators for the UK automotive sector allows for the conclusion that this sector indeed possesses a potentially elevated vulnerability to impacts arising from leaving the European Union (HMSO, 2018; Head and Mayer, 2019; Thissen et al., 2020; Latorre et al., 2019). Due to the pronounced attachment between this industry and the locations of its manufacturing sites, such sectoral exposure could likely be paralleled by a regional one (Thissen et al., 202; Chen et al., 2017). However, this reasoning is primarily driven by a set of quantifiable results regarding the potential implications of trade barriers on the industry's supply chain and sales. Other possible components, such as labour shortages caused by a new immigration regime or the outflow of FDI, require further substantiating material to serve as a foundation for a robust conclusion.

A number of potential trade scenarios have been considered in relation to the resurgence of trade barriers, be they in the form of tariffs or — arguably much more costly and therefore damaging — non-tariff barriers. A series of studies reviewed here reached the conclusion that Brexit, in whatever shape it may take, might lead to adverse outcomes for the UK automotive sector on the one hand, while on the other hand, affecting the communities linked to the industry (HMSO, 2018; Thissen et al., 2020; Chen et al., 2017).

Several qualitative surveys, frequently conducted by Bailey in association with a range of other colleagues, mirrored the perceptions of automotive companies as well as their suppliers. Findings from these surveys reveal the problems that the participants initially encountered in terms of the complex, pan-European integrated supply chain (Bailey et al., 2023; Li et al., 2019). Further challenges, such as a potential lack of (qualified) workers as a result of the termination of the fundamental freedoms or a possible drop in investment in the sector, were likewise mentioned and substantiated by the authors' arguments (Bailey et al., 2022; Bailey et al., 2023). However, the lack of supporting quantitative results poses a problem in assessing these elements on the same level as, for instance, output reduction. Equally problematic is the fact that a few of these surveys tend to be missing an adequate study size. For example, Li and colleagues (2019) interviewed just 9 representatives of automotive companies, primarily from the West Midlands, about their understanding of the sectoral burden of Brexit. The observations emerging from such small sample sizes suffer from a lack of representativeness. They merely provide indications or circumstantial evidence.

Nevertheless, the research reviewed is unanimous and convincing that the UK automotive industry could be severely exposed to the consequences of Brexit partly owing to its notably sophisticated JIT supply chains. To what degree and through which channels, be it immigration or FDI, such exposure might occur, however, remains to be seen. Even the automotive industry itself appears to be sensitive to its possible vulnerability, as it lobbied very early on for *Remain* and then for a 'soft' Brexit (SMMT, 2016; SMMT, 2018b). Additional quantitative research in the field will no doubt take place in the future. At the same time, it is worth acknowledging the reality that not simply the UK economy, but rather the world economy, has been subject to other far-reaching shocks since the 2016 referendum. Indeed, both the pandemic and the Russian war of aggression fell in the period either shortly before or shortly after the commencement of the TCA, making it arguably more difficult to examine the Brexit effect in isolation.

Finally, a quote from a study participant is worth highlighting: *"[...] we've got a topic called climate change on the horizon. The products that we generate 100% of revenue and profit from today and likely to be banned in this decade, so that should be what we're concentrating our minds and efforts on."* (Bailey et al., 2023, p.9). Mirroring the reality that the British automotive industry is facing not only Brexit but rather the reality of a shifting industry — namely towards electric vehicles (EVs). For this, the British automotive industry needs substantial investment, particularly in the manufacturing of its own batteries (Bailey and Rajic, 2022). Incidentally, these batteries are partly why major car companies are pushing for a renegotiation of some aspects of the TCA (O'Carroll and Jolly, 2023; Hughes, 2023). Under the current regime, UK electric cars would be subject to tariffs based on the imported batteries they contain as the percentage of third-party products — according to the prevailing rules-of-origin — would be too high (Bailey and Raijc, 2022). This highlights that the British automotive industry is not just grappling with the consequences of Brexit, but must additionally deal with other events such as the war or the pandemic, whilst not neglecting the industry's overall fundamental transition to e-mobility.

5.3 Voting against one's own Interest? —The Effect of Automotive Employment on Voting Behaviour

On 23 June 2016, 17,410,742 Britons cast their vote for *Leave*, thereby demonstrating their desire to leave the European Union (The Electoral Commission, 2019). The centre of the British automotive industry — the West Midlands — with a turnout of 72 per cent likewise supported leaving (The Electoral Commission, 2019). With a percentage of 59 per cent, the regional share of *Leave* votes exceeded the national average of just under 52 by as much as 7 percentage points (The Electoral Commission, 2019). A closer look at the local districts, which are closely intertwined with the automotive industry, leaves a mixed impression. While Birmingham and Stratford-on-Avon, the latter with an above-average turnout of almost 81 per cent, saw just over half of the voters opt for breaking away from the European project (The Electoral Commission, 2019). Elsewhere, Solihull, home to the Jaguar factory, and Converty, numerically the town with the highest amount of car companies, both supported leaving with 55 and 56 per cent of the respective ballots cast (Qamar et al., 2021; The Electoral Commission, 2019).

The British automotive industry is an industry which, as explained at length, exhibits an enhanced vulnerability to the consequences of Brexit. Aware of this possibility, the SMMT and many of its members, such as Toyota and BMW, tried to raise awareness of the issue and campaign for *Remain* before the referendum (SMMT, 2016; Ruddick, 2016). For example, BMW, which owns the subsidiaries Rolls-Royce Motor Cars and Mini, addressed their almost 8,000 employees with a warning about Brexit ramifications including insinuations of a potential impact on the "employment base" (Asthana and Stewart, 2016). So, did residents vote against their own self-interest? How much (if any) influence did employment in the UK automotive industry have on the vote? The following section addresses the question of the relationship between *Leave* voting behaviour and local vehicle manufacturing employment while accounting for other potentially significant influential factors.

5.3.1 *Methodological Approach and Data*

Taking into account that, in reality, circumstances, i.e., a dependent variable, have more than one individual predictor to explain it, a form of multivariate regression is adopted (Maravelakis, 2019; Meyers et al., 2016). Apart from the advantage inherent to this approach — namely, that it allows for multiple independent variables allowing for a more accurate depiction of reality — this decision is further informed by the observation of other studies. For instance, a form of multivariate regression, among other things, is applied in the works of the authors Goodwin and Heath (2016) or Clarke with his co-authors (2017), when analysing the voting behaviour in the Brexit referendum. In the present case, the purpose of the model is to assess the influence, answering the question: "Did *automotive employment affect the Leave vote?* "

For this, a form of linear multiple regression is resorted to, standardised by the following formula:

$$y = \beta_0 + \beta_N X_N + \epsilon$$

The dependent variable, represented by y, denotes the share of votes in favour of leaving the EU at the district level. Thereby, a bounded dependent variable is introduced into the linear model, since the percentage is bound within an interval between 0 and 100, however, this should in this case not be a source of any particular concern. For one, these limits are not exhausted, as there is no district with either 0 or 100 per cent in favour of *Leave*, and for another, these percentages are derived from unbounded data. For the predictor, the independent variable, that is, X_N, the choice had been guided by variables previously identified in extensive studies, many of which were included in Section 3. In particular, *age, education* level, national *identity, employment* status and *immigration* stood out. Only the percentage of employees in the automotive industry in each district represents a distinct predictor in this analysis.

For this purpose, an aggregated level analysis, drawing from datasets representing district-level elevations, is conducted. Altogether 319 observations could be collected, whereby the sample only represents England and Wales, as comprehensive data for Scotland and Northern Ireland was either not available or inherently not collected at this level. Opting for data at the district level permits a more detailed 'zooming in' compared to data taken at the local authority or regional level. Especially with regard to the spatial clustering of the automotive industry, which tends to occur at the district level — take for instance in Birmingham or Solihull — this appears to be a potential benefit.

Representing a socio-demographic characteristic, *age* functions as a predictor in the model. Across various individual- and aggregated-level studies, *age*'s strong predictive power was repeatedly documented (Goodwin and Heath, 2016; Alabrese et al., 2019; Becker et al., 2017). Indicating that especially older age was associated with a higher likelihood of voting leave on an individual level (Ashcroft, 2016). The same applies to the aggregated level — a higher percentage of inhabitants of older age raised the *Leave* vote share in those places (Alabrese et al., 2019). This evidence, in conjunction with the verifiable strong predictive ability of age, renders the inclusion of this variable necessary. If only to circumvent the risk of omitting an important, influential variable. For this purpose, data from the Annual Population Survey on the district level for England and Wales is drawn (Office for National Statistics, n.d.-a). The data provides the average percentage of age subgroups for a period from June 2015 through June 2016 — the month of the referendum. Of increased interest is the so-called “Group 4", representing the share of persons above the age of 65 within the total population over the age of 16.

Another socio-demographic predictor, whose distinct predictive capacity could equally be confirmed throughout a number of research studies, is the *education* level (Ashcroft, 2016; Alabrese et al., 2019). According to individual-level findings, citizens with greater educational attainment tended to favour remaining within the EU in the voting booth (Becker et al., 2017, Alabrese et al., 2019). Whereas contrary evidence suggests that electors with a lower level of education were more inclined to vote in support of leaving the EU (Becker et al., 2017, Alabrese et al., 2019). The variable *education* is compiled based on available survey data from the 2011 Census, held in 10-year intervals (Office for National Statistics, n.d.-c). Although the data was gathered almost 5 years prior to the referendum, one can assume that the general pattern of educational attainment should be fairly stable over time. The variable expresses the share of the educational levels in the population of a district in per cent. Again, one category is of particular interest — a very basic level of education, as represented by “Level 1” (Browne, 2014).

Given the publicly conducted debate around *immigration* in the course of the referendum, which should prevail beyond the vote, and the effective exploitation of the subject matter by the *Leave* campaign, the inclusion of an immigrant predictor seems essential. Although there is mixed evidence regarding the predictive strength of this variable, it should not be a reason to exclude it. On one side, a certain degree of effect of immigration on the electoral outcome can be observed, on the other side, however, it cannot be detected (Hobolt, 2016; Goodwin and Milazzo, 2017). Several studies give special emphasis to the proportion of immigrants from countries involved in the Eastern Enlargement in conjunction with the assessment of voting behaviour (Becker et al., 2017; Goodwin and Heath, 2016). For this reason, the present study distinguishes between two different sub-groups of native-born Europeans. First, those who originally stem from countries that were part of the Union prior to the Eastern enlargement (depicted as “EU 15”), and second, people born in countries that joined the Union after the Eastern enlargement (represented as “EU EE”). Likewise, the utilised data originates from the Census 2011. It should be noted that this means using 'static' data on immigration, i.e., the proportion of Eastern Europeans recorded in the British districts in 2011 (Office for National Statistics, n.d.-c). This observation is important because most studies that have found an impact, especially from Eastern European immigration, have referred to demographic shifts, the increase or decrease in migration flows (Becker et al., 2017; Goodwin and Heath, 2016).

At first glance, possibly appearing unrelated to the predominantly socio-economically driven variable choice, national *identity* also acts as an independent variable. Associated with asserting a positive impact on the *Leave* vote, the national identities of 'British' and 'English' seem to hold some form of predictive power (Hobolt, 2016; Henderson et al., 2021; Goodwin and Milazzo, 2017). Once again, the Annual Population Survey for the year of the referendum, 2016, serves as the data source for the identity shares per district (Office for National Statistics, n.d.-a).

To at least account for economic factors to some degree, *employment* is incorporated as a predictor as well. As with the majority of the variables incorporated in this analysis, there is a body of literature indicating that employment status may have had an impact on the selection of whether to vote to *Remain* or *Leave* the European Union (Becker et al., Dijkstra et al., 2020; Alabrese et al., 2019). Of particular interest are the findings associated with the unemployment rate. Indeed, evidence suggests that a larger unemployment rate is associated with a larger *Leave* share (Becker et al. 2017). Consequently, data on the *unemployment* rate retrieved from the 'model-based estimates of unemployment', compiled by the National Statistic Office, is incorporated into the model (Office for National Statistics, n.d.-a).

Lastly, the *automotive employment* predictor, unique to this model, is incorporated — representing the industry proportion of people employed in the UK automotive industry per district. Based on the preceding discussion, it is reasonable to assume that the UK automotive industry, and thus specific areas where it is clustered, will be highly sensitive to the fallout associated with leaving the European Union. This begs the question of whether employment in this segment has had an effect on the share of the *Leave* vote. There are indeed some findings that hint that a relatively high share of manufacturing employment coincides with a higher *Leave* rate (Becker et al., 2017). Whether this will equally be the case regarding automotive employment remain to be seen in the following analysis. For this, data is obtained from the Business Register and Employment Survey for 2016, which provides the percentage employment share for the industry — not the share of automotive employees among the overall employment in the district (Office for National Statistics, n.d.-b).

5.3.2 *Results*

In order to test the question, of whether the local automotive employment has had an effect on the share of *Leave* votes, a multiple regression was conducted. Basing the independent variable choice on the predictors identified by other papers (such as Becker et al., 2017) and own, separate regressions of the other variables (see Appendix), were included in the assessment.

TABLE 2 PREDICTORS OF BREXIT VOTE: AUTOMOTIVE EMPLOYMENT

Table 2. Predictors of Brexit vote: automotive employment

	OLS England and Wales	OLS Automotive
(Intercept)	3.2004 ***	3.4484 *
	0.2740 (0.0000) ***	1.3957 (0.0217) *
Group_4	0.0245 ***	0.0294
	0.0068 (0.0004) ***	0.0201 (0.1588)
Level_1	0.2429 ***	0.2308 +
	0.0131 (0.0000) ***	0.1220 (0.0716) +
EU_EE	−0.0179	−0.0032
	0.0256 (0.4843)	0.0526 (0.9525)
British	−0.0052 *	−0.0025
	0.0024 (0.0275) *	0.0109 (0.8223)
English	0.0065 ***	0.0027
	0.0012 (0.0000) ***	0.0052 (0.6118)
Unemployment	0.0475 **	0.0136
	0.0154 (0.0022) **	0.0711 (0.8500)
Employment_auto	0.0114	−0.0009
	0.0184 (0.5344)	0.0239 (0.9702)
Num.Obs.	319	30
R2	0.741	0.694
R2 Adj.	0.735	0.596
AIC	279.8	28.6
BIC	313.7	41.2
Log.Lik.	−130.915	−5.319
RMSE	0.36	0.29

Notes: Table reports results from OLS regressions. The dependent variable is the share of the Leave vote in a district area in England and Wales.Robust standard errors are presented in parentheses; ***Significant at 1%; **significant at 5%; *significant at 10%

Table 2 illustrates the findings obtained for two ordinary least squares (OLS) regression models, in which the dependent variable represents the percentage of the district population that votes to leave the EU. For Model 1, "OLS England and Wales", it can be observed that the coefficients for older age (Group 4) and lower education (Level 1) are, as expected, found to be positive and statistically significant. This suggests that districts registering a higher proportion of the older population and/or a higher proportion of people with lower levels of education recorded greater support for leaving the Union. Likewise, the coefficients derived for English identity and unemployment indicate a positive significance. Suggesting that both, an increased unemployment rate and a higher share of people self-identifying as English in a district are related to a stronger *Leave* vote portion. Contrary to widespread evidence, the model registers a negative significance for the share of the population identifying as British on the proportion of the *Leave* vote (Goodwin and Milazzo, 2017; Hobolt, 2016). In this case, the implication would be that a higher proportion of British-identifying residents in a district has a negative effect on the *Leave* share. Finally, the predictor of special interest — employment in the automotive sector — lacks significance. Its coefficient shows a positive value, yet its p-value is above the significance threshold.

The other model, 'OLS Automotive', displayed in Table 2, is based on a second, narrower data set. In this case, only those districts with automotive employment above 1.5% were considered. By definition, with a total of just 30 observations, the statistical significance is reduced. In general, the predictors age, employment, education, identity, and immigration coefficients have the same prefixes as in the other model, however, they are not significant. Again, the automobile employment variable is not statistically significant, though it does exhibit a negative coefficient on this occasion.

An individual examination of English regions and Wales is given in Table 3. Again, the findings are reported for multiple OLS regression models — in which the proportion of *Leave* votes at the district level is treated as the dependent variable. Similarly, to the second model in Table 2, the statistical significance is reduced due to the decrease in the number of observations. Once more, education can be detected as a positive significant predictor. For all regions — except the East — a greater proportion of low-educated individuals implies increased support for a *Leave* vote. The identity predictors of English and British were statistically significant for the South East, West Midlands, and London regions. For London, the indication might be that those districts with a higher proportion of individuals with an identity British showed reduced support for leaving the Union. The opposite is true for the West Midlands and the South East, where a higher proportion

TABLE 3 PREDICTORS OF BREXIT VOTE: INDIVIDUAL REGIONS

Table 3. Predictors of Brexit vote: individual regions

	East	East Midlands	London	North East	North West	South East	South West	Wales	West Midlands	Yorkshire and The Humber
(Intercept)	2.5060 *	2.5877 *	7.2594 ***	1.1498	3.0336	2.7710 **	2.6009	0.9337	2.6375	2.0784 +
	1.1328 (0.0336) *	0.9752 (0.0136) *	1.1627 (0.0000) ***	3.8062 (0.7776)	1.8890 (0.1184)	0.8379 (0.0017) **	1.6095 (0.1235)	1.8743 (0.6267)	1.8957 (0.1780)	1.1673 (0.0984) +
Group_4	0.0112	−0.0108	0.0129	0.0809	0.0222	0.0176	0.0073	0.1326 +	0.0007	0.0117
	0.0166 (0.5037)	0.0162 (0.5111)	0.0391 (0.7445)	0.0531 (0.2026)	0.0210 (0.2990)	0.0156 (0.2632)	0.0211 (0.7343)	0.0708 (0.0836) +	0.0167 (0.9674)	0.0241 (0.6350)
Level_1	0.2320 ***	0.2997 ***	0.3253 ***	0.1947	0.1822 *	0.2016 ***	0.3032 ***	0.1922 *	0.1954 ***	0.2909 ***
	0.0358 (0.0000) ***	0.0377 (0.0000) ***	0.0463 (0.0000) ***	0.2178 (0.4219)	0.0806 (0.0309) *	0.0334 (0.0000) ***	0.0695 (0.0004) ***	0.0828 (0.0371) *	0.0420 (0.0001) ***	0.0544 (0.0001) ***
EU_EE	0.0538	0.1056 +	−0.0268	0.2130	−0.0889	0.0265	−0.2395	0.1015	0.0396	0.0124
	0.0428 (0.2177)	0.0549 (0.0657) +	0.0446 (0.5533)	0.3170 (0.5384)	0.1282 (0.4933)	0.0696 (0.7046)	0.1542 (0.1378)	0.0947 (0.3033)	0.0796 (0.6238)	0.1431 (0.9325)
English	0.0132	0.0135	−0.0250 +	0.0169	0.0136	0.0125 *	0.0010	−0.0132	0.0316 *	0.0144
	0.0081 (0.1134)	0.0093 (0.1583)	0.0123 (0.0525) +	0.0204 (0.4546)	0.0096 (0.1649)	0.0053 (0.0230) *	0.0102 (0.9214)	0.0172 (0.4556)	0.0148 (0.0448) *	0.0117 (0.2398)
British	0.0014	0.0076	−0.0523 **	−0.0157	0.0121	0.0063	0.0039	0.0059	0.0058	0.0069
	0.0093 (0.8846)	0.0109 (0.4949)	0.0145 (0.0015) **	0.0212 (0.5001)	0.0123 (0.3330)	0.0068 (0.3562)	0.0119 (0.7448)	0.0150 (0.7021)	0.0141 (0.6835)	0.0103 (0.5161)
Unemployment	0.0851	−0.0242	−0.2039 +	0.1931 +	0.0335	0.0520	0.1181	0.0769	0.0689	0.0009
	0.1084 (0.4378)	0.0417 (0.5679)	0.1058 (0.0659) +	0.0750 (0.0618) +	0.0611 (0.5881)	0.0653 (0.4295)	0.1124 (0.3076)	0.1107 (0.4995)	0.0429 (0.1223)	0.0673 (0.9892)
Employment_auto	0.0854	−0.0025	0.1244	−0.0551	−0.0665	0.0386	−0.2052	0.0016	0.0039	0.2505
	0.0892 (0.3449)	0.0133 (0.8498)	0.8054 (0.8785)	0.2654 (0.8455)	0.1029 (0.5230)	0.0784 (0.6247)	0.1934 (0.3027)	0.0547 (0.9768)	0.0245 (0.8745)	0.1811 (0.1898)
Num.Obs.	43	33	32	12	39	62	26	21	30	21
R2	0.839	0.834	0.916	0.943	0.382	0.745	0.776	0.879	0.809	0.913
R2 Adj.	0.807	0.787	0.891	0.844	0.243	0.712	0.690	0.814	0.749	0.867
AIC	28.1	6.1	28.6	−6.3	49.0	35.4	9.7	−6.6	3.1	−2.1
BIC	43.9	19.6	41.8	−1.9	64.0	54.6	21.0	2.8	15.7	7.3
Log.Lik.	−5.030	5.946	−5.295	12.141	−15.524	−8.721	4.144	12.319	7.459	10.050
RMSE	0.27	0.20	0.29	0.09	0.36	0.28	0.21	0.13	0.19	0.15

Notes: Table reports results from OLS regressions. The dependent variable is the share of the Leave vote in a district area in England and Wales.Robust standard errors are presented in parentheses; ***Significant at 1%; **significant at 5%; *significant at 10%

of individuals with English identity might be indicative of a district with a higher preference to leave the Union. As with the other models, the region-based analysis fails to demonstrate a statistical significance for the predictor of automotive employment. Among the traditional automobile regions, the estimates fluctuate between positive and negative signs. For instance, negative estimates occur for the North West and North East regions, while positive estimates are found for the West Midlands and the South East.

5.3.3 *Discussion and preliminary conclusion*

The garnered call for a high level of caution when it comes to their interpretation. A number of additional aspects should certainly be considered when evaluating and interpreting the findings. For one, many, if not all, of the coefficients presented are comparatively small across all models, which might call the effect of the predictors into question, even though they in principle exhibited statistical significance. Furthermore, the independent variables — unemployment and automotive employment — do not exhibit a linear relationship with the share of leave votes. In light of this, a cohesive statement on their significance can only be drawn with caution. In addition, almost all the utilised datasets contain several outliers. This can partly be traced to the regional heterogeneity across the districts. For example, Stratford-on-Avon, with a share of 11.8 per cent of the workforce employed in the automotive sector, represents an outlier, given that only 30 other districts even demonstrate shares of over 1.5 per cent. Indicating another factor that might influence the fit of the model to the data and hence, the results.

Considering these possible interferences compromising the model's suitability and consequently the value of the derived inference, different approaches might allow for a more coherent conclusion and insights. For instance, a spatial analysis could be considered, similar to the work of David Hearne (2020). Its advantage would be the ability to control for spatial correlations, i.e., the influence that, say, the district of Warwick exerts on its neighbouring district of Stratford-on-Avon and vice-versa. In this context, the possibility of using data at the ward level, a level below the district level, might additionally be explored, allowing for a more detailed 'zooming in'. Apart from the ward level, which would constitute another form of an aggregated analysis, the exploitation of individual-level data could equally be contemplated. All these possible approaches might be more successful in tracking the effect, if there is one of employment in the UK automotive industry on the proportion of the vote in favour of leaving. In addition, by identifying and accounting for other automotive-related sectors, e.g., steel, the variable automotive employment may reveal some additional insight into the voting behaviour shown during the referendum.

Nevertheless, with some caution, a few implications can be derived from the findings of the model. As expected, and in concordance with the other analyses previously presented in this paper, *age, education* level, *employment* status and national *identity* did exert an effect on the dependent variable. The lack of significance of the predictor of automotive employment across all models, whether with smaller or larger sample sizes, allows for hypotheses at best. Potential hypotheses range from the population's unawareness about the regional dependence on the automotive sector to an awareness of the symbiotic local and sectoral relationship, but a lack of knowledge about the potential consequences of leaving the EU, especially for this industry and thus for the region. Perhaps, however, it was simply other elements that prevailed over automotive employment, such as the share of national identities or the proportion of unemployed.

As to whether the electorate voted against their own economic self-interest in the referendum, is difficult to generally determine. It would appear that they did not consciously cast their votes *against* their own interests, yet at the same time, they did not vote *in favour* of them either. Of course, this statement is restricted to the British car industry only. Other potentially equally affected sectors — such as the chemical industry — could exhibit different evidence and thus conclusions.

6 Conclusion

Since the British people declared their support for leaving the European Union — on that pivotal day in June 2016 — it seemed as if not a year went by without the subject dominating the nation (Clarke et al., 2017; Foster, 2023). Even the 2020 withdrawal — accompanied by its epilogue in the form of the TCA in 2021 — could not help abate the issue. Leaving the British people to reflect on years of political and economic turmoil. There are still voices coming from the British business community warning of the damage that has already been done — or is likely to occur — as a direct result of leaving the EU (Foster, 2023). Some, such as the British automotive industry, even went so far as to call for a renegotiation of the new trade regime anchored in the TCA (O'Carrol and Jolly, 2023; Hughes, 2023).

The underlying reasons for the referendum have long been examined in an attempt to understand the voting behaviour of the population. A large number of studies have looked at a variety of social, economic, demographic, identity, and political predictors (Becker et al., 2017, Clarke et al., 2017). Thereby, the socio-demographic predictors — age and level of education — as well as national identities — be it British or English — and the economic environment frequently stood out (Becker et al., 2017; Alabrese et al., 2019). An apt summary of the results is the following quote which describes Brexit as *"[...] a story of industrial decline and growing social and economic inequality, overlapping with nationalism and political beliefs [...]"* (Harris and Charlton, 2016, p.2127).

The present paper has further carefully examined the possible economic consequences of Brexit, particularly concerning the British automotive industry. In a review of the available body of literature related to Brexit, the weight of evidence indicated that the withdrawal from the Union is expected to adversely affect the British economy (Vandenbussche et al., 2022; Chen et al., 2017; Giammetti, 2020; Dhingra et al., 2017a). Equally striking is the nature of how these repercussions might arise. Indeed, the negative effects brought about by Brexit are not only attributable to the reintroduction of tariffs; but rather, non-tariff barriers, the termination of the fundamental freedoms caused by leaving the Single Market, and the uncertainties triggered by the lengthy negotiations - inter alia — play at least as important a role.

In addition, it became apparent that the Brexit-related effects will in all likelihood not be evenly distributed throughout the regions and industries of the UK (Chen et al., 2017; Thissen et al., 2020). Rather, a sectoral and regional heterogeneity of the distribution may be assumed. This leads back to the British car industry, where sectoral and regional success has been closely interwoven. Whether the automotive industry actually shows an increased vulnerability to a departure from the Union and whether, conversely, a strong local dependence on the same might have influenced the *Leave* vote formed the basis of an in-depth case study. In other words: *"Did the voters possibly vote against their own economic interests?"*

A variety of empirical findings, drawing upon several quantitative and qualitative approaches, suggested that the UK automotive industry might be more exposed to the consequences of Brexit (HMSO, 2018; Latorre et al., 2019; Head and Mayer, 2019). With the vulnerability of the sector established, the question of whether the electorate may have opted to vote to leave during the referendum contrary to their own economic interests, that is, the continued success of carmakers, was addressed.

For this purpose, several OLS models were conducted to investigate the assumption. No evidence was detected to indicate that employment in the automotive industry had any influence on the share of the *Leave* vote. Thus, no finite answer to the previous question could be provided. Nevertheless, it could be said that voters may not have necessarily voted *against* their own interests, yet at the same time, they did not vote *for* them either.

Just as Brexit has not yet subsided in the public eye, academics will no doubt be seeking further insights into the impact of Brexit on the (British) economy in the future. Particularly in light of the fact that the new trade regime — governed by the TCA — has now been in place for nearly two years, this should prompt in-depth research into its implications. It is conceivable that additional, extraordinary global shocks, such as the Russian war of aggression and the pandemic, may render the individual identification and quantification of the Brexit consequences more difficult.

The same is true for the British car industry. It is likely that the full consequences of the withdrawal from the European Union will only unfold in the coming decade. Yet the discussion about a revision of the TCA indicates an essential aspect - the imminent, unstoppable transformation of the automotive industry away from the combustion engine towards electromobility. By the end of this decade, the sale of new diesel and petrol vehicles will be prohibited in the UK (Department for Transport et al., 2020). At present, only one so-called Gigafactory is operating in the UK, producing the batteries needed for the mobility transition (The Economist, 2023; Jolly, 2021). Planned investments presently appear to be fraught with uncertainty given the nature of the TCA (Hughes, 2023; O'Carrol and Jolly, 2023). Only time will tell what the future development of the British automotive industry will entail and what damage she has suffered as a consequence of the exit from the European Union.

Bibliography

Adam, K. (2019, December 12). "Get Brexit done": Boris Johnson's effective but misleading slogan in the British election. *Washington Post*. Retrieved June 27, 2023, from https://www.washingtonpost.com/world/europe/get-brexit-done-boris-johnsons-effective-but-misleading-slogan-in-the-uk-election/2019/12/12/ec926baa-1c62-11ea-977a-15a6710ed6da_story.html

Alabrese, E., Becker, S. O., Fetzer, T., & Novy, D. (2019). Who voted for Brexit? Individual and regional data combined. *European Journal of Political Economy*, *56*, 132–150. https://doi.org/10.1016/j.ejpoleco.2018.08.002

Amos, O. (2022, October 24). *Rishi Sunak has been named the UK's next prime minister*. BBC Newsround. Retrieved May 11, 2023, from https://www.bbc.co.uk/newsround/63376196

Ashcroft, L. (2016, October 29). *How the United Kingdom voted on Thursday. . . and why - Lord Ashcroft Polls*. Lord Ashcroft Polls. Retrieved May 11, 2023, from https://lordashcroftpolls.com/2016/06/how-the-united-kingdom-voted-and-why/

Asthana, A., & Stewart, H. (2016, March 16). EU referendum: Rolls-Royce warns its staff of Brexit risks. *The Guardian*. Retrieved June 27, 2023, from https://www.theguardian.com/business/2016/mar/02/rolls-royce-tells-employees-britain-better-in-eu

Bachmann, V., & Sidaway, J. D. (2016). Brexit geopolitics. *Geoforum*, *77*, 47–50. https://doi.org/10.1016/j.geoforum.2016.10.001

Bailey, D., De Propris, L., De Ruyter, A., Hearne, D., & Ortega-Argilés, R. (2023). Brexit, trade and UK advanced manufacturing sectors: a Midlands' perspective. *Contemporary Social Science*, 1–16. https://doi.org/10.1080/21582041.2023.2192700

Bailey, D., De Ruyter, A., Hearne, D., & Ortega-Argilés, R. (2022a). Shocks, resilience and regional industry policy: Brexit and the automotive sector in two Midlands regions. Regional Studies, 57(6), 1141–1155. https://doi.org/10.1080/00343404.2022.2071421

Bailey, D. H., & Budd, L. (2019). Brexit and beyond: a Pandora's Box? *Contemporary Social Science*, *14*(2), 157–173. https://doi.org/10.1080/21582041.2019.1621365

Bailey, D. H., & De Propris, L. (2017). Brexit and the UK Automotive Industry. *National Institute Economic Review*, *242*, R51–R59. https://doi.org/10.1177/002795011724200114

Bailey, D. H., De Ruyter, A., MacRae, C., McNeill, J., & Roberts, J. (2022b). Perceiving and managing Brexit risk in UK manufacturing: evidence from the midlands. *Contemporary Social Science*, *17*(5), 468–484. https://doi.org/10.1080/21582041.2022.2073386

Bailey, D. H., Driffield, N., & Kispeter, E. (2019). Brexit, foreign investment and employment: some implications for industrial policy? *Contemporary Social Science*, *14*(2), 174–188. https://doi.org/10.1080/21582041.2019.1566563

Bailey, D., & Rajic, I. (2022). *Manufacturing after Brexit - UK in a changing Europe*. UK In a Changing Europe. https://ukandeu.ac.uk/research-papers/manufacturing-after-brexit/

BBC. (2017, October 23). Brexit: Business lobby groups call for transition deal clarity. *BBC News*. Retrieved June 22, 2023, from https://www.bbc.com/news/business-41716284

BBC. (2022, October 24). Rishi Sunak has been named the UK's next prime minister. BBC Newsround. Retrieved June 30, 2023, from https://www.bbc.co.uk/newsround/63376196

Becker, S. O., Fetzer, T., & Novy, D. (2017). Who voted for Brexit? A comprehensive district-level analysis. *Economic Policy*, *32*(92), 601–650. https://doi.org/10.1093/epolic/eix012

Biermann, F., & Jagdhuber, S. (2021). Take it *and* leave it! A postfunctionalist bargaining approach to the Brexit negotiations. *West European Politics*, *45*(4), 793–815. https://doi.org/10.1080/01402382.2021.1901039

Boffey, D. (2020, December 11). The EU's no-deal Brexit plans: what they are and what they mean. *The Guardian*. Retrieved June 28, 2023, from https://www.theguardian.com/politics/2020/dec/10/the-eus-no-deal-brexit-plans-what-they-are-and-what-they-mean

Boffey, D., & Stewart, H. (2020, December 12). UK and EU say no-deal Brexit is now most likely outcome. *The Guardian*. Retrieved June 28, 2023, from https://www.theguardian.com/politics/2020/dec/11/no-deal-brexit-likeliest-ursula-von-der-leyen-eu-leaders

Born, B., Müller, G. J., Schularick, M., & Sedlacek, P. (2019). The Costs of Economic Nationalism: Evidence from the Brexit Experiment*. *The Economic Journal*, *129*(623), 2722–2744. https://doi.org/10.1093/ej/uez020

Brakman, S., Garretsen, J., & Kohl, T. (2017). Consequences of Brexit and options for a 'Global Britain.' *Papers in Regional Science*, *97*(1), 55–72. https://doi.org/10.1111/pirs.12343

Brown, R., Liñares-Zegarra, J. M., & Wilson, J. (2019). The (potential) impact of Brexit on UK SMEs: regional evidence and public policy implications. *Regional Studies*, *53*(5), 761–770. https://doi.org/10.1080/00343404.2019.1597267

Browne, T. (2014, June 18). 2011 Census - Office for National Statistics. *www.ons.gov.uk*. Retrieved June 16, 2023, from https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/qualificationsandlabourmarketparticipationinenglandandwales/2014-06-18#background-notes

Campos, N. F., & Coricelli, F. (2017). EU Membership, Mrs Thatcher's Reforms and Britain's Economic Decline. *Comparative Economic Studies*, *59*(2), 169–193. https://doi.org/10.1057/s41294-017-0023-7

Carreras, M., Carreras, Y. İ., & Bowler, S. (2019). Long-Term Economic Distress, Cultural Backlash, and Support for Brexit. *Comparative Political Studies*, *52*(9), 1396–1424. https://doi.org/10.1177/0010414019830714

Chen, W., Los, B., McCann, P., Ortega-Argilés, R., Thissen, M., & Van Oort, F. (2017). The continental divide? Economic exposure to Brexit in regions and countries on both sides of The Channel. *Papers in Regional Science*, *97*(1), 25–54. https://doi.org/10.1111/pirs.12334

Clarke, H. D., Goodwin, M. S., & Whiteley, P. (2017). Brexit Introduced. In *Cambridge University Press eBooks* (pp. 1–10). https://doi.org/10.1017/9781316584408.002

Cowburn, A. (2016, July 11). Theresa May says "Brexit means Brexit" and there will be no attempt to remain inside EU. *The Independent*. https://www.independent.co.uk/news/uk/politics/theresa-may-brexit-means-brexit-conservative-leadership-no-attempt-remain-inside-eu-leave-europe-second-referendum-a7130596.html

Curtice, J. (2017). Why Leave Won the UK's EU Referendum. *Journal of Common Market Studies*, *55*, 19–37. https://doi.org/10.1111/jcms.12613

Davies, R. B., & Studnicka, Z. (2018). The heterogeneous impact of Brexit: Early indications from the FTSE. *European Economic Review*, *110*, 1–17. https://doi.org/10.1016/j.euroecorev.2018.08.003

Dennison, J., & Geddes, A. (2018). Brexit and the perils of 'Europeanised' migration. *Journal of European Public Policy*, *25*(8), 1137–1153. https://doi.org/10.1080/13501763.2018.1467953

Department for Transport, Office for Low Emission Vehicles, Department for Business, Energy & Industrial Strategy, The Rt Hon Sir Alok Sharma KCMG MP, & The Rt Hon Grant Shapps MP. (2020, November 18). Government takes historic step towards net-zero with end of sale of new petrol and diesel cars by 2030. *GOV.UK*. Retrieved June 29, 2023, from https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030

Dhingra, S., Huang, H., Ottaviano, G. I., Pessoa, J. C., Sampson, T., & Van Reenen, J. (2017a). The costs and benefits of leaving the EU: trade effects. *Economic Policy*, *32*(92), 651–705. https://doi.org/10.1093/epolic/eix015

Dhingra, S., Machin, S., & Overman, H. G. (2017b). Local Economic Effects of Brexit. *National Institute Economic Review*, *242*, R24–R36. https://doi.org/10.1177/002795011724200112

Dhingra, S., & Sampson, T. (2022). Expecting Brexit. *Annual Review of Economics*, *14*(1), 495–519. https://doi.org/10.1146/annurev-economics-051420-104231

Dijkstra, L., Poelman, H., & Rodríguez-Pose, A. (2020). The geography of EU discontent. *Regional Studies*, *54*(6), 737–753. https://doi.org/10.1080/00343404.2019.1654603

Donnelly, T., Barnes, S. B., & Morris, D. L. (2005). Restructuring the Automotive Industry in the English West Midlands. *Local Economy*, *20*(3), 249–265.

https://doi.org/10.1080/02690940500191034

Donnelly, T., Begley, J., & Collis, C. (2016). The West Midlands automotive industry: the road downhill. *Business History*, *59*(1), 56–74. https://doi.org/10.1080/00076791.2016.1235559

Douch, M., & Edwards, T. H. (2021). The Bilateral Trade Effects of Announcement Shocks: Brexit as a Natural Field Experiment. *Journal of Applied Econometrics*, *37*(2), 305–329. https://doi.org/10.1002/jae.2878

Driffield, N., & Karoglou, M. (2019). Brexit and Foreign Investment in the UK. *Journal of the Royal Statistical Society*, *182*(2), 559–582. https://doi.org/10.1111/rssa.12417

Du, J., Satoğlu, E. B., & Shepotylo, O. (2023). How did Brexit affect UK trade? *Contemporary Social Science*, 1–18. https://doi.org/10.1080/21582041.2023.2192043

Egger, P., Francois, J., & Nelson, D. (2015). The Role of Goods-Trade Networks for Services-Trade Volume. The World Economy, 40(3), 532–543. https://doi.org/10.1111/twec.12331

Felbermayr, G., Gröschl, J. K., & Steininger, M. (2021). Quantifying Brexit: from ex post to ex ante using structural gravity. *Review of World Economics*, *158*(2), 401–465. https://doi.org/10.1007/s10290-021-00436-z

Fetzer, T. (2019). Did Austerity Cause Brexit? *The American Economic Review*, *109*(11), 3849–3886. https://doi.org/10.1257/aer.20181164

Fingleton, B. (2020). Exploring Brexit with dynamic spatial panel models: some possible outcomes for employment across the EU regions. *The Annals of Regional Science*, *64*(2), 455–491. https://doi.org/10.1007/s00168-019-00913-2

Foster, P. (2023, June 28). UK manufacturers warn Brexit is undermining their place in EU supply chains. *Financial Times*. Retrieved June 28, 2023, from https://www.ft.com/content/2f99a9c3-5077-4c31-ada4-1987a1ad6921

Freeman, R., Manova, K., Prayer, T., & Sampson, T. (2022). Unravelling Deep Integration: UK Trade in the Wake of Brexit*. *UK In a Changing Europe*.

Gartzou-Katsouyanni, K., Kiefel, M., & Osuna, J. J. O. (2021). Voting for Your Pocketbook, but against Your Pocketbook? A Study of Brexit at the Local Level. *Politics & Society*, *50*(1), 3–43. https://doi.org/10.1177/0032329221992198

Gasiorek, M., Serwicka, I., & Smith, A. (2019). Which manufacturing industries and sectors are most vulnerable to Brexit? *The World Economy*, *42*(1), 21–56. https://doi.org/10.1111/twec.12757

Giammetti, R. (2020). Tariffs, domestic import substitution and trade diversion in input-output production networks: an exercise on Brexit. *Economic Systems Research*, *32*(3), 318–350. https://doi.org/10.1080/09535314.2020.1738347

Giammetti, R., Russo, A., & Gallegati, M. (2020). Key sectors in input–output production networks: An application to Brexit. *The World Economy*, *43*(4), 840–870. https://doi.org/10.1111/twec.12920

Goodwin, M. S., & Heath, O. (2016). The 2016 Referendum, Brexit and the Left Behind: An Aggregate-level Analysis of the Result. *The Political Quarterly*, *87*(3), 323–332. https://doi.org/10.1111/1467-923x.12285

Goodwin, M. S., & Milazzo, C. (2017). Taking back control? Investigating the role of immigration in the 2016 vote for Brexit. *The British Journal of Politics and International Relations*, *19*(3), 450–

464. https://doi.org/10.1177/1369148117710799

Graziano, A., Handley, K., & Limão, N. (2020). Brexit Uncertainty and Trade Disintegration. *The Economic Journal*, *131*(635), 1150–1185. https://doi.org/10.1093/ej/ueaa113

Harris, R., & Charlton, M. (2016). Voting out of the European Union: Exploring the geography of Leave. *Environment and Planning A*, *48*(11), 2116–2128. https://doi.org/10.1177/0308518x16665844

Haynes, F. (2020, April 26). The UK motor vehicle manufacturing industry: 2008 to 2018 - Office for National Statistics. *www.ons.gov.uk*. Retrieved June 27, 2023, from https://www.ons.gov.uk/businessindustryandtrade/manufacturingandproductionindustry/articles/theukmotorvehiclemanufacturingindustry2008to2018/2020-04-16

Head, K., & Mayer, T. (2019). Brands in Motion: How Frictions Shape Multinational Production. *The American Economic Review*, *109*(9), 3073–3124. https://doi.org/10.1257/aer.20161345

Helm, T. (2018, April 22). Japan ambassador's Brexit warning: there won't be a deal better than the single market. *The Guardian*. Retrieved June 21, 2023, from https://www.theguardian.com/politics/2018/apr/22/koji-tsuruoka-japan-ambassador-britain-brexit-single-market

Henderson, A., Poole, E. G., Jones, R. N., Wincott, D., Larner, J., & Jeffery, C. (2021). Analysing vote-choice in a multinational state: national identity and territorial differentiation in the 2016 Brexit vote. *Regional Studies*, *55*(9), 1502–1516. https://doi.org/10.1080/00343404.2020.1813883

Henkel, M., & Seidel, T. (2018). A SPATIAL PERSPECTIVE ON EUROPEAN INTEGRATION: HETEROGENEOUS WELFARE AND MIGRATION EFFECTS FROM THE SINGLE MARKET AND THE BREXIT. *Economic Inquiry*, *57*(1), 333–352. https://doi.org/10.1111/ecin.12732

Her Majesty's Stationery Office [HMSO]. (2018). *EU Exit: Long-term economic analysis*.

Hill, P., Korczak, A., & Korczak, P. (2019). Political uncertainty exposure of individual companies: The case of the Brexit referendum. *Journal of Banking and Finance*, *100*, 58–76. https://doi.org/10.1016/j.jbankfin.2018.12.012

Hobolt, S. B. (2016). The Brexit vote: a divided nation, a divided continent. *Journal of European Public Policy*, *23*(9), 1259–1277. https://doi.org/10.1080/13501763.2016.1225785

Hobolt, S., & Wratil, C. (2016, June 27). *Which argument will win the referendum – immigration, or the economy?* EUROPP. Retrieved June 21, 2023, from https://blogs.lse.ac.uk/europpblog/2016/06/21/brexit-winning-argument-immigration-or-economy/

Holton, K., & Carry, N. (2023, May 17). Stellantis tells UK to change Brexit deal or see car plants close. *Reuters*. Retrieved June 22, 2023, from https://www.reuters.com/business/autos-transportation/stellantis-says-uk-needs-change-brexit-deal-bbc-2023-05-16/

Hosoe, N. (2018). Impact of border barriers, returning migrants, and trade diversion in Brexit: Firm exit and loss of variety. *Economic Modelling*, *69*, 193–204. https://doi.org/10.1016/j.econmod.2017.09.018

Hughes, D. (2023, May 17). Pressure on Sunak to rewrite Brexit deal as car makers face 'existential threat.' *The Independent*. https://www.independent.co.uk/business/pressure-on-sunak-to-rewrite-brexit-deal-as-car-makers-face-existential-threat-b2340394.html

Igwe, P. A. (2022). The Paradox of Brexit and the Consequences of Taking Back Control. *Societies*, *12*(2), 69. https://doi.org/10.3390/soc12020069

Ijtsma, P., Levell, P., Los, B., & Timmer, M. P. (2018). The UK's Participation in Global Value Chains and Its Implications for Post-Brexit Trade Policy. *Fiscal Studies*, *39*(4), 651–683. https://doi.org/10.1111/1475-5890.12176

Jafari, Y., & Britz, W. (2020). Brexit: an economy-wide impact assessment on trade, immigration, and foreign direct investment. *Empirica*, *47*(1), 17–52. https://doi.org/10.1007/s10663-018-9418-6

Jolly, J. (2019, May 13). Honda says it will close Swindon plant in 2021, ending workers' hopes. *The Guardian*. Retrieved June 21, 2023, from https://www.theguardian.com/business/2019/may/13/honda-close-swindon-plant-ending-workers-hopes

Jolly, J. (2021, November 30). UK battery 'gigafactory' plans huge expansion as electric car demand soars. *The Guardian*. Retrieved June 29, 2023, from https://www.theguardian.com/business/2021/oct/25/uk-battery-gigafactory-electric-car-sunderland-envision-nissan

Jones, E. (2020). The Negotiations. In *Oxford University Press eBooks* (pp. 37–65). https://doi.org/10.1093/oso/9780198848356.003.0002

Ke, L., Liu, Q., Han, K., & Zhang, W. (2022). The impact of Brexit on supply chain cost and Ro-Ro traffic at Dover. *Maritime Policy & Management*, 1–17. https://doi.org/10.1080/03088839.2022.2158382

Latorre, M. C., Olekseyuk, Z., & Yonezawa, H. (2019). Trade and foreign direct investment-related impacts of Brexit. *The World Economy*, *43*(1), 2–32. https://doi.org/10.1111/twec.12859

Li, D. M., Shishank, S., De Ruyter, A., Ali, S. F., Bailey, D. H., Hearne, D., & Salh, S. (2019). 9. Brexit and the Auto Industry: Understanding the Issues for Supply Chain Management. In *Emerald Publishing Limited eBooks* (pp. 173–191). https://doi.org/10.1108/978-1-78769-765-220191010

Los, B., McCann, P., Springford, J., & Thissen, M. (2017). The mismatch between local voting and the local economic consequences of Brexit. *Regional Studies*, *51*(5), 786–799. https://doi.org/10.1080/00343404.2017.1287350

Los, B., Timmer, M. P., & De Vries, G. J. (2015). HOW GLOBAL ARE GLOBAL VALUE CHAINS? A NEW APPROACH TO MEASURE INTERNATIONAL FRAGMENTATION. *Journal of Regional Science*, *55*(1), 66–92. https://doi.org/10.1111/jors.12121

Loth, W. (2015). *Building Europe: A History of European Unification*. de Gruyter Oldenbourg.

Maravelakis, P. (2019). The use of statistics in social sciences. *Journal of Humanities and Applied Social Sciences*, *1*(2), 87–97. https://doi.org/10.1108/jhass-08-2019-0038

Mayer, T., Vicard, V., & Zignago, S. (2019). The cost of non-Europe, revisited*. *Economic Policy*, *34*(98), 145–199. https://doi.org/10.1093/epolic/eiz002

McCann, P. (2018). The trade, geography and regional implications of Brexit. *Papers in Regional Science*, *97*(1), 3–8. https://doi.org/10.1111/pirs.12352

Meyers, L. S., Gamst, G., & Guarino, A. (2016). *Applied Multivariate Research: Design and Interpretation*. SAGE Publications, Incorporated.

Moradlou, H., Reefke, H., Skipworth, H., & Roscoe, S. (2021). Geopolitical disruptions and the manufacturing location decision in multinational company supply chains: a Delphi study on

Brexit. *International Journal of Operations & Production Management*, *41*(2), 102–130. https://doi.org/10.1108/ijopm-07-2020-0465

O'Carroll, L., & Jolly, J. (2023, May 17). Why are leading carmakers urging UK to overhaul Brexit deal? *The Guardian*. https://www.theguardian.com/business/2023/may/17/why-is-a-leading-carmaker-urging-uk-to-overhaul-brexit-deal-stellantis

Office for National Statistics. (n.d.-a). *Annual Population Survey*. Nomis. Retrieved June 29, 2023, from https://www.nomisweb.co.uk/query/construct/submit.asp?menuopt=201&subcomp=

Office for National Statistics. (n.d.-b). *Business Register and Employment Survey*. Nomis. Retrieved June 29, 2023, from https://www.nomisweb.co.uk/query/construct/components/simpleapicomponent.aspx?menuopt=1710&subcomp=

Office for National Statistics. (n.d.-c). *Census 2011*. Nomis. Retrieved June 29, 2023, from https://www.nomisweb.co.uk/query/construct/components/stdListComponent.asp?menuopt=12&subcomp=100

Office for National Statistics. (2018, January 3). Who does the UK trade with? - Office for National Statistics. *www.ons.gov.uk*. Retrieved May 15, 2023, from https://www.ons.gov.uk/businessindustryandtrade/internationaltrade/articles/whodoestheuktradewith/2017-02-21

Office for National Statistics. (2021, May 24). The impacts of EU exit and the coronavirus on UK trade in goods - Office for National Statistics. *www.ons.gov.uk*. Retrieved June 22, 2023, from https://www.ons.gov.uk/businessindustryandtrade/internationaltrade/articles/theimpactsofeuexitandthecoronavirusonuktradeingoods/2021-05-25

Office for National Statistics. (2023, June 13). UK trade - Office for National Statistics. *www.ons.gov.uk*. Retrieved June 21, 2023, from https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/bulletins/uktrade/latest

Partington, R. (2023, January 5). Five charts that show the UK's economic prospects in 2023. *The Guardian*. Retrieved May 11, 2023, from https://www.theguardian.com/business/2022/dec/29/five-charts-that-show-the-uks-economic-prospects-in-2023

Portes, J. (2022). Immigration and the UK economy after Brexit. *Oxford Review of Economic Policy*, *38*(1), 82–96. https://doi.org/10.1093/oxrep/grab045

Portes, J., & Forte, G. (2017). The economic impact of Brexit-induced reductions in migration. *Oxford Review of Economic Policy*, *33*(suppl_1), S31–S44. https://doi.org/10.1093/oxrep/grx008

Portes, J., & Springford, J. (2023). The impact of the post-Brexit migration system on the UK labour market. *Contemporary Social Science*, 1–18. https://doi.org/10.1080/21582041.2023.2192516

Qamar, A. A., Gardner, E., Buckley, T., & Zhao, K. (2021). Home-owned versus foreign-owned firms in the UK automotive industry: Exploring the microfoundations of ambidextrous production and supply chain positioning. *International Business Review*, *30*(1), 101657. https://doi.org/10.1016/j.ibusrev.2019.101657

Qamar, A., Collinson, S., & Green, A. E. (2022). Covid-19 disruption, resilience and industrial policy: the automotive sector in the West Midlands. *Regional Studies*, 1–15. https://doi.org/10.1080/00343404.2022.2126449

Rhodes, C. (2019, December 16). The motor industry: statistics and policy. *House of Commons Library*. https://researchbriefings.files.parliament.uk/documents/SN00611/SN00611.pdf

Ringe, W. (2021). Brexit and how it affects capital markets (regulation). In Edward Elgar Publishing eBooks. https://doi.org/10.4337/9781800376588.00012

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. https://doi.org/10.1093/cjres/rsx024

Roscoe, S., Skipworth, H., Aktas, E., & Habib, F. (2020). Managing supply chain uncertainty arising from geopolitical disruptions: evidence from the pharmaceutical industry and brexit. *International Journal of Operations & Production Management*, *40*(9), 1499–1529. https://doi.org/10.1108/ijopm-10-2019-0668

Ruddick, G. (2016, March 3). Toyota UK warns of cutbacks if Britain leaves EU. *The Guardian*. Retrieved June 22, 2023, from https://www.theguardian.com/politics/2016/mar/03/uk-motor-industry-backs-uk-remaining-in-europe-survey-eu-positive-impacy

Sampson, T. (2017). Brexit: The Economics of International Disintegration. *Journal of Economic Perspectives*, *31*(4), 163–184. https://doi.org/10.1257/jep.31.4.163

Schäfer, H., & Kämmerer, J. A. (2021). At Brexit crossroads: autonomy and gains from trade as alternatives? Introduction and overview. In *Edward Elgar Publishing eBooks*. https://doi.org/10.4337/9781800376588.00007

Schäfer, K. A. (2020, February 11). Autoindustrie: Welche Regionen von der Autobranche abhängen. WiWo. Retrieved June 30, 2023, from https://www.wiwo.de/unternehmen/auto/blick-hinter-die-zahlen-5-autoindustrie-undjobs-wo-in-deutschland-die-meisten-jobs-an-der-autobranche-haengen/25533060.html

Siles-Brügge, G. (2019). Bound by Gravity or Living in a 'Post Geography Trading World'? Expert Knowledge and Affective Spatial Imaginaries in the Construction of the UK's Post-Brexit Trade Policy. *New Political Economy*, *24*(3), 422–439. https://doi.org/10.1080/13563467.2018.1484722

SMMT. (2016, August 9). Remaining in Europe critical to future of UK automotive industry, warns SMMT. *SMMT*. Retrieved June 22, 2023, from https://www.smmt.co.uk/2016/06/remaining-in-europe-critical-to-future-of-uk-automotive-industry-warns-smmt/

SMMT. (2018a). *Automotive Brexit myths - busted - SMMT*. Retrieved June 22, 2023, from https://www.smmt.co.uk/industry-topics/europe-and-international-trade/automotive-brexit-myths-busted/

SMMT. (2018b, November 28). 'No deal' Brexit catastrophic blow to British auto industry, warn businesses in new survey. *SMMT*. Retrieved June 21, 2023, from https://www.smmt.co.uk/2018/11/no-deal-brexit-catastrophic-blow-to-british-auto-industry-warn-businesses-in-new-survey/

SMMT. (2019). *Motor Industry Facts 2019*. Retrieved June 22, 2023, from https://www.smmt.co.uk/wp-content/uploads/sites/2/SMMT-Motor-Industry-Facts-May-2019-V2.pdf

SMMT. (2020). SMMT MOTOR INDUSTRY FACTS 2020. *SMMT*. Retrieved June 29, 2023, from https://www.smmt.co.uk/wp-content/uploads/sites/2/SMMT-Motor-Industry-Facts-Nov-2020.pdf

SMMT. (2021). *Brexit and the UK Car Industry - SMMT*. Retrieved June 29, 2023, from https://www.smmt.co.uk/industry-topics/europe-and-international-trade/

Steinberg, J. B. (2019). Brexit and the macroeconomic impact of trade policy uncertainty. *Journal of International Economics*, *117*, 175–195. https://doi.org/10.1016/j.jinteco.2019.01.009

The Economist. (2020, July 30). Why Britain is more geographically unequal than any other rich country. *The Economist*. Retrieved June 21, 2023, from https://www.economist.com/britain/2020/07/30/why-britain-is-more-geographically-unequal-than-any-other-rich-country

The Economist. (2023, January 24). Britain's carmaking industry is increasingly under threat. *The Economist*. https://www.economist.com/britain/2023/01/24/britains-carmaking-industry-is-increasingly-under-threat

The Electoral Commission. (2019, September 25). *Results and turnout at the EU referendum*. Retrieved June 28, 2023, from https://www.electoralcommission.org.uk/who-we-are-and-what-we-do/elections-and-referendums/past-elections-and-referendums/eu-referendum/results-and-turnout-eu-referendum

Thissen, M., Van Oort, F., McCann, P., Ortega-Argilés, R., & Husby, T. (2020). The Implications of Brexit for UK and EU Regional Competitiveness. *Economic Geography*, *96*(5), 397–421. https://doi.org/10.1080/00130095.2020.1820862

Tiwasing, P. (2021). Brexit and skill shortages: an empirical analysis of UK SMEs. *Economics and Business Letters*, *10*(1), 9–15. https://doi.org/10.17811/ebl.10.1.2021.9-15

Troitiño, D. R., Kerikmäe, T., & Chochia, A. (2018). *Brexit: History, Reasoning and Perspectives*. Springer.

Usherwood, S. (2021). 'Our European Friends and Partners'? Negotiating the Trade and Cooperation Agreement. *Journal of Common Market Studies*, *59*(S1), 115–123. https://doi.org/10.1111/jcms.13238

Vandenbussche, H., Connell, W., & Simons, W. (2022). Global value chains, trade shocks and jobs: An application to Brexit. *The World Economy*, *45*(8), 2338–2369. https://doi.org/10.1111/twec.13259

Walker, P., Crerar, P., & Elgot, J. (2022, October 20). Liz Truss resigns as PM and triggers fresh leadership election. *The Guardian*. Retrieved May 11, 2023, from https://www.theguardian.com/politics/2022/oct/20/liz-truss-to-quit-as-prime-minister

Wallace, H. M. (2016). Heading for the Exit: the United Kingdom's Troubled Relationship with the European Union. *Journal of Contemporary European Research*, *12*(4). https://doi.org/10.30950/jcer.v12i4.803

Appendix

TABLE 4 PREDICTORS OF BREXIT VOTE: INDIVIDUAL CONSIDERATION

Table 4. Predictors of Brexit vote: indidvidual consideration

	Automotive Employment	Employment	Education	Age	National Identity	Immigration
(Intercept)	7.2972 ***	7.3249 ***	10.7885 ***	10.1634 ***	5.8544 ***	7.8187 ***
	0.0459 (0.0000) ***	0.1157 (0.0000) ***	1.2832 (0.0000) ***	0.7363 (0.0000) ***	0.3599 (0.0000) ***	0.0827 (0.0000) ***
Employment_auto	0.0630 *					
	0.0265 (0.0182) *					
Unemployment		0.0027				
		0.0278 (0.9232)				
Level_1			−0.0710 **			
			0.0273 (0.0098) **			
Level_2			0.1176 ***			
			0.0154 (0.0000) ***			
No_qualifications			−0.0364 *			
			0.0158 (0.0215) *			
Level_3			−0.0641 ***			
			0.0170 (0.0002) ***			
Level_4			−0.1008 ***			
			0.0146 (0.0000) ***			
Group_1				−0.0200		
				0.0122 (0.1013)		
Group_2				−0.0547 ***		
				0.0095 (0.0000) ***		
Group_4				−0.0150		
				0.0145 (0.3022)		
British					−0.0023	
					0.0048 (0.6350)	
English					0.0310 ***	
					0.0034 (0.0000) ***	
Welsh					0.0201 ***	
					0.0034 (0.0000) ***	
Scottish					−0.1345 **	
					0.0430 (0.0019) **	
Other_EU						0.4513
						0.5256 (0.3912)
EU_EE						−0.3686
						0.5367 (0.4927)
EU_15						−0.7139
						0.5097 (0.1623)
Other_countries						−0.0311 ***
						0.0093 (0.0009) ***
Num.Obs.	319	319	319	319	319	319
R2	0.015	0.000	0.860	0.246	0.403	0.557
R2 Adj.	0.012	−0.003	0.857	0.238	0.396	0.551
AIC	693.3	698.2	80.0	612.3	539.5	444.7
BIC	704.6	709.5	106.4	631.1	562.1	467.3
Log.Lik.	−343.631	−346.088	−32.998	−301.139	−263.762	−216.342
RMSE	0.71	0.72	0.27	0.62	0.55	0.48

Notes: Table reports results from OLS regressions. The dependent variable is the share of the Leave vote in a district area in England and Wales.Robust standard errors are presented in parentheses; ***Significant at 1%; **significant at 5%; *significant at 10%