Voting Determinants of Brexit: How Trade and Immigration Affected the Vote Share for Brexit across the UK

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Abstract:
On June 23rd, 2016, the UK shocked the world when 52% of voters decided the country should leave the EU. The referendum results reverberated through the country, the EU, and around the world. Prime Minister David Cameron stepped down in the referendum’s wake and the UK political elite has found itself having to almost exclusively focus on Brexit. As a string of surprising election results shock the globe, it becomes clear that a new trend of voter behavior appears to be emerging in many countries. This paper hopes that analyzing the determinants of the Brexit Referendum can illuminate this new trend in voter behavior. The hypothesis presented is that within a Local Authority District, the ‘Leave’ vote share is more related to subjective feelings towards immigration than objective hardships faced due to unemployment from immigration and trade vulnerability. Further, the flow of immigrants will have a heterogeneous effect across regions of the UK, with increased immigration increasing the Leave vote share in England and Wales, while decreasing the Leave vote share in Scotland. These hypotheses are confirmed by the data analysis and regressions, as there are positive relationships between both the change in the foreign-born population share and the trade integration level and the Leave vote share across the UK. However, in Scotland alone the relationship between the change in the foreign-born population share and the Leave vote share is negative.

Key Words: Brexit, referendum, voter behavior, immigration, trade, trade vulnerability, unemployment, economic adversity, rational ignorance, European Union, United Kingdom, Scotland, England, Wales, Greater London

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I) Introduction:

On June 23rd, 2016, the UK shocked the world when by a narrow margin the electorate voted to leave the EU. While polls before the vote showed a close race, most pundits and politicians believed that the results would end in the UK remaining a part of the EU. They noted that all the economic evidence supported them remaining in the EU, cited academic papers showing the pain of leaving the EU and having to renegotiate trade deals, and discredited false claims by the opposition. Further, the traditional political elite was for the most part united behind Remain. The surprising result was one of a string of electoral surprises recently, with the Colombian referendum on peace being rejected and the US Presidential Election going to Donald Trump. The US Presidential election, in particular, appears to mirror the Brexit result: an uprising of the right wing, populist, anti-globalization, anti-trade, anti-immigrant faction—one only need look at the surprising result in Michigan and Wisconsin to understand the role anti-trade sentiment and to the rhetoric of Donald Trump to understand the role anti-immigrant sentiment played in the election.

The result revealed divides in the UK between generations, education levels, urbanity/rurality, and between Scotland and England/Wales. The outcome resulted in the resignation of Prime Minister David Cameron, may lead to a second referendum on Scottish exit from the UK, and has driven down the valuation of the British Pound. While the EU is expected to survive Brexit, the result of this referendum has strengthened other far-right anti-EU parties across Europe, most notably with the rise of Marine Le Pen in France.

In this paper, I seek to understand the economic and social determinants of the Brexit Referendum. Specifically, my research question is “how did trade and immigration impact voters’ decisions in the referendum across Local Authority Districts in the UK?” I aim to answer
this question using an OLS regression to determine correlations between the variables of interest and the ‘Leave’ vote share in a Local Authority District. Hopefully, results from this paper can be useful within the UK to help the political elite understand their lack of understanding of why the referendum resulted in Leave, and possibly help others outside the UK understand why right-wing nationalist/populist parties are gaining traction.

First, I provide further context on the British Referendum on Continued EU membership and the existing literature on voter behavior, impacts of immigration and trade, and literature on Brexit already conducted. Then I describe the data and provide summary statistics, before going into my methodology. Finally, I discuss the results and conclusions that can be drawn from the analysis. This paper finds strong support for the hypothesis that trade vulnerability and immigration played significant roles in the referendum. Across the whole of the UK, increased trade vulnerability and increased immigration are related to higher Leave vote shares in Local Authority Districts. However, in Scotland alone, increased immigration is related to lower Leave vote shares. Theoretical explanations for this phenomenon discovered in the data are explored in the Results and Conclusion sections of this paper.

II) Background: The British Referendum on Continued EU Membership

The British Referendum on European Union membership, commonly and hereafter referred to as Brexit, was held on June 23rd, 2016. After months of contentious debate, the UK held the referendum on whether they wanted to “Remain” in or “Leave” the EU. In a surprise to pollsters, politicians, and the many across the globe, 52% of voters, or over 17 million people voted to Leave the EU as compared to marginally more than 16 million people who voted Remain. Thus, the UK is now tasked with negotiating an exit from the European Union.
The referendum faired differently in different parts of the country: England voted 53.4% Leave and Wales voted 52.5% Leave, whereas Northern Ireland voted 55.8% Remain and Scotland voted 62.0% Remain. The vote was also very divided across urban and rural areas, with urban areas predominately voting to remain in the EU, while rural areas on average voted to leave, particularly in England.

In the wake of the referendum, Theresa May was elected by the ruling Conservative Party after the referendum forced the resignation of David Cameron. May is now tasked with negotiating the exit from the EU. The UK government recently invoked Article 50 of the Treaty on the European Union, the formal procedure for withdrawing, in March of 2017, which would put the UK on course to leave the EU by March of 2019. In the meantime, the UK remains a full member of the European Union.

The political science implications of the referendum were far reaching. Most significantly, the contrast between the clear and well-publicized stances of minor parties—United Kingdom Independence Party (UKIP) and Nigel Farage supporting Leave, the SNP and Nicola Sturgeon advocating Remain, and the Liberal Democrats and Tim Farron also advocating Remain. Contrastingly, the two major parties—the Conservatives and Labour—were divided by the referendum question. Prime Minister Cameron campaigned for Remain, while another prominent Conservative, Boris Johnson—the former London mayor—campaignied for Leave. While the Conservatives were clear but divided in their message on the Referendum, Labour was united in their support of Remain but internal discord over the unpopular leadership of Jeremy Corbyn sent mixed messages to voters. Corbyn was unwilling to campaign vigorously for Remain and thus the strength of the Labour party to encourage voters to vote Remain was diminished. Overall, most UK’s government officials supported Remain and tried campaigning
for it, but were unsuccessful in convincing the public of their economic and social arguments against a united UKIP and Eurosceptic movement, partially led by Boris Johnson and Nigel Farage.

The sharp divide that emerged between what the political elite supported and the outcome of the referendum surprised many in the UK, EU, and across the globe. While Conservatives generally were less united in their opposition to leaving the EU, David Cameron of the Conservatives staked his Prime Ministership on the outcome of the referendum. In addition, nearly the entirety of Parliament opposed it, with the Labour Party in strong, if disorganized, opposition. Further, the economic evidence showed the negative consequences of Brexit. However, all of this didn’t sway the decision of many voters. Realizing why so many people voted to leave the EU can help political scientists, economists, and politicians understand recent voting behavior in the UK and can perhaps explain other recent surprising electoral outcomes including the election of Donald Trump in the US.

Both before and after the outcome of the Brexit vote, many believed that the outcome of the referendum would hinge on factors such as immigration and trade. The rise of Euroscepticism and UKIP were largely predicated on growing distaste with the functioning of the EU, feelings that immigrants were taking jobs or endangering the country, and that the increased trade deficits with the EU were hurting the UK economy. Per the Guardian one month before the referendum, the UK’s trade deficit with other EU countries was running at a record high level, with the gap between exports and imports in the first three months of 2016 widened by £0.7bn to £23.9bn. Further, they note that trade was becoming a major issue in the referendum campaign, with “the leave camp saying that the size of the UK’s deficit will encourage other EU countries to grant Britain continued access to the European single market in
the event of a Brexit vote on 23 June” (Guardian). This rising sentiment forced David Cameron to hold the referendum and may have resulted in the referendum’s outcome. Another major argument for leaving the EU were the fees that the UK paid to the EU, which were over and above what they received back from the EU in direct investment. The Leave campaign often argued that the fees they currently paid to the EU could be put to better use funding the National Health Service, but often they advertised misleading or false statistics about the amount the UK pays into the EU.

It is hard to know which arguments held the most sway for any individual voter but using econometric tools we can perhaps spot trends in voter behavior, informing us of the true motivations behind the UK electorate. In this paper, I seek to understand the economic and social determinants of the Brexit Referendum. In the following section, this paper will establish a review of both voting behavior literature as well as relevant literature surrounding Brexit, followed by a summation of this paper’s contribution to the body of literature in this field. Then I describe the data and provide summary statistics, before going into my methodology. Finally, I discuss the results and conclusions that can be drawn from the analysis.

III) Literature Review:

The academic field of analyzing and predicting voting behavior has been around for some time, however, very recent work surrounding the impact trade has on voting is more consequential to the model developed here. This literature review will commence in four stages. First it will cover work in the field of voting behavior and how labor market disadvantages impact voting. Then it will delve into work surrounding how literature has identified the impact of trade on a region, whether for analysis of how trade affects voting behavior or otherwise. Then
a review of work on how immigration impacts voters’ behavior will be presented. Lastly, this review will summarize the work completed in the few months since the referendum on the determinants of the Leave vote. After this review, there is a brief summation of this paper’s addition to this body of literature.

1. Labor Market disadvantages impacting voting behavior:

The original voting behavior economist is Anthony Downs, with his most notable work being Down’s Rational Ignorance Theorem. This theorem posits that given that each individual voter has a negligible probability of affecting the outcome in a large election, voters will not have an incentive to acquire political information before voting. Put similarly, “If all others express their true view, he [the voter] gets the benefit of a well-informed electorate no matter how well-informed he is; if they are badly informed, he cannot produce those benefits himself. Therefore, as in all cases of individual benefits, the individual is motivated to shirk his share of the costs: he refuses to get enough information to discover his true views. Since all men do this, the election does not reflect the true consent of the governed” (Downs 1957, p. 246). While some on the losing side of elections would very much be drawn to this argument, any functioning democracy must accept the will of the voters. Down’s Rational Ignorance Theory does not hold in practice as a natural conclusion of the theory would result in no one voting; yet, there are always voters in an election, and indeed over 33 million voted for or against Brexit. Nevertheless, this theory could help reveal why some voted to leave the EU, when their economic and political preferences may have truly aligned with the remain camp. Downs informs us that voters may not have expended the costs of discovering their true views and instead may have been swayed by advertising and rhetoric. Instead of voting for the
economically rational choice they may have voted in accordance with subjective views of immigrants and anti-EU sentiment.

Downs provides the theoretical framework for this paper which will show that voters had a high correlation of voting to Leave the EU and social factors, primarily immigration. There is evidence that will be presented later in this paper showing that immigrants have had no impact on UK wages and further that the correlation between voting Leave and immigrants is dependent on the origin country of the immigrant—immigration from Eastern European countries correlates with higher shares of voting Leave while immigrants from the rest of the EU is correlated negatively with the Leave vote share. Thus, any anti-immigrant sentiment is primarily due to cultural differences. Downs reveals that it is theoretically possible that UK voters based their vote off subjective views and rhetoric rather than objective truths because they did not want to face the information costs of finding those truths.

Looking at how objective economic conditions impact voting behavior, Patrick Emmenegger, Paul Marx, and Dominik Schraff, in their paper “Labour Market Disadvantage, Political Orientations and Voting: How Adverse Labour Market Experiences Translate into Electoral Behavior”, discuss three mechanisms by which labour market disadvantages influence voter behavior. They note that disadvantages in the labour market—which in this paper we are assuming come from trade and immigration—can increase support for redistribution, reduce internal political efficacy, or lower external political efficacy, resulting into support for pro-redistribution parties, vote abstention, or support for protest parties. In the Brexit context, support for pro-redistribution policies would presumably be a vote to leave the EU, as the Leave campaign advocated that the funds the UK pays to the EU could be redirected to the NHS, for example. There is little evidence of the second effect on voter behavior, vote abstention, in the
Brexit referendum—most likely as the vote for Brexit was a monumental vote, which almost certainly countered any disillusionment with impacting electoral outcomes. However, the third effect, increased support for protest parties, would also result in a Leave vote, as the establishment on both sides support the Remain campaign in some form, while the major protest party, UKIP, strongly advocated for leaving the EU. We can then see through this literature that we should expect any economic adversity to be highly correlated with the Leave vote share in Local Authority Districts.

In excerpts below the authors explain the mechanisms and impacts of labour market disadvantages on electoral outcomes.

“First, labour market disadvantage can depress individuals’ self-perceived competence to influence politics (low internal efficacy), which is likely to lead to abstention from voting. Second, labour market disadvantage can influence individuals’ perception of the extent to which the political system, in particular the mainstream parties, are responsive to their personal interests (low external efficacy), which is likely to lead to increased protest voting or abstention from voting. Finally, following the political economy literature, we hypothesise that labour market disadvantage influences individuals’ economic interests and is thus likely to lead to increased support for pro-redistribution parties.” (Emmenegger et al. 2001)

“it has been argued that labour market disadvantage leads to phenomena such as withdrawal from political participation, radicalisation or political distrust. Literature has traditionally focussed on unemployment as a form of disadvantage that deprives citizens of work-related skills and resources that foster political inclusion (Rosenstone, 1982; Verba et al., 1995; Schur, 2003). Disadvantage comprises concepts such as employment precariousness, outsiderness, insecurity, in-work poverty and so on. It covers situations such as having no or only insecure employment, being underemployed due to involuntary part-time or earning a low wage. We do not claim that these forms yield identical political behaviour effects. But from a psychological and epidemiological perspective, they have in common that they trigger (worries about future) material and social deprivation and hence function as powerful stressors. This has been shown for job insecurity (Sverke et al., 2002), unemployment (Paul and Moser, 2009) and precarious employment (Benach et al., 2014).” (Emmenegger et al. 2001)

The Leave campaign appealed to those disadvantaged in the labor market, by drawing on unemployment due to trade, immigration, and the amount of taxpayer money being sent to Brussels. A core tenant of the Leave campaign’s argument was that the UK sends £350m a week
to Brussels. This figure was not correct, as several Brexiteers acknowledged after the polls had closed. Britain’s net contributions are much lower once payments to farmers, poorer regions, and science—primarily through universities—as well as the rebate that former Prime Minister Margaret Thatcher established are considered. In the end, Britain does make net contributions to the EU budget of £163m a week, which will be saved once the UK leaves the EU. Figure 1 below, published from the Financial Times using Treasury data, shows that the net payments to the EU have been increasing over the past decade. The prospect of the UK being able to take this money and potentially help those who have been disadvantaged in the labor market is a reason many voted for Brexit. Ultimately, the Leave campaign had realized that their voter base would be those economically disadvantaged and they campaigned to these voters. This paper hopes to find this effect in the data, by analyzing the correlation between labor market disadvantage and propensity to vote Leave.

**Figure 1:**

![Figure 1: UK payments to EU budget](image)

Source: Financial Times—Data from Treasury
2. Trade:

David Autor, David Dorn, Gordon Hanson, and Kaveh Majlesi have a 2016 paper entitled “The Electoral Consequences of Rising Trade Exposure” that looks at the impact increased import penetration from China since their joining of the WTO in 2001 has had on political polarization in the US. Analyzing outcomes from the 2002 to 2010 congressional elections, they find an ideological realignment that centers in trade-exposed local labor markets. By utilizing the exogenous component of rising trade with China, they find strong evidence that congressional districts exposed to larger increases in import penetration disproportionately removed moderate representatives from Congress. Interestingly, trade-exposed districts with an initial majority white population or initially in Republican hands became substantially more likely to elect a conservative Republican, while trade-districts with a majority-minority population or initially in Democratic hands became more likely to elect a liberal Democrat. This ideological divide has driven up partisanship in Congress to the point where the most conservative Democrat is now more liberal than the most liberal Republican, opening an ideological gulf between the two parties.

It is clear to understand why voters would be affected by international trade. From the 1950s to the 1980s, manufacturing allowed U.S. workers without a college degree to attain a middle-class lifestyle, however such opportunities have evaporated as increased trade has impacted the manufacturing sector (Pierce and Schott 2016). The Autor, Dorn, Hanson, Majlesi (2016) analysis focuses on this impact of international trade on U.S. manufacturing jobs, which in turn has driven the ideological divide. They use evidence that industries more exposed to import competition from China have seen higher rates of plant exit, larger contractions in employment, and lower incomes for affected workers (Autor, Dorn, Hanson, and Song 2014).
Further, they realize that local labor markets that have more-exposed industries have experienced more substantial job loss, persistent increases in unemployment, non-participation in the labor force, and uptake of government transfers (Autor, Dorn, and Hanson 2013). Notably, per their estimates, automation has played a bigger role than trade exposure on job loss, persistent unemployment, non-participation in the labor force, and uptake of government transfers (Autor, Dorn, and Hanson 2013). To measure the trade exposure of a region, they used the change in industry import penetration from China, weighting each industry by its initial share of employment. They also separate the component of U.S. import growth that is driven by export-supply growth in China and U.S. product-demand shocks. This measure for trade exposure is like other work before them. This paper will utilize a similar measure to approximate trade vulnerability, however, due to data availability, I will be using the value added by net import industries instead of weighting each industry by employment. Further, I will be considering all trade, not just the trade vulnerability to Chinese imports.

Various papers have attempted to estimate regional trade exposure. Autor et al. (2013) use the change in industry import penetration from China, weighting each industry by its initial share of commuting zone employment. Scheve and Slaughter (2001) in their paper on determining what drives individuals’ trade policy preferences, use two different measures of regional exposure: one is the share of regional employment accounted for by high-tariff industries, identified as manufacturing industries with above-median tariff rates, secondly they identified the net import industries and calculated the share of regional employment accounted for by these industries. They established that these two variables measure each region’s comparative disadvantage employment (Scheve and Slaughter 2001). Scheve and Slaughter found that while these two measures of regional trade exposure could not predict a person’s
preference for restrictions on trade, when these variables were paired with a dummy for home ownership they became significant in predicting the support of trade restrictions (Scheve and Slaughter 2001). They found that Heckscher-Ohlin logic did a pretty good job of explaining American attitudes towards trade, as lower-skilled workers were more protectionist. This will guide our model of how British voters made their decision in the referendum based on socioeconomic conditions, and we will expect that workers in trade-vulnerable sectors, which are being impacted disproportionately from globalization, will have exhibited a greater propensity to vote to leave the EU.

Similarly, Dippel et al. (2015) link votes for far-right parties in Germany to trade integration with China and Eastern Europe. The body of literature has clearly established that voting for far-right parties and anti-EU sentiment can be traced back to trade impact across Europe and the US.

Topalova (2010) presents a methodology for measuring trade impact that will be applicable to this paper. Topalova (2010) measures trade impact by weighting the relative prices of tradable goods by employment to obtain an index of the terms of trade for each state or district. In essence, they are establishing terms of trade for each region by using employment in traded industries as their primary measure. As will be explored further in the methodology section of this paper, I will establish trade impact in a similar fashion, except using value added in lieu of employment. This paper uses the amount of value added to net import industries within each region as a method to distinguish trade vulnerable areas. This is done so as to be similar to using employment by net import industries, as employment by industry was not available at the Local Authority District level. For robustness, this is done for industries that are net import industries overall, net import industries with the EU specifically, and net import industries where
over 50% of the imports come from the EU, representing industries that are most impacted directly from trade with the EU. Further details of this estimation strategy are explored in the Methodology section of this paper—it is important to recall that this methodology is an extension from the literature presented above.

3. **Immigration:**

Immigration into the UK has been on the rise. As seen in Figure 2, the UK has experienced a sharp rise in the number of EU citizens immigrating into the country. Per the Office of National Statistics data on immigration into the UK in their May 2016 Quarterly Report, net long-term international migration was +333,000 (up 20,000 from 2014; not statistically significant). They cite this increase in net migration resulting from a decrease in emigration, while immigration remained at a similar level as the prior year. Net migration of EU citizens was estimated to be 184,000 compared with only 174,000 in 2014. Non-EU net migration was 188,000, which was a similar level as previous years. Looking over a longer timeframe, it becomes clear that for the last 15 years net immigration has increased significantly, which is partially due to more countries joining the EU (seen in figure 2 below).

Interestingly, Becker, Fetzer, and Novy (2016) find that there is a negative correlation between the Leave vote in the Brexit referendum and migrant shares in 2001 from the 12 EU accession countries that joined in 2004 and 2007, the initial EU 15 countries, and non-EU countries. They note that this is a result of these immigrants predominantly moving into urban areas. Remarkably, in terms of migration growth, only migration from the mainly Eastern European EU accession countries positively correlate with the Vote Leave share. Migration from Eastern Europe is predominantly of low-skilled workers who moved into areas with lower-skilled native populations, which they show as correlating with a larger Vote Leave share.
(Becker, Fetzer, and Novy 2016). They note that this could be because lower-skilled natives are more vulnerable to wage impacts of immigration. Nonetheless, it is striking that the correlation on immigration is significant in opposite direction depending on the countries of origin of the immigrants.

**Figure 2:**

![Graph showing migration trends](image)

When analyzing where immigrants are coming from, as seen in Figure 3, it becomes apparent that the rise in net immigration from 1997 to 2005 was driven by primarily an increase in Non-EU citizen immigration. From 2005 to 2015, net migration of Non-EU citizens remained constant or possibly even declined, while net migration of EU citizens increased to the point where the net migration of EU and Non-EU citizens is now similar. This rise in immigration overall, and EU citizen immigration, in particular, may have fueled the vote to leave the EU. Either out of fear of losing jobs or from racial prejudice many UK residents may have voted to
leave the EU due to rising immigration in the hopes that they could stem the tide of immigrants flowing into the country.

**Figure 3:**

Most literature surrounding attitudes and political beliefs being affected by immigration primarily focus on the impact immigration has on real wages. In turn, the literature draws a line from the decreased wages to voting behavior. Hericourt and Spielvogel (2014) analyze how standard socio-economic factors, as well as media consumption impact views on immigration. They note that there are only small or negligible effects of immigration on the wages of native-born workers (which in our case can be seen in Figure 4, which is drawn from a Financial Times article). However, as they put it, “the actual threat of competition has less influence on resident workers’ opinions about immigration than the perceived threat does” (Hericourt and Spielvogel 2014). They note that in 2002, nearly 40% of Europeans were concerned about the detrimental
wage effects stemming from immigration (Hericourt and Spielvogel 2014). In this paper, we can take the Brexit referendum in part as a referendum on immigration and thus understanding what shapes opinions towards immigration is important. Hericourt and Spielvogel (2014) emphasize that it is the subjective perception of the effects, not an objective assessment, which could lead individuals to come out for or against immigration. Thus, in our model we will not be using the objective impact on wages due to immigration in a region, but rather the flow of immigrants into an area which could shape the subjective feelings towards immigration and thus Brexit. In another work and importantly for our model, Hainmueller and Hiscox (2007) show that education level is a key determinant of individual opinion about immigration, because it influences attitudes towards competition from immigrant workers and it reflects differences in cultural values. Evidence has shown that education is negatively correlated with the Leave vote share (Becker, Fetzer, Novy 2016).

**Figure 4:**

![Chart: Wages of UK-born and EU immigration](image)

The chart shows the change in the share of EU immigrants for every local area in the UK (left to right) and the change in local wage levels (up and down). There is no correlation, indicating that areas with high levels of immigration do not have lower wage growth. There is no indication that immigration reduces wages.

Source: Financial Times
Another important work for our model comes from a study done on the impacts of immigration in Spain on electoral outcomes. Cutillas and Mendez (2013) reveals the effect of immigration inflows on natives’ election outcomes. They find that Latin-American immigration increased natives’ participation rate and their support for the major leftist party, Socialist Workers’ Party, whereas, African immigration only increase natives’ support for anti-immigration formations. They provide suggestive evidence that the heterogeneity of effects from different types of immigration is not due to economic factors. Rather, Spanish natives’ attitudes towards immigrants are mainly driven by noneconomic factors like dissimilarities between natives and immigrants in language, religion, and race (Cutillas and Mendez 2013).

More recent work has shown that immigration from EU ascension countries contributed to the rise of right wing parties across Europe (Becker and Fetzer 2016). This would apply to the UK as well, where the predominant far right wing party is UKIP. A recent study found that support for UKIP in the most recent European Parliament elections was the best predictor of support for leaving the EU, as opposed to economic factors and immigration (Becker, Fetzer, and Novy 2016). This should make sense as UKIP’s primary objective is to create a UK independent from Europe. Notably, this literature provides evidence for voters in the Brexit referendum voting Leave being driven by non-economic factors—this paper will show this in the data.

4. Other work on determinants of Brexit:

In the months following the referendum many sought to resolve how this result could have occurred. Many magazines, newspapers, and blogs took to looking at correlations among age, education, population density, and more. Economists also started doing some more analytical work to find further correlations or even causal pathways. Many have shown evidence that UK regions characterized by declining shares of manufacturing employment, lower real wage growth, and increasing income inequality voted systematically more to leave the EU (e.g.
Becker et al. 2016, Bell and Machin 2016, Colantone and Stanig 2016a, Clarke and Whittaker 2016, Darvas 2016, Langella and Manning 2016, Menon and Salter 2016). Bell and Machin (2016) showed that areas with relatively low median wages were substantially more likely to vote Leave. Colantone and Stanig (2016) show that Chinese import shocks are a key causal driver of differences in support for Leave across regions. They used the Autor et al. (2013) methodology explored earlier to establish a region-specific measure for the exposure to Chinese imports. This paper shows that regions that have been more exposed to the recent surge of manufacturing imports from China, due to their historical industry specification, show higher Leave vote shares. My paper will hope to expand on this work and discover the effect that being exposed to trade overall, not just from an increase in Chinese manufacturing imports, has on the Leave vote share. Theoretically, a similar result should arise.

Many of these papers use their results to claim that the correlations they find from economic adversity to Leave vote share are driven by the displacement determined by globalization in the absence of effective compensation of its losers. Colantone and Stanig (2016) state this directly, while Zoega (2016) uses this to prescribe economic policies that aim at making the gains from trade and immigration as widespread as possible.

Other recent work has explored the tie between immigration and the Leave share of the vote, which is relevant to this paper. Zoega (2016) finds that regions that have benefitted from immigration as well as trade most strongly favor Remain, while the regions where people feel the most threatened voted Leave. Similarly, Clarke and Whittaker (2016) found that while there is a negative correlation between the stock of immigrants and Leave vote share, there is positive correlation between the recent increase in the number of immigrants and the Leave vote share. In theory, this is because the stock of immigrants can over time shift peoples’ attitudes towards
favoring globalization and reduces the perspective of immigrants being a threat to their culture or jobs, whereas increases in the flow of immigrants can bring about animosity towards immigrants as they rapidly change the area. Those areas that have typically been home to self-identified “English” people but have over the last five or ten years seen a significant increase in the number of immigrants would tend to want to stop that flow by voting Leave. This result is similar to the results found in this paper using the Office of National Statistics Data at the Local Authority District level. This result has also been widely noted in the 2016 US Presidential election.

From all this recent work, it is clear there is a relation between economic factors in a region, such as wages, unemployment, industry of employment, and trade impact, and the share of Leave voters. Clarke and Whittaker (2016) establish: the geographical distribution of living standards influenced the referendum vote, with employment having a significant effect, older areas voted more to leave and areas with lots of students being more likely to vote Remain, cultural and geographical factors played a key role, as cohesion within a local area to vote similarly and that different areas voted differently even after controlling for other factors, and lastly they establish that the level of migration doesn’t seem to matter but the pace of change over the last decade does. However, little work has been done to realize which of these factors, cultural or economic, were more significant in determining the outcome of the referendum.

In a similar vein, Becker, Fetzer, and Novy (2016) did find that electoral preferences for the UKIP party (who focus on breaking the UK off from Europe) in the 2014 European Parliamentary elections can explain almost 92% of the variation in the support for Leave across local authority areas. Similarly, nearly 80% of the variation in local authority area can be explained through demographic factors. Whereas, only a little variation (under 50%) in the Leave vote share can be explained by various measures of a local authority area’s exposure to the
EU, measured through trade exposure, receipts of EU structural funds, and immigration from EU countries (Becker, Fetzer, and Novy, 2016). They show that demography, education, and the larger economic structure of an area, which are all fundamental, slow-moving factors, explain more of the variation in the Leave vote share than measures of EU exposure.

Overall, research has been conducted on the importance of economic factors and immigration on voting in general. There has also been work on how trade exposure or integration can impact electoral outcomes. Lastly, the body of work surrounding Brexit is rapidly expanding, with work now on the importance of wages, previous electoral behavior, trade integration, immigration, and demographic variables on the Leave vote share in local authority areas.

This paper will be approaching the topic in a similar vein, but will add to the literature in several ways. Firstly, this paper, while looking at the importance of economic and social factors on the referendum outcome, will also look at how these economic and social factors behave differently across different areas of the UK—primarily across England and Scotland. There may be differences in the estimations of our variables of interest between England and Scotland for a variety of reasons: they could experience immigration from different areas of the EU, they could hold fundamentally different views towards immigrants and trade, and/or these differences could be due to them nature of their respective economies, with Scotland being more export intensive and perhaps needing immigration to fill jobs (e.g. in the oil industry). This is an area that, as far as I can tell, has been ignored in the literature surrounding Brexit. Discovering fundamental differences in how voters react to trade vulnerability and immigration in the different countries of the UK is a significant contribution to the body of literature on Brexit and is useful for policy makers moving forward with future elections that may exhibit similar voter behavior trends, notably the seemingly impending second referendum on Scottish exit from the UK.
Secondly, this paper will check the estimates for measures of trade integration and immigration through robustness checks. The robustness checks are there to confirm the validity of my identification strategy for trade impact and immigration effects. The robustness checks look at slightly different measures for both trade and immigration to see if the estimate of their impact changes. Lastly, this paper reinforces the previous work by finding similar results, primarily the impact of immigration, using a new data set from the Office of National Statistics that is comprehensive and disaggregated at the Local Authority District level instead of at the county level.

IV) Summary Statistics of the Vote

Looking at the map of the election outcomes, seen in Figure 5 below (source: BBC), the UK was substantially divided over the referendum. Every local authority area in Scotland voted over 50% remain, as did most of Northern Ireland and the Greater London area, as well as most heavily populated areas. Looking at each country individually in figure 6, we see that England voted 53.4% Leave, Wales 52.5% Leave, Northern Ireland only 44.2% Leave and Scotland only 38.0% Leave. When splitting Greater London from the rest of England in figure 7 we see that the rest of England voted 55.4% Leave and Greater London only voted 40.1% Leave. Figures 8 and 9 mirror figures 6 and 7, respectively, in their splitting of the country and they show the number of votes in each region for Leave (in blue) and for Remain (yellow). These make clear that the results in England dominated the rest of the results across the UK, even when Greater London is considered separate from the rest of England. While Scotland, Northern Ireland, and Greater London all voted Remain by large margins, the voting population in the rest of England dwarfs the rest of the country. Thus, a relatively close margin (53% to 47%) in England overwhelmed
the total result, as can be clearly seen by figure 10, which splits the UK by country with the size of the circle being the electorate, the vertical axes being the share of country that voted Leave and the coloring significant of the result of the referendum in that country (blue for over 50% Leave, yellow for over 50% Remain).

**Figure 5:**

![Map of the UK showing the result of the referendum](image)

**Figure 6:**

![Bar chart showing the share of Leave votes in different regions](image)

Source: BBC

**Figure 7:**

![Bar chart showing the share of Leave votes in different regions](image)

Source: BBC
Figures 11 through 13 illuminate correlations between population size, turnout percentage, and the Leave vote share. Figure 11 reveals the negative relationship between population and Leave vote share; figure 12 reveals the positive relationship between turnout percentage and Leave vote share; and figure 13 reveals the negative relationship between population and turnout percentage. Notably, many of the local authority districts in London that had some of the highest share of Remain voters also had the lowest turnout percentages. Having such large populations, this phenomenon may have impacted the result of the referendum.
Figure 14, taken from the BBC and the Lord Ashcroft Polls, reveals the sharp divide across generations, with younger generations voting predominately Remain, while older generations predominately voted Leave. Those aged between 18-24 voted 73% Remain and 27% Leave; conversely, those over the age of 64 voted 40% Remain and 60% Leave. While those under the age of 45 voted more Remain than Leave, the larger voting population of the older generations that all voted more Leave than Remain overwhelmed the outcome of the referendum.
V) Data and Methodology

My analysis will rely heavily on data from the Office of National Statistics (ONS), a UK government database. The data I will utilize from the ONS includes data in two different geographical size units. Data on employment, unemployment, economic inactivity, population, and flow of immigration into the area both from outside the UK and inner-UK migration, are all on the local authority district level. Local authority districts are the subnational division of the UK for the purposes of local government. This is the same area disaggregation that the Referendum vote data is at, per the BBC. Other data utilized for this paper, obtained from the ONS, such as foreign born population from 2005 to 2015, and the level of trade impact is found at the county level. Local authority districts lie wholly in counties, but counties are often made up of several Local Authority Districts. As an example, Surrey, in the south east of England, seen here, consists of 11 local authority districts contained within the boundaries of the county: Spelthorne, Runnymede, Surrey Heath, Woking, Elmbridge, Guildford, Waverly, Mole Valley,
Epsom and Ewell, Reigate and Banstead, and Tandridge. The voter data, unemployment, population, and flow of immigration is all disaggregated at the smaller local authority areas, while trade impact and static foreign born population is at the larger county level. Observations for this data are then assumed to be equal across the county. This allows us to capture more of the true effect, as our sample size will be greater, and there will be more sources of variation with greater disaggregation. Using the county value for each of the local authorities is not ideal, but restrictions from data availability forced this decision.

Data on immigration comes in two forms: the change in the percent of immigrants coming into a local authority area from either 2005 or 2010 to 2015 and the change in the foreign-born population across ten years (from 2005 to 2015) or across 5 years (from 2010 to 2015). The change in the percent of immigrants coming into a local authority area is measured as the number of foreign immigrants in 2015 divided by the population in 2015 minus the number of foreign immigrants in 2010 (or 2005 for the ten-year estimate) divided by the population in 2010 (or 2005 for the ten-year estimate). The change in the foreign-born population is the non-UK born population estimate in 2015 divided by the population in 2015 minus the non-UK born population estimate in 2010 (or 2005 for the ten-year estimate) divided by the overall population in 2010 (or 2005 for the ten-year estimate).

The measure of trade impact was hard to determine. Previous work (see Scheve and Slaughter 2001 as an example) have used the amount of employment in net import industries as a
measure for how vulnerable an area is to trade. This paper will take a similar approach, but instead of using amount of employment in net import industries, which would be the ideal data, due to employment data by industry being unavailable at the Local Authority level, this paper uses the amount of value added from net import industries. First, industries that are net import industries in the UK were identified. This included agricultural products, mining, manufacturing, and more. For robustness, this paper also identifies industries that are net import industries with the EU specifically, and net import industries with the EU, where more than 50% of the imports come from the EU—which this paper will refer to as heavy EU net import industries. After assigning a dummy for whether it was a net import industry, the value added of these industries was taken as a percentage of total value added for each local authority area. Value added is the Dollar value of how much that region enhanced some industry, including through wages. This creates a measure that establishes the amount of economic activity that an area relies on in trade vulnerable industries—nearly a proxy for GDP of an industry in a region. The higher the percent of value added from net import industries, the more vulnerable the area is to economic losses due to trade. Obviously, not being able to take the amount of employment in the net import industries and instead taking value added has its downsides. First and foremost, if a person in a local authority area is a high earner in a net import industry, they will appear to be bringing up the trade vulnerability of that area, when they still only have one vote. The amount of value added by any one person is not proportional to their vote’s influence on the overall outcome. Instead of a one-to-one relation of being employed in a net import industry to a vote for or against Brexit, this measure takes monetary values in net import industries and relates them to the vote outcome. While this measure has this downside, it is still a valid measure as the value added in an area is a close proxy for employment, as well as economic reliance on net import industries which can
still appear to influence the electoral outcome. Furthermore, Becker, Fetzer, and Novy 2016 employ a similar approach to discern trade vulnerability. Specifically, they measure trade integration as the share of value added in a UK region that can be attributed to consumption and investment demand in the rest of the EU. They then use this measure to discern the correlation between trade integration and the Leave vote share in the Referendum. They find that areas with higher trade integration, typically areas with higher manufacturing employment, were more likely to vote to Leave the EU. I employ a similar approach and find similar results, as can be seen in the Results Section of this paper and Table 1.

Regression 1, seen below, regresses the economic and social variables on the outcome variable, the percent of the vote that is Leave, by Local Authority District levels. Notably, the percent of the vote that is Leave by Local Authority District will be presented as a decimal with 1.0 signifying 100% and 0.0 signifying 0%. My economic variables include, the percent of value added in net import industries (VA), and the unemployment rate. For social factors, I include, the mid-2015 population estimate, the change in the foreign population share from 2010 to 2015, and dummies for Greater London, Wales, and Scotland (so that the baseline is England without London—notably, data for immigration is not available for Northern Ireland so those local authority districts are excluded from analysis).

\[
1) \quad \text{PercentLeave}_i = \alpha + \beta_1 VA_i + \gamma \text{Unemployment}_i + \delta \text{Population}_i + \\
\rho_1 \text{PercentForeignPopChange}_{10-15}_i + \mu \text{GreaterLondon} + \tau \text{Wales} + \\
\varphi \text{Scotland} + \epsilon
\]
Regressions 2 through 8, seen below, present a series of robustness checks on the initial regression. In the following paragraphs, I detail these robustness checks and their necessity.

For robustness checks on trade impact, I use the percent of value added from EU specific net import industries (seen in regression 2), as well as value added from EU specific net import industries where EU imports make up at least 50% of overall imports (regression 3). By using these modifications on my identification strategy, I can see if voters were responsive to general trade vulnerability (regression 1) or were more responsive to trade vulnerability with the EU (regression 2) and finally whether they are responsive to very strong EU import intensive industries (regression 3).

2) $\text{PercentLeave}_i = \alpha + \beta_2 \text{VA}_E + \gamma \text{Unemployment}_i + \delta \text{Population}_i + \rho_1 \text{PercentForeignPopChange}_10_{15} + \mu \text{GreaterLondon} + \tau \text{Wales} + \varphi \text{Scotland} + \epsilon$

3) $\text{PercentLeave}_i = \alpha + \beta_3 \text{VA}_E + \gamma \text{Unemployment}_i + \delta \text{Population}_i + \rho_1 \text{PercentForeignPopChange}_10_{15} + \mu \text{GreaterLondon} + \tau \text{Wales} + \varphi \text{Scotland} + \epsilon$

For robustness checks on immigration, I also look at the change in the foreign population share from 2005 to 2015 (regression 4) to see whether a longer window of immigration change (10 years instead of 5 years) is important. I use the average immigration rates from 2010 to 2015 (regression 5) and from 2005 to 2015 (regression 6) to see how average immigration rates over those years could be different from the overall change in immigrants—my initial identification strategy looks at the end amount of foreign born residents, but if an area sees large flows of
immigrants both in and out, their foreign-born population share wouldn’t change much but they may still be struggling with immigration. I also will include the static share of foreign born population in a local authority district in 2015 (regression 7). In regression 8, I regress with both the 2010 to 2015 percent foreign population change as well as the static share of foreign born population in a local authority district in 2015, in the hopes that this will account for the fact that areas that already have high foreign born population shares would see potentially larger increases in the foreign-born population as immigrants move into areas where prior immigrants have set up roots and communities.

4) \( \text{PercentLeave}_i = \alpha + \beta_1 VA_i + \gamma \text{Unemployment}_i + \delta \text{Population}_i + \rho_2 \text{PercentForeignPopChange}_05_{-}15_i + \mu \text{GreaterLondon} + \tau \text{Wales} + \phi \text{Scotland} + \epsilon \)

5) \( \text{PercentLeave}_i = \alpha + \beta_1 VA_i + \gamma \text{Unemployment}_i + \delta \text{Population}_i + \rho_3 \text{Av Im}_5_i + \mu \text{GreaterLondon} + \tau \text{Wales} + \phi \text{Scotland} + \epsilon \)

6) \( \text{PercentLeave}_i = \alpha + \beta_1 VA_i + \gamma \text{Unemployment}_i + \delta \text{Population}_i + \rho_4 \text{Av Im}_10_i + \mu \text{GreaterLondon} + \tau \text{Wales} + \phi \text{Scotland} + \epsilon \)

7) \( \text{PercentLeave}_i = \alpha + \beta_1 VA_i + \gamma \text{Unemployment}_i + \delta \text{Population}_i + \rho_5 \text{For Pop}_15_i + \mu \text{GreaterLondon} + \tau \text{Wales} + \phi \text{Scotland} + \epsilon \)

8) \( \text{PercentLeave}_i = \alpha + \beta_1 VA_i + \gamma \text{Unemployment}_i + \delta \text{Population}_i + \rho_1 \text{PercentForeignPopChange}_10_{-}15_i + \rho_5 \text{For Pop}_15_i + \mu \text{GreaterLondon} + \tau \text{Wales} + \phi \text{Scotland} + \epsilon \)
The second area that I explore in this paper, is the disparity that the coefficients on my regressors exhibit when looking in England (exempting Greater London) alone (regression 9), Wales alone (regression 10), Scotland alone (regression 11), and in Greater London alone (regression 12). These regressions are done to establish any differences that these social and economic factors have on the Leave vote share across different countries. For example, we can see—by comparing results from regression 1 and regression 11—whether the percent change in foreign-born population has a different relationship with the Leave vote share in Scotland than it does in the rest of the UK.

9) $PercentLeave_i = \alpha + \beta_1 VA_i + \gamma Unemployment_i + \delta Population_i + \rho_1 PercentForeignPopChange_{10\_15}_i + \epsilon$

10) $PercentLeave_i = \alpha + \beta_1 VA_i + \gamma Unemployment_i + \delta Population_i + \rho_1 PercentForeignPopChange_{10\_15}_i + \epsilon$

11) $PercentLeave_i = \alpha + \beta_1 VA_i + \gamma Unemployment_i + \delta Population_i + \rho_1 PercentForeignPopChange_{10\_15}_i + \epsilon$

12) $PercentLeave_i = \alpha + \beta_1 VA_i + \gamma Unemployment_i + \delta Population_i + \rho_1 PercentForeignPopChange_{10\_15}_i + \epsilon$

These regressions are the same as regression 1, except are limited to the respective regions designated for each and thus the region dummies are no longer needed, as all observations are within a single country/region (England—except Greater London, Wales, Scotland, or Greater London). These regressions will be weaker in their conclusions and not have
as much certainty (larger standard error) as the number of observations is dramatically reduced when limiting the region of focus.

Overall, it will be challenging to discern unbiased estimates on the variables as many will be correlated with each other, thus biasing estimates towards zero. As high population density areas are typically younger, more educated, have higher foreign population shares, and were generally more satisfied with globalization, the impacts found in this paper may be biased. Further, as there appear to be fundamental differences between those in Scotland and Northern Ireland (particularly the areas of Northern Ireland that share a border with Ireland), and England and Wales, our estimates for the determinants of Brexit will be different for different areas. Those in Scotland may be more receptive to immigration and possibly more likely to vote Remain if they have seen benefits from immigrants into their area, whereas the same amount of immigration into England may be correlated with higher vote shares of Leave, or Scotland could have seen immigration from a different part of Europe or the world.

VI) Results

Looking at Table 1—which details regressions 1 through 8, detailed in the last section (each column detailing its respective numbered regression)—the first regression shows statistically significant effects on all covariates, although the change in the foreign population from 2010 to 2015 is only significant at the 90% level. Interpreting these results, we see that regions with a larger percent of their total value added coming from net import industries, and thus more trade vulnerable, are more likely to vote Leave. Similarly, higher unemployment rates and larger increases in the foreign-born population are both correlated with higher Leave vote shares. Areas with larger populations, as well as our dummy variables for Greater London,
Scotland, and Wales all produce negative coefficients, revealing that they are negatively correlated with the Leave vote share.

**Table 1:**

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Standard errors in parentheses

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

The robustness checks on the measure of trade integration, seen in columns two and three, reveal that our measure of trade integration is not very correlated with our other variables as the coefficients on our other variables did not change significantly. Further, column two uses a measure of trade integration that is like the measure used in column one. However, instead of using value added from net import industries, it is a measure that takes the value added from EU net import industries. There are some industries that are overall net import industries in the UK,
but are not net import industries when just looking at EU-UK trade, and the opposite holds as well. This measure then is looking at whether voters were more aware of their exposure to EU specific trade, versus overall trade exposure, as shown in the first regression. The coefficient is very similar to the coefficient in column one (0.00374*** versus 0.00430*** previously). This decrease leads us to argue that voters were more sensitive to overall trade exposure than EU specific trade. When moving to column three, this paper adjusted the measure of trade integration to be the percent value added from EU net import industries, where more than 50% of imports come from the EU. This is a subset industries from our measure in column two, and is meant to identify those people who are particularly vulnerable to EU-specific trade. The coefficient on this measure is 0.00452***, more similar to our original estimate and larger than our estimate in either column one or two. This should make intuitive sense as this measure is identifying regions that have larger shares of their value added coming from heavily EU-UK traded sectors. These regions should be more vulnerable to EU trade fluctuations and adverse impacts from trade, as they have higher employment in the sectors that are heavily imported from the EU. Notably, all the estimates on the different measures of trade integration are significant at the 99% level.

Moving on to the checks on immigration, looking at our original regression we can see that our coefficient on the change in foreign born population from 2010 to 2015 is 0.252*. This implies that a 1 percent increase in the foreign-born population in a local authority area is related to a .252 percentage point increase in the Leave vote share in that district. Importantly, this coefficient is significant, however, only at the 90% level. When looking at the change in the foreign-born population from 2005 to 2015 (a ten-year period instead of a five-year period), we find a coefficient of 0.343***—which is notably significant at the 99% level. This lends us to
believe that the ten-year change in the foreign-born population has a greater impact on the propensity to vote Leave than the five-year change in foreign-born population. Looking at columns 5 and 6, the measure for immigration was the average number of immigrants into a region divided by that region's population over a ten-year and five-year span, respectively. This measure looks at how a region has over the time span experienced continued large proportional net inflows of immigrants. Notably, these regions would typically be regions that have large immigrant populations already (as immigrants are more likely to move into a region where there is an established immigrant community), and are typically regions with large populations (even though it would require fewer immigrants moving into an area with a low population to produce a large proportional average immigrant flow). The coefficients for the average immigrant flow for the last ten years and the last five years are -0.0526*** and -0.0543***, respectively. This informs us that average immigration, weighted by overall population, has a significant negative correlation with the Leave vote share. Further, there is not a significant difference between the average over the last ten years and over the last five years. While the change in foreign population was a positive coefficient (an increase in the foreign-born population is related to an increase propensity to vote to Leave the EU), the average immigration flows as a proportion of the population of a region is negatively correlated, informing us that areas that experience large average net inflows of immigrants are less likely to vote Leave. When looking at columns 7 and 8, we can see that the coefficient on the static amount of the foreign-born population in a local authority district is also negatively correlated with the Leave vote share. As the average number of immigrants moving into an area as a proportion of population is correlated with the overall static amount of the foreign-born population, we can see why we would obtain a negative estimate for the coefficient. The key takeaways from this are that increases over the last five or
ten years of the foreign-born population in a local authority area are correlated with higher propensities of voting to Leave the EU, while the static number of the foreign-born population at the time of the vote is correlated with lower propensity of voting to Leave the EU. Lastly, looking at column 8, where both the change in the foreign-born population from 2010 to 2015 and the static percent of a region that is foreign-born in 2015, we see that both our estimates become more significant. The coefficient on change in foreign-born population share becomes 0.670***, notably significant at the 99% level now, having been 0.252* when the static number of foreign born residents was not controlled for. The coefficient on the static proportion a local authority area that is foreign-born in 2015 is now -0.433*** when controlling for the change in foreign-born population share over the previous five years, having been -0.304*** when not controlling for the change over the previous five years. Clearly, as areas that experienced large increases in the share of their foreign-born population over the five years leading up to 2015 would have larger proportions of foreign born residents in 2015, these two variables are related. When not controlling for one or the other, the estimates are biased towards zero as they consider the other’s effect (and they are diametrically opposed). Now controlling for both the change in and the static share of foreign-born residents, we see more significant estimates of their relation to the Leave vote share. Using these, now un-biases, estimates, we can interpret that a local authority area that experienced a one percent increase in the share of foreign born residents from 2010 to 2015 is correlated with a .670 percentage point increase in the Leave vote share than a comparable region, while that same region having a one percent higher static share of foreign-born population in 2015 is correlated with at .433 percentage point decrease in the Leave vote share than a comparable region.
Looking at the dummy variables for Greater London, Scotland, and Wales, we can control for the fundamental differences between people from these areas. The coefficient on the dummy for Scotland is \(-0.180^{***}\), meaning that a local authority area in Scotland on average votes .18 percentage points less for Leave than a comparable local authority in England (excluding Greater London). Similarly, the coefficient for Greater London is \(-0.125^{***}\). Notably, when the static share of a population that is foreign-born is controlled for, the coefficient for this dummy is the only one to significantly change, as it now becomes insignificant. This is due to Greater London boasting large shares of foreign-born residents and thus the effect is mitigated by collinearity with the static share of foreign-born residents. Lastly, the coefficient on the dummy for Wales is \(-0.0506^{***}\). While this is still negative and significant at the 99% level it is less than half the coefficient on Greater London and less than a third of the coefficient on Scotland, implying that Wales is the closest comparable region to England in terms of uncontrolled for fundamental factors that would influence the populations to vote the way they did.

Looking at table 2, which details regressions 9 through 12, which look at the impacts of the social and economic factors on the Leave vote share in particular regions—regression 9 in England, exempting Greater London, regression 10 in Wales, regression 11 in Scotland, and regression 12. Table 2 also includes the original regression (regression 1) in the first column for easy comparison.

Looking at England—exempting Greater London—first, we see that the impact of the percent of value added coming from net import industries has increased—from 0.00430*** to 0.00702***. Unemployment rate has a similar coefficient, as does the population level in the middle of 2015. The coefficient on change in foreign population has become insignificant, decreasing from 0.252* to 0.242 (with the standard error increasing from 0.130 to 0.148). Overall, when looking
at England alone, the results are similar to the country as a whole, which makes intuitive sense as England accounts for the majority of the UK.

Table 2:

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Overall perc leave</th>
<th>England perc leave</th>
<th>Wales perc leave</th>
<th>Scotland perc leave</th>
<th>Greater London perc leave</th>
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</thead>
<tbody>
<tr>
<td>p_va_import</td>
<td>0.00430***</td>
<td>0.00702***</td>
<td>0.00233</td>
<td>0.00527***</td>
<td>0.0201***</td>
</tr>
<tr>
<td></td>
<td>(0.000608)</td>
<td>(0.000648)</td>
<td>(0.00135)</td>
<td>(0.00144)</td>
<td>(0.00586)</td>
</tr>
<tr>
<td>unemployment_rate</td>
<td>0.0191***</td>
<td>0.0163***</td>
<td>0.0160</td>
<td>0.00310</td>
<td>-0.0373**</td>
</tr>
<tr>
<td></td>
<td>(0.00289)</td>
<td>(0.00339)</td>
<td>(0.0120)</td>
<td>(0.00605)</td>
<td>(0.0181)</td>
</tr>
<tr>
<td>mid_15_pop</td>
<td>-1.80e-07***</td>
<td>-2.21e-07***</td>
<td>-1.59e-07</td>
<td>-3.20e-08</td>
<td>6.90e-08</td>
</tr>
<tr>
<td></td>
<td>(3.80e-08)</td>
<td>(4.65e-08)</td>
<td>(1.58e-07)</td>
<td>(6.81e-08)</td>
<td>(3.32e-07)</td>
</tr>
<tr>
<td>change_for_pop_10_15</td>
<td>0.252*</td>
<td>0.242</td>
<td>-0.958</td>
<td>-1.121*</td>
<td>0.907</td>
</tr>
<tr>
<td></td>
<td>(0.130)</td>
<td>(0.148)</td>
<td>(0.936)</td>
<td>(0.545)</td>
<td>(0.538)</td>
</tr>
<tr>
<td>d_greaterlondon</td>
<td>-0.125***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0161)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d_scotland</td>
<td>-0.180***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0137)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d_wales</td>
<td>-0.0506***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0165)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.429***</td>
<td>0.391***</td>
<td>0.440***</td>
<td>0.288***</td>
<td>0.477***</td>
</tr>
<tr>
<td></td>
<td>(0.0161)</td>
<td>(0.0189)</td>
<td>(0.0738)</td>
<td>(0.0371)</td>
<td>(0.123)</td>
</tr>
<tr>
<td>Observations</td>
<td>373</td>
<td>321</td>
<td>21</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.530</td>
<td>0.357</td>
<td>0.318</td>
<td>0.458</td>
<td>0.423</td>
</tr>
</tbody>
</table>

Moving to looking at Wales alone, notably all the standard errors increased a great deal as the number of observations dropped from 373 in the UK to only 21 in Wales. None of the coefficients are significant, though the coefficient on the change in foreign-born population is now negative (-0.958) but not significant. The other coefficients all decreased from their values in regression 1 and became insignificant.

When running the regression on Scotland alone, the impact of the percent of value added from net import industries become more positive (0.00527*** from 0.00430***). The coefficients on the unemployment rate and population level lost significance—possibly due to the decrease in observations from 373 to 31. Most notably, the coefficient on the change in
foreign-born population became significantly negative (-1.121*) meaning that a one percent increase in the foreign-born population share from 2010 to 2015 is related to a 1.121 percentage point decrease in the Leave vote share. This is the opposite direction of correlation than our results for the UK overall.

Lastly, looking at Greater London, our impact of the percent of value added from net import industries has increased, the unemployment rate switched signs to become negative (-0.0373** from 0.0191 before). The result on unemployment implies that areas with higher rates of unemployment is correlated with lower propensities of Voting Leave, but this result could be due to omitted variable bias, primarily that high unemployed areas are more likely to vote Labour, particularly in Greater London and Labour was more unified in opposition of Brexit. Thus, I would recommend against making the conclusion of unemployment resulting in lower shares of voting Leave in the referendum in Greater London, but rather argue that the result is indicative of a correlation that could possibly go through other causal pathways. The population level and change in foreign born population both lost significance as the number of observations decreased from 373 to 32.

Looking quickly at figure 14 below, we can see that the correlation between the Leave vote share and the percent of value added from net import industries in Scotland, Wales and Northern Ireland is weakly positive, while in England the correlation is strongly positive. Figure 15 reveals that the correlation between Leave vote share and the change in foreign-born population from 2010 to 2015 in England is positive, but in Scotland Wales, and Northern Ireland the correlation is negative—a larger change in the foreign-born population is correlated with lower shares of voting Leave. These results are remarkable as they would suggest a large divide between the views and voting behavior of those in England versus the rest of the UK. The
immigration result could be due to a series of factors: Scotland, Wales, and Northern Ireland could be experiencing immigration from different parts of Europe, they could hold fundamentally different social views towards immigration and the EU, in particular, and/or their economies could be more reliant on immigration and thus they are happier to have immigrants come, whereas in England immigrants could be seen as economic threats. I will leave the study of this result to future researchers.

**Figure 14:**

**Figure 15:**

**VII) Conclusions**

The takeaway of these results is that trade integration had a positive correlation with the Leave vote share, as does the change in the foreign-born population share over the last five years. Conversely, the static share of foreign-born residents in an area has a negative relationship with the Leave vote share. These results hold through robustness checks and are similar to work done by others (see: Becker Fetzer, Novy 2016; Clarke and Whittaker 2016; Additionally, the relationship between immigration and the Leave vote share, as well as the relationship between trade integration and the Leave vote share, is different across the different countries of the UK. Overall, the relationship is positive across the UK, but in Scotland alone, greater trade integration is related to lower propensities of voting Leave. This could be due to a series of
factors: different countries of origin of immigrants, different cultural views towards immigrants, different economic reliance on immigrants, or a host of other theoretical reasons.

These results have implications both for UK politicians moving forward with Brexit, and for other countries, particularly in Europe who may be facing increased anti-EU sentiment recently. British lawmakers can take these results to better understand the motivations of voters in their constituencies. Others across the globe can use these results to better understand why voters may turn against globalization and can tailor policies to better support those hurt by trade and immigration related wage losses.
VIII) Bibliography


Langella, Monica and Alan Manning. “Who voted Leave: the characteristics of individuals mattered, but so did those of local areas”. *LSE*. 2016.


