

# Global Competition and Brexit \*

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## Abstract

Using disaggregated referendum returns and individual-level data, we show that support for the Leave option in the referendum regarding European Union membership of the United Kingdom was systematically higher in regions hit harder by economic globalization. We focus on the shock of surging imports from China over the past three decades. An instrumental variables approach supports a causal interpretation. We claim that this effect is driven by the displacement determined by globalization in the absence of effective compensation of its losers. On the other hand, neither stocks nor inflows of immigrants in a region are associated with support for the Leave option. The analysis of individual data from the British Election Study shows that attitudes towards immigration are strongly correlated with vote choice. Yet, attitudes about immigration are more closely related to the import shock than to the actual incidence of immigration in a region.

**Keywords:** Brexit; Globalization; Economic Vote.

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# 1 Introduction

The success of the Leave option in the Brexit referendum of June 2016 was probably the single most important event in European politics in the past two decades. In the wake of the outcome, a good deal of speculation and analysis has taken place about the underlying causes of the success of the Leave option. Immigration has taken a center stage in this debate, as it had during the campaign. Indeed, evidence shows that immigration, in particular from the Eastern European countries that joined the EU in 2004-2007, was central among the self-reported motives of Leave voters. In this paper we show that, despite the importance of voters' perceptions and attitudes towards immigration, at a deeper level of analysis the fundamental reasons behind the support for the Leave option do lay elsewhere. In particular, we contend that the roots of the referendum outcome are to be found in the economic globalization shock of the last three decades, and especially in the displacement of British manufacturing driven by surging imports from China.

Our analysis proceeds in two steps. First we work with official referendum results at the regional level, and specifically at the NUTS-3 level of disaggregation. Our variable of interest is the share of Leave votes in each region. We regress this share over an indicator for the exposure of each region to the Chinese import shock, between 1990 and 2007. This index is computed following the methodology developed by Autor et al. (2013), which combines information on import flows at the country level with data on the historical sectoral composition of employment in each region. The underlying idea is very intuitive: different regions have been more or less exposed to the rise of China as a manufacturing power depending on their ex-ante industry specialization, as measured at the end of the 80s. In particular, the Chinese shock has been stronger in those regions in which a larger share of workers was initially employed in industries witnessing subsequent larger increases in imports from China, e.g. textiles or electronic goods.

The share of Leave votes was systematically higher in those regions that have witnessed larger import shocks: a one standard deviation increase in the strength of the shock at the regional level is associated with an increase by 2 percentage points in support for the Leave

option. This finding is robust to accounting for the possible endogeneity of the import shock, which we instrument by using imports from China to the United States rather than the UK, in line with earlier studies in international economics (Autor et al. 2013, 2014, 2015, 2016; Bloom et al. 2016; Colantone et al. 2015; Dauth et al. 2014; Hummels et al. 2014). By doing so, we aim to capture the exogenous increase in Chinese imports to the UK driven by supply shocks in China, rather than by potentially endogenous domestic factors in Britain. The effect of the import shock on Leave votes is also robust to controlling for a number of regional characteristics, and in particular for the stock and the recent inflow of immigrants in each region. There is no evidence that higher immigration led to more Leave votes. If anything, regions characterized by a larger stock of immigrants as a share of the population tend to vote more in favor of Remain.

In the second part of the study, we perform an analysis of vote choice for individual voters, based on the British Election Study (BES) data that were collected just before the referendum (Wave 8). For each individual we have information concerning the vote intention, as well as controls for demographic characteristics, education, labor market status, attitudes regarding immigration, party ID, and ideology. Based on the region of residence, we match the BES data for each individual with the regional data on the import shock. Conditional on education and other characteristics, individuals in regions more affected by the import shock are more likely to vote for Leave. On the other hand, neither the stock nor the recent inflow of immigrants in their region have any predictive power with respect to their vote intention.

The results at the individual level are in line with the evidence at the regional level. However, the individual level data allow us to investigate more in depth the underlying patterns along several dimensions. First, we show that the effect of the import shock is not restricted to a specific category of voters, but seems to be broadly relevant for the whole population, with the notable exception of retired people. In particular, the effect of the import shock is not statistically different for service workers, whose jobs are not directly affected by manufacturing imports from China. This evidence suggests that voters have

responded to the shock in a sociotropic rather than simple “pocketbook” fashion . This is in line with earlier evidence from the economic vote literature showing that voters engage in sociotropic rather than pocketbook voting when choosing legislators and chief executives (Duch and Stevenson 2008; Kinder and Kiewiet 1981). In other words, support for incumbent parties is driven by (perceptions of) general economic conditions at the macro level, not by (potentially idiosyncratic) economic conditions at the individual or household level. These general economic conditions, in turn, do not reflect merely the state of the economy at the national level but, importantly, also at the local level (Ansolabehere et al. 2014).

Next, we focus on the role of individual attitudes towards immigration. A large majority of Leave voters has also been found to support restrictions to immigration from EU countries, regardless of the consequences (Ipsos MORI 2016; Lord Ashcroft 2016). According to the BES data, a majority of voters, and around 80% of prospective Leave voters, also stated that leaving the EU would lead to lower immigration.

When including different measures of attitudes towards immigration in our regressions at the individual level, we find that concerns with immigration are strongly correlated with voting Leave. At the same time, very little predictive power is left for the import shock. However, we also find that attitudes towards immigration are themselves systematically worsened by the import shock, while they are not related in a clear way to the actual extent of immigration in a region. This result does not come as a surprise, as recent literature has pointed out that salience of immigration as a national issue trumps or alters the role of actual experience with influxes or presence of immigrants (e.g., Hopkins 2010, 2011). The significant effect of the import shock on attitudes can be interpreted in several ways, which we discuss below. While we want to refrain from speculation about psychological mechanisms, we cannot avoid noticing that this piece of evidence is consistent with an interpretation that sees the immigration issue as a scapegoat for a malaise that has more structural economic roots and is related to globalization without compensation of its losers.

This paper makes two main contributions. The first one is to provide a rigorous scien-

tific analysis of this specific political event, whose importance is undeniable, and to dispute the growing conventional wisdom that support for Brexit was a consequence of immigration from EU countries to the United Kingdom. The second contribution is to refocus the literature towards a clearer understanding of the political consequences of globalization, in a way that pays serious attention on the one hand to causal identification, and on the other hand to political mechanisms like electoral behavior and vote choice in referendums. In particular, earlier work has mostly focused on the association between voting behavior and self-reported perceptions of economic conditions, and on country-level measures of globalization. On the contrary, we focus on an objective measure of exposure to globalization, which also varies across different regions within the same country. Moreover, we tackle the endogeneity issue in a rigorous way, by employing an instrumental variable approach that is becoming standard in international economics.

Almost a decade ago, Kayser (2007) polemically noted that “the sheer volume of literature in this area has made it easy to overlook an important fact: very little of it addresses the effect of economic globalization on actual politics, understood more narrowly as electoral politics.” The situation has not changed much since the claim was made. Our contribution, then, attempts to reconnect the political science literature on globalization with the well-developed literature on the economic vote broadly understood.

## **2 The Brexit referendum**

On June 23 2016, United Kingdom citizens who were not residing abroad for more than 15 years, as well as Commonwealth residents in the UK, were called to express their stance in a referendum about the future of the UK in the European Union. The question of the ballot was stated as follows: “Should the United Kingdom remain a member of the European Union or leave the European Union?”. Voters could choose between two options: “Remain a member of the European Union” or “Leave the European Union”. The referendum, albeit “consultative”, was considered politically binding for Parliament and the cabinet. The referendum had a pretty high turnout, 72.2%, and the Leave option prevailed by almost 4

percentage points (51.9% vs. 48.1%). Importantly, there was substantial variation in results across geographic areas. At the level of constituent countries, Scotland and Northern Ireland saw very strong support for Remain, while England and Wales were more in favor of Leave. But even within England and Wales there was significant variation across regions. For instance, somewhat tellingly, the Remain option had more support than Leave in most areas of Greater London, the major destination of recent immigration from European Union countries (especially the somewhat poorer new members of Central Eastern Europe). We exploit this heterogeneity of outcomes for identification in our empirical analysis.

The referendum was initially called by Prime Minister David Cameron, who had made it a central promise in the Tory reelection campaign in 2015. In the run-up to the vote, two campaigning groups emerged: “Leave.EU” for the Leave option, and “Britain Stronger in Europe” for the Remain option. On the Remain side were most of the establishment, including the directorates of the main parties (Conservative, Labour, Liberal Democratic, and, importantly, the Scottish National Party). The Leave camp was supported by the UK Independence Party (almost a single-issue party about UK leaving the EU) and minority factions within the major parties. The most prominent establishment supporter of Brexit was Boris Johnson, Tory former mayor of London. He plausibly saw his taking sides as an opportunity to bid for the leadership of the party against David Cameron, who, in spite of taking the initiative to hold the referendum, strongly supported the Remain option. Cameron’s cabinet was split, with six out of twenty-four ministers being in favor of Leave.

Outside of politics, the business community was largely in favor of Remain. Several UK multinationals, including Vodafone and British Telecom, publicly declared this orientation. In February 2016, almost 200 business leaders published an open letter to support the Remain option in The Times newspaper.<sup>1</sup> The group included the top managers of 36 out of the 100 largest companies listed in the London Stock Exchange. Small and medium enterprises were more split. On the financial side, the City of London was strongly on the

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<sup>1</sup>Link here: <http://www.thetimes.co.uk/tto/opinion/letters/article4696807.ece>

Remain side, fearing that an exit from the EU would hamper London's centrality as a financial hub. Some foreign banks like JP Morgan even declared they would re-locate part of their activities to the Continent in case of Brexit. And yet, in spite of this large support in the establishment in favor of Remain, the Leave option rapidly grew momentum in the weeks prior to the vote, and attentive analysts (e.g., Goodwin 2016) were not surprised by the final outcome of the referendum, that saw the Leave option prevail by a small, but not negligible margin.

A great deal of debate and analysis has followed the referendum, mostly in the form of blog posts and articles in the press. A number of empirical regularities have been established. Considering individual-level factors, older, less educated, and poorer people were more likely to vote for Leave, while students and women were more in favor of Remain. Beyond individual characteristics, though, there is a growing awareness that social and economic conditions across geographic areas also mattered. For instance, Langella and Manning (2016) report that a declining share of employment in agriculture, manufacturing, mining and construction in the past three decades is significantly associated with higher Leave vote shares at the regional level. A similar correlation is found with respect to declining employment in services over the same period. Darvas (2016) reports evidence that support for Leave was stronger in regions characterized by higher income inequality, as measured by the Gini coefficient, and by a higher poverty rate.

Consistent with this evidence, Bell and Machin (2016) find that support for the UK Independence Party in the 2015 election, and relatedly for the Leave option in the referendum, was higher in areas of Britain that have witnessed poorer performance in terms of real wage growth over the past two decades. Clarke and Whittaker (2016) also find evidence of higher Leave shares in areas with lower employment rates.

At a deeper level of analysis, our study aims at isolating the causal impact of global competition as a fundamental driver of divergence in performance across regions of the UK. We do this by exploiting the exogenous shock of the surge of China as global manufacturer.

Despite its prominence in the public debate, evidence concerning the role of immigra-

tion is somewhat mixed. With the exception of Langella and Manning (2016), most of the analysts do not find a positive association between the level of immigration and support for Leave. If anything, there is evidence to the contrary: areas characterized by higher shares of foreign-born population were more likely to vote in favor of Remain. This is consistent with more immigrants settling in areas characterized by a relatively younger and economically dynamic environment. London is probably the most notable example of this. Besides that, there is some evidence that the recent change in the proportion of immigrants is associated with higher support for the Leave option (see for example Clarke and Whittaker 2016; Darvas 2016; Langella and Manning 2016). This pattern might be driven by those communities that started from very low levels of immigration, and began facing only recently an increasingly diverse environment. In our analysis we account both for the share of immigrants in the population of the region, and for their recent influx.

### **3 Globalization and politics**

The political science literature on globalization and trade openness has initially focused on macro-level policy outcomes. In particular, there have been two main strands of studies: one focusing on the welfare state as a form of compensation to losers from open trade, and the other investigating the pressure towards a race to the bottom in terms of taxation, especially of more mobile capital.

The first strand of literature originates with the concept of “embedded liberalism” introduced by Ruggie (1982, 1994), and draws from the empirical regularity that sees trade openness being associated with more state spending (Cameron 1978). In this perspective, a bargain involving generous redistribution and insurance against economic shocks in exchange for support for global trade was struck after World War II in Western democracies. The second strand focuses on the constraints that mobile capital puts on the ability of national governments to raise revenues to pay for insurance and redistribution schemes (Burgoon 2001; Garrett 1998; Garrett and Mitchell 2001). Rodrik (1997) combines the implications of the two perspectives to highlight a fundamental tension: globalization generates



at the same time higher demand for insurance and redistribution, and more constraints in terms of taxation; such tension could lead, potentially, to a protectionist backlash.

More recently, the focus in the literature has shifted from the macro-level policy outcomes to the underlying political phenomena that lead to policy choices. That is, the direct effects that globalization might have on public opinion, individual policy preferences, and voting behavior. This recent work has thus started to provide micro-foundations to the previous macro work, suggesting mechanisms that link, on one side, redistribution and trade policies and, on the other side, political competition, public opinion, and party politics.

One first set of contributions looks at how exposure to risk deriving from global competition shapes preferences for redistribution (Rehm 2009; Walter 2010), and how political parties might alter their platforms in response to globalization (Burgoon 2012). Other studies have directly explored how exposure to risk deriving from global competition shapes support for protectionist trade policy (Margalit 2012; Mayda and Rodrik 2005), and how support for open trade has been declining over time (Scheve and Slaughter 2007). In addition, some authors have looked directly at the question of whether compensation increases the support of exposed groups for open trade (Hays 2009; Hays et al. 2005).

Another set of contributions has looked at voting behavior more directly. Some have noticed and tried to explain how openness might influence accountability, especially by dampening the relationship between performance of the national economy and electoral success of incumbent executives (Hellwig and Samuels 2007; Kayser and Peress 2012); others have started looking at how globalization affects voting behavior proper, in terms of party and candidate choice (Autor et al. 2016; Che et al. 2016; Dippel et al. 2016; Jensen et al. 2016; Mughan et al. 2003)

Our paper contributes to the extant literature in this field in two main ways. First, we provide a rigorous analysis of the Brexit vote, a recent political event of the utmost relevance. Second, and most importantly, we improve on earlier work by exploiting a precise identification strategy at the regional level, which allows us to capture the causal impact of trade globalization on voting behavior. In particular, previous studies have relied to a

large extent on self-reported perceptions of economic conditions or on country-level measures of globalization. On the contrary, we employ an objective measure of exposure to globalization, i.e. the import shock from China, which varies across different regions of the same country depending on their historical industrial specialization. In addition to that, we tackle the endogeneity issue in a rigorous way, by exploiting an instrumental variable approach that is becoming standard in international economics (see Autor et al. 2013 for the seminal contribution). Therefore, our analysis identifies a causal effect of globalization on voting.

We posit that it is possible to understand the success of the Leave option in the Brexit referendum as a consequence of increasing exposure to the global economy: a shock that has created winners and losers by hitting certain regions and social groups in the UK more than others. Lack of sufficient compensation of the losers from globalization might lay behind the observed result. In this respect, Hays (2009) had warned about the potentially problematic sustainability of the embedded liberalism bargain in the context of liberal market economies, of which the UK is a specimen. Overall, the argument we propose is to an extent agnostic regarding the exact mechanisms that link the import shock and support for Brexit. As a matter of fact, support for the Leave option can be construed in several ways: as a vote against incumbent political elites and against the business establishment, and/or as a vote against international integration and in favor of national sovereignty, and/or as a vote against immigration. As we discuss below, all these readings are consistent with the globalization shock being a fundamental determinant of Brexit.

In the simplest interpretation, what happened is compatible with a bare-bones economic voting mechanism: a vote in support of Brexit was to an extent interpreted as an anti-incumbent vote.<sup>2</sup> The import shock we measure led to a crisis of traditional manufacturing in some areas of the country, and depressed local economies generated pressures to vote against the option preferred by the incumbent Prime Minister and the leadership

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<sup>2</sup>There is evidence from other countries that anti-incumbent sentiments and economic evaluations affect referendum vote choice, e.g., Brouard and Tiberj (2006) for France and De Vreese and Semetko (2004) for Denmark.

of the mainstream parties. In this sense, choosing the Leave option in the referendum had more to do with punishing the incumbent than specifically leaving the European Union or regaining national sovereignty. A similar reasoning applies to voting against the business establishment, which was also largely in favor of Remain.

In addition, the referendum outcome can be linked to the resurgence of protectionism and to the nationalist and isolationist syndrome documented by Mayda and Rodrik (2005) and Margalit (2012). Data from surveys carried out right after the referendum corroborate this interpretation: many supporters of Brexit mention the desire to regain national sovereignty as an important motive for their choice (Lord Ashcroft 2016).

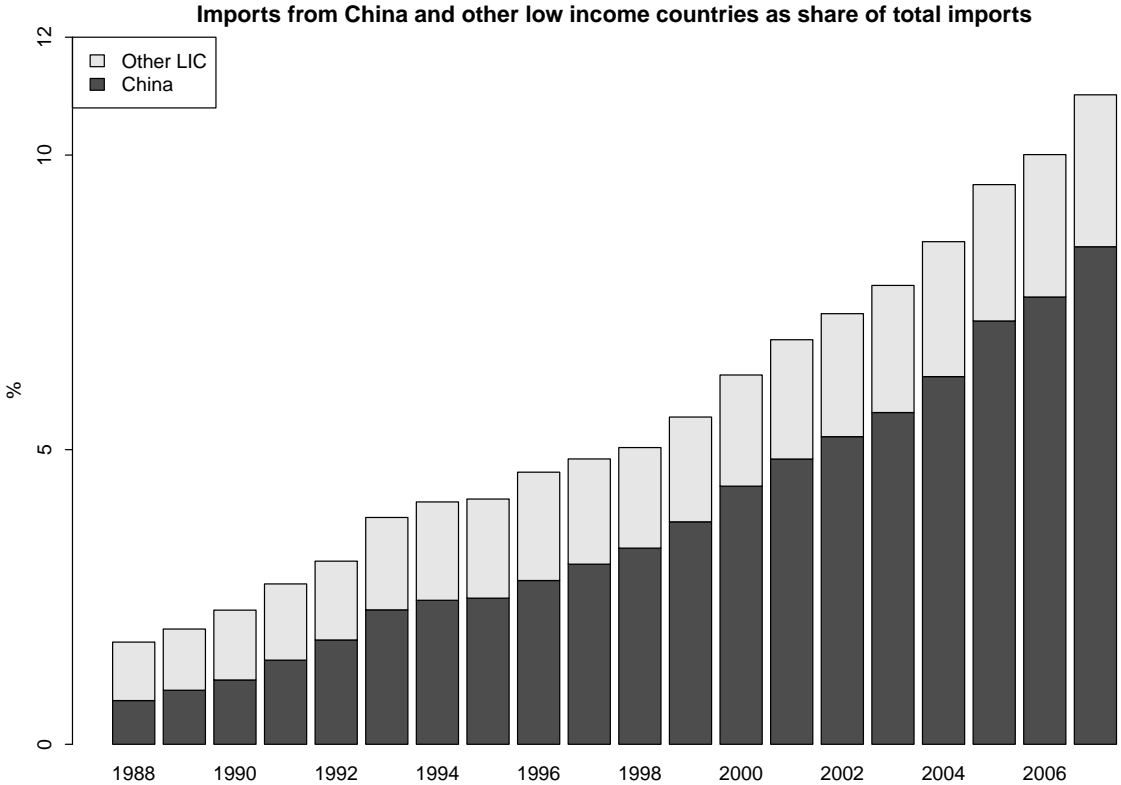
At the same time, it is undeniable that support for Brexit was also perceived by important parts of the British electorate, as well as in the political and media discussions, as a vote against immigration. Using country-level data on Western European countries, Jeannot (2016) provides evidence about the interplay between depressed economic conditions and immigration from new EU members in forming mass attitudes towards European Union institutions. Interestingly, the evidence we present below shows that the actual incidence of immigration in a given area was not associated with support for Brexit. Yet, attitudes and perceptions regarding immigration were strongly predictive of Leave votes in our analysis of individual-level data. Ultimately, though, such attitudes are themselves determined by the import shock, more than by regional immigration levels. We discuss in detail below the implications of this phenomenon for our claim that trade globalization is a main driver of voting behavior in the Brexit referendum.

## **4 Data and empirical strategy**

### **4.1 The import shock**

Over the last three decades the world has been witnessing a sharp increase in trade between industrialized countries and emerging low-income economies. China has been the major player in this respect. Figure 2 shows the variation in the Chinese share of total man-

Figure 1: Evolution of the relative importance of imports from China and other low income countries in the UK.



manufacturing imports in the United Kingdom, from the end of the 1980s until 2007. In line with similar evidence for the US (e.g., Autor et al. 2013) this share displays a sizable increase, from about 1% to around 8.6%. This is even more remarkable if one considers that total import flows were more than doubling in absolute terms at the same time. Imports from other low-income countries have also increased substantially in absolute terms, although their share has remained pretty much constant over time.<sup>3</sup> The growth in import pressure from China thus clearly emerges as the most relevant trade shock, and constitutes the main focus of our analysis.

Our empirical strategy involves regressing referendum results and individual vote intentions on a measure of the Chinese trade shock. To this purpose, we need to build a

<sup>3</sup>The other low income countries are the 51 nations with a level of GDP per capita lower than 5% of the US figure, as identified by Bernard et al. (2006). See Table A1 in Appendix A.

region-specific indicator for the exposure to Chinese imports. The analysis is performed at the NUTS-3 level of regional disaggregation. NUTS (the French acronym for “Nomenclature of Territorial Units for Statistics”) is the official classification of territorial units in the European Union. According to this classification, the territory of each EU country is partitioned in administrative regions at three nested levels. The NUTS-3 level is the most disaggregated one and is meant to capture, in Eurostat’s words, “small regions for specific diagnoses”.<sup>4</sup> We focus on a total of 167 NUTS-3 British regions, with an average population of around 370,000 inhabitants. The NUTS-3 regions of Northern Ireland are excluded due to lack of data on the explanatory variables. The results we report are robust if we perform the analysis at the NUTS-2 level of regional disaggregation.

We calculate the strength of the trade shock at the regional level following a methodology originally introduced by Autor et al. (2013) for the United States. In particular, the index is defined as follows:

$$\text{ImportShock}_{it} = \sum_k \frac{L_{ik(\text{pre-sample})}}{L_{i(\text{pre-sample})}} * \frac{\Delta \text{IMPChina}_{kt}}{L_{k(\text{pre-sample})}} \quad (1)$$

where  $i$  indexes NUTS-3 regions,  $k$  industries in the manufacturing sector, and  $t$  years.  $\Delta \text{IMPChina}_{kt}$  is the change in (real) imports to the UK from China over the past  $n$  years, in industry  $k$ . This is normalized by the total number of workers in the same industry in the UK at the beginning of the sample period,  $L_{k(\text{pre-sample})}$ . In order to back out the region-specific trade shock, we take the weighted sum of the change in imports per worker across industries, where the weights capture the relative importance of each industry in a given region. Specifically, the weights are defined as the ratio of the number of workers in region  $i$  and industry  $k$ ,  $L_{ik(\text{pre-sample})}$ , over the total number of workers in the region,  $L_{i(\text{pre-sample})}$ , both measured at the beginning of the sample period.

This empirical approach stems from a theoretical model developed by Autor et al. (2013) and has a very intuitive interpretation. The basic idea is as follows: different regions are more or less exposed to the increase in import pressure from China depending on their

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<sup>4</sup>Further information is available from <http://ec.europa.eu/eurostat/web/nuts/overview>.

initial employment composition. In particular, for a given change in nation-level imports per worker (i.e.  $\Delta \text{IMPChina}_{kt} / L_{k(\text{pre-sample})}$ ), the Chinese shock will be stronger in those regions in which a larger share of workers was initially employed in industries witnessing larger subsequent increases in imports from China. Intuitively, cross-regional variation may stem from two sources. In the first place, larger shocks are attributed to regions in which more workers were initially employed in the manufacturing sector. However, for a given overall share of manufacturing workers, the shock is going to be stronger for regions in which more workers were employed in industries for which Chinese imports have increased the most, e.g. textiles or electronic goods.

We measure industry specialization in 1989, before the emergence of China as a global manufacturing player. We then look at import growth between 1990 and 2007, to avoid picking up the complicated ramifications of the 2008 global financial meltdown. This also reassures us that the effects our analysis isolates are manifestations of long-term processes taking place in the British and global economy, rather than simple consequences of one particular shock like the global financial crisis of 2008. Data on the composition of employment at the regional level are from the UK Office for National Statistics, while data on imports are from Eurostat COMEXT. Both employment and trade data are disaggregated at the NACE Rev. 1.1 subsection level.<sup>5</sup>

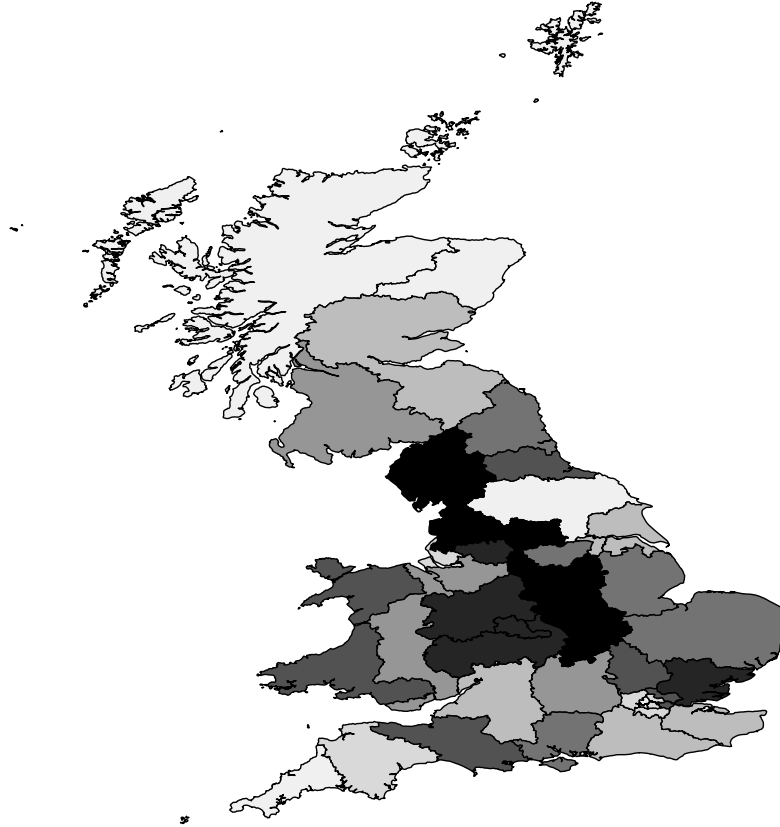
Given the cross-sectional nature of our empirical analysis, we are going to use a single value on the strength of the import shock for each NUTS-3 region. Specifically, we first compute  $\text{Import Shock}_{it}$  considering 5-year changes in imports (i.e.  $n=5$ ), and then take the average between 1990 and 2007. The resulting variable is denoted by  $\text{Import Shock}_i$ . Figure 2 displays the variation in the strength of the shock across NUTS-2 regions –at a higher level of aggregation than the data in the regressions below– for convenience of exposition. At the NUTS-3 level, the variable we employ has an average value of 0.32, i.e. a growth in imports from China by 320 real euros per worker, with a standard deviation of 0.14. The region with the lowest shock, perhaps not surprisingly, is Camden and City of

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<sup>5</sup>Subsections are identified by two-character alphabetical codes (from DA to DN for the manufacturing sector) and correspond to 2-digit industries or aggregations of them. See Table A2 in Appendix B for details.

London (0.06). The region with the largest shock is Leicester (0.75).

Figure 2: Strength of the import shock across NUTS-2 regions.



*Note:* Darker shades correspond to stronger import shock.

An issue with our empirical approach is the possible endogeneity of the trade shock. We tackle this issue by instrumenting Import Shock using the growth in imports from China to the United States (sourced from the Center for International Data at UC Davis). Specifically, the instrument is constructed as follows:

$$\text{Instrument for Shock}_{it} = \sum_k \frac{L_{ik(\text{pre-sample})}}{L_{i(\text{pre-sample})}} * \frac{\Delta \text{IMPChinaUSA}_{kt}}{L_{k(\text{pre-sample})}} \quad (2)$$

With respect to the previous formula for Import Shock, here we substitute  $\Delta \text{IMPChinaUSA}_{kt}$

for  $\Delta \text{IMPChina}_{kt}$ . Also in this case we take the average of 5-year changes in imports between 1990 and 2007 to retrieve the instrumental variable Instrument for Shock $_i$ . Motivated by earlier literature (e.g. Autor et al. 2013, 2014, 2015, 2016; Bloom et al. 2016; Colanzone et al. 2015; Dauth et al. 2014; Hummels et al. 2014), this instrument is meant to capture the variation in Chinese imports which is due to the exogenous changes in supply conditions in China, rather than to domestic factors in the United Kingdom that could be correlated with electoral outcomes.

It is important to spend a few words on the potential sources of endogeneity. In particular, the import shock in a given region might be endogenous to Brexit votes if imports to the UK at the industry level were correlated with the expected votes of that region in the referendum, or with its political leanings more in general. Endogeneity might emerge, in the simplest example, if there are different types of regions, those to which political actors in London pay attention (call them “key constituencies”) and those that are ignored (call them “neglected constituencies”). As a consequence, imports in industries that are important in the economy of key constituencies grow less because the government acts to protect those industries. On the other hand, politicians do not try to implement protectionist policies for the industries located in neglected constituencies. At the same time, key constituencies have less anti-elite resentment than neglected constituencies and thus are more likely to vote Remain, in line with the orientation of the elites.

Concerns about this source of endogeneity are mitigated if one considers that our measure of the import shock refers to the period 1990-2007, long before the referendum. Even more importantly, trade policy is an exclusive competence of the European Union. In practice, for our purposes, this means that UK tariffs on Chinese goods are fixed by EU institutions, and are the same across all EU Members. Still, it might be that UK representatives lobby the EU for more protection of industries located in key constituencies, while they give in more easily when the relevant industry is concentrated mostly in areas that are easier to neglect politically. If this is the case, areas that are closer to the elites might still have experienced a milder import shock as compared to areas neglected by the elites. In turn, if



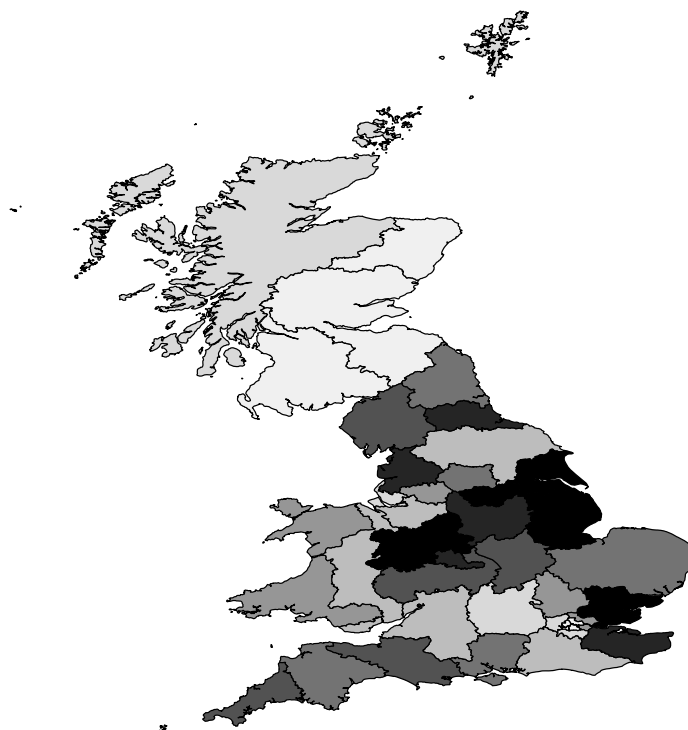
areas closer to the elites followed the recommendation of the elites and supported Remain to a larger extent, this would create an endogeneity problem. Our instrumental variable strategy is meant to solve this type of issue, as exports from China to the United States are plausibly orthogonal to any NUTS-3 region specific factor in Great Britain.

## **4.2 Disaggregated referendum data**

In the first part of our empirical analysis we use referendum returns, disaggregated at the regional level, as the outcome variable. Specifically, based on official referendum results, we compute the share of Leave votes in each NUTS-3 region.

As can be seen in Figure 3, there is significant spatial heterogeneity in support for the Leave option. For convenience of exposition, the figure reports differences at the NUTS-2 level of disaggregation. Variation in referendum returns is even more substantial across NUTS-3 regions, where the standard deviation of the Leave share is 10.6 percentage points. Support for Leave goes from a minimum of 21.4 in Lambeth (Inner London) to a maximum of 72.3 in Thurrock (Essex). This heterogeneity is key for our identification strategy.

Figure 3: Vote share of the Leave option across NUTS-2 regions.



*Note:* Darker shades correspond to stronger support for the Leave option.

In the second part of the analysis we employ individual-level data from the British Election Study, Wave 8. The BES is a survey, managed by a consortium of UK universities, that has covered every UK election as of 1964. Wave 8 was carried out between May 6 and June 22 2016, just before the Brexit referendum, and has a total of 31,409 respondents. The survey reports the intention to vote in the referendum, plus a wealth of data including demographic characteristics, education, labor market status, type of occupation, and attitudes towards immigration. Using information about the place of residence of the respondent we allocate each individual to a NUTS-3 region.

The resulting dataset allows us to test whether, conditional on education and other demographic characteristics, voters in areas more exposed to the Chinese import shock were more likely to declare the intention to vote for the Leave option. Moreover, we study

how the effect of import competition varies across heterogeneous individuals based, for instance, on their occupation. Finally, we also investigate the interplay between the import shock, individual attitudes towards immigration, and vote intentions.

### 4.3 Empirical specification

For the regional level analysis, our baseline specification has the following form:

$$\text{LeaveShare}_i = \alpha_{j(i)} + \beta_1 \text{ImportShock}_i + \beta_2 \text{ImmigrantShare}_i + \beta_3 \text{ImmigrantArrivals}_i + \varepsilon_i. \quad (3)$$

*Leave Share<sub>i</sub>* is the vote share for the Leave option in NUTS-3 region *i* (as a percentage of valid votes). *Import Shock* is the strength of the Chinese import shock at the regional level, computed as explained above between 1990 and 2007.

We control for immigration through two variables, based on data from the UK Office for National Statistics. *Immigrant Share* is the share of foreign-born residents out of the total population of the region in 2015. *Immigrant Arrivals* is the inflow of immigrant workers, based on registrations to National Insurance, divided by the total working-age population of the region in 2015. By including these two variables we aim to control both for the stock of immigrants, which reflects immigration dynamics in the region over the past decades, and for the most recent influx, to which voters may be particularly sensitive.

The number of new arrivals is based on registrations to National Insurance, on which most of the Brexit debate has focused. In fact, Leave campaigners (and, arguably, voters) were not concerned much with illegal immigration. The central issue was rather the legal right for EU citizens (in particular Eastern Europeans) to settle and work in the United Kingdom. This type of immigration is fully captured by National Insurance registrations, as they are a prerequisite for signing an employment contract. One might be concerned that temporary influxes of imported labor force might affect voters propensity to support Brexit. To account for this possible alternative explanation, in a robustness check we include information, also from the Office for National Statistics, on *Temporary* foreign workers in the region, as a share of the working-age population. With these measures at hand,

we can study how the import shock is related to the Leave vote, net of possible effects that immigration might have on it.

The specification includes  $\alpha_{j(i)}$ : these are fixed effects for the NUTS-1 macro region  $j$  to which NUTS-3 region  $i$  belongs. The UK is divided into 12 NUTS-1 regions. For instance, Scotland is a NUTS-1 macro-region, and Greater London is another. By including these fixed effects, we can account for any confounder that affects similarly all the NUTS-3 areas in a macro-region. This refers both to stable characteristics of broad geographic areas (e.g., a different political culture in Scotland), and to recent unobserved shocks that might have affected in a similar way the different NUTS-3 areas within a NUTS-1 macro region. Indeed, from the econometric point of view, our coefficients are identified only by variation in vote shares and strength of the import shock (and other covariates) across different NUTS-3 regions located in the same NUTS-1 macro-region. This very conservative strategy works against finding an effect of the import shock if there is relatively little variation in exposure to Chinese competition across NUTS-3 areas within the same NUTS-1 macro-region.<sup>6</sup>

The last term in the specification,  $\varepsilon_i$ , is an error term. Given that there might be unobserved correlation in the errors across NUTS-3 regions in the same area, we report standard errors that account for clustering at the NUTS-2 level, which is the intermediate level of regional disaggregation between NUTS-3 and NUTS-1. We also estimate models with random intercepts at the NUTS-2 level. These allow for positive correlation between the errors for any two observations (at the NUTS-3 level) within a given NUTS-2 region.

In the second part of the empirical analysis we estimate regressions based on individual-level data. The baseline specification for these estimations is as follows:

$$P(\text{Leave}_\ell) = F(\alpha_{j(\ell)} + \beta_1 \text{ImportShock}_{i(\ell)} + \beta_2 \text{ImmigrantShare}_{i(\ell)} + \beta_3 \text{ImmigrantArrivals}_{i(\ell)} + \mathbf{L}_\ell \boldsymbol{\gamma}' + \varepsilon_\ell), \quad (4)$$

where  $\ell$  indexes individual respondents, and  $i$  NUTS-3 regions as before.

This specification is very similar to the one just described for the regional analysis. The

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<sup>6</sup>Our results are qualitatively analogous, in terms of direction and statistical significance, if NUTS-1 fixed effects are not included in the models.

explanatory variables at the NUTS-3 level are exactly the same, and NUTS-1 fixed effects  $\alpha_{j(\ell)}$  are always included. The dependent variable *Leave* is an indicator variable which takes value one if individual  $\ell$  declares the intention to vote for the Leave option. The baseline model is estimated by probit. In addition, we include in the specification a vector of individual variables,  $\mathbf{L}_\ell$ , which includes education and demographic characteristics. Standard errors are clustered by NUTS-3 regions, since we have multiple respondents within each area. We also estimate hierarchical linear probability models with NUTS-3 random intercepts, with the same specification in terms of covariates.

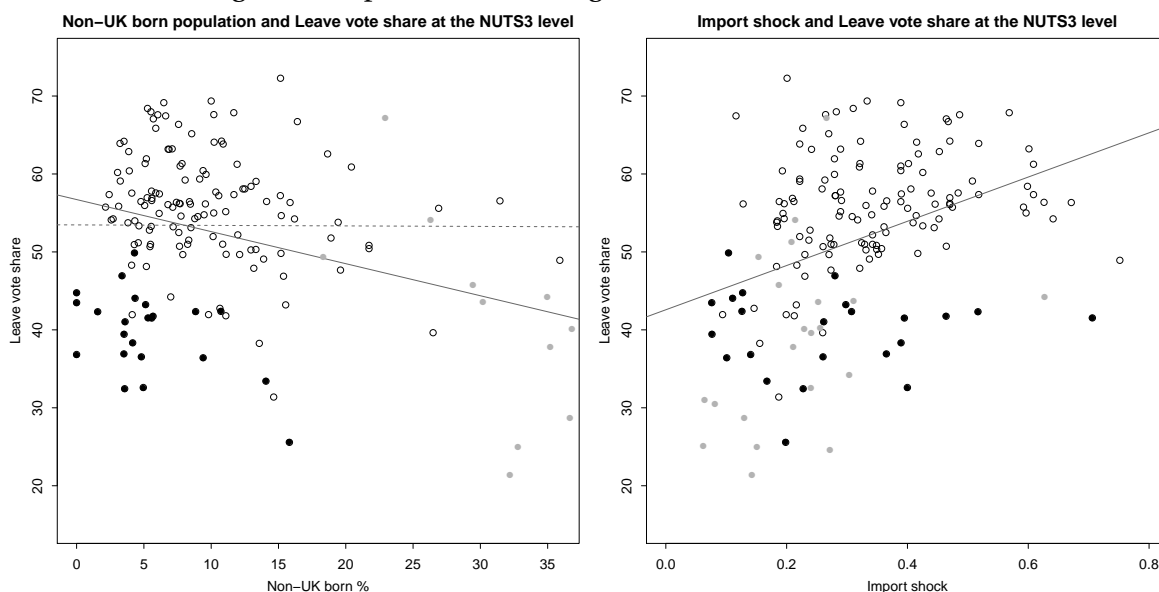
## 5 Results

### 5.1 Regional level official referendum results

As preliminary evidence, the right panel of Figure 4 plots the Leave vote share by NUTS-3 region against our measure of the import shock. The grey line is the least-squares fit. There is a clear positive association between strength of the import shock and support for the Leave option. The left panel of Figure 4 plots the Leave vote share against the share of immigrants in the population. The solid grey line is the least-squares fit on the whole data, while the dashed grey line is the least-squares fit once Greater London is excluded. At this level of analysis, there is no clear association between immigration and vote for Leave. Once the observations from the London area are excluded, the negative association between immigration and Leave share disappears. A similar picture emerges if one considers the arrival rate of immigrants in 2015 (unreported).

Table 1 reports the baseline estimates of eq. (3), where the dependent variable is the share of Leave votes at the NUTS-3 level. In columns 1-3 we show estimates of a parsimonious specification, which includes only the import shock and NUTS-1 fixed effects  $\alpha_{j(i)}$ . Specifically, the model in column (1) is estimated by OLS. The one in column (2) includes random intercepts at the NUTS-2 level, in addition to NUTS-1 fixed effects. Column (3) reports IV estimates of the model in column (1), where Chinese imports to the UK are instru-

Figure 4: Import shock, immigration, and Leave vote share.



Notes: Black dots are NUTS3 regions of Scotland, grey dots are the NUTS3 of London, and the hollow dots are the remaining NUTS3 of England and Wales. The grey solid lines are least-squares fits on the whole sample, the dashed grey line is the least-squares fit excluding London.

mented through Chinese imports to the US. The coefficient of the import shock is always positive, and clearly bounded away from zero. The results are basically unchanged in magnitude and significance across the three columns. The first-stage coefficient on the instrument used in column (3) is positive (0.128) and significantly different from zero ( $t = 25.7$ ). The F-statistic is also very high, signaling the strength of the instrument. The fact that the IV coefficient in the second stage is pretty close to the OLS one suggests the absence of a clear endogeneity bias.

The effect of the import shock is substantively quite significant: if we compare two regions –*within the same NUTS-1 macro-region*– that differ by one standard deviation in strength of the import shock, these are expected to differ by almost two percentage points in their support for Leave. And if we compare a region at the 10th percentile of import shock (Cardiff and Vale of Glamorgan) with a region at the 90th percentile of import shock (Gwent Valleys), both located in the same NUTS-1 macro-region (Wales), these are expected to differ by four and a half percentage points in their support for Leave. In fact, their actual Leave

vote share differed by 16 percentage points.

In columns 4-6 we add to the specifications the two variables on immigration: Immigrant Share and Immigrant Arrivals. Following the same order of columns 1-3, we report the results for a linear model with NUTS-1 fixed effects (column 4), a NUTS-2 random-intercepts and NUTS-1 fixed effects model (column 5), and an IV model with NUTS-1 fixed effects (column 6). The effect of the import shock remains positive, statistically significant, and pretty stable in size. The share of immigrants in the population is negatively and significantly related to support for the Leave option, consistent with earlier evidence, while the coefficient on new arrivals is negative but not statistically different from zero.<sup>7</sup> The results are essentially unchanged in the multilevel and IV estimations, both for the import shock and for the immigration variables.<sup>8</sup>

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<sup>7</sup>It is worth noting that these negative correlations are basically unchanged –and the stock of immigrants is still statistically significant– if we exclude all the regions in Greater London (NUTS-1 UKI) and in Scotland (NUTS-1 UKM) from the analysis. Hence this association is not driven by specific characteristics of these two geographic areas.

<sup>8</sup>We also test the robustness of our finding regarding the import shock including a measure of the acceleration in the inflow of immigrants between 2005 and 2015, in line with the explanation proposed by Langella and Manning (2016). The acceleration is defined as  $A = \frac{Arrivals_{2015}}{Arrivals_{2005}}$ . The magnitude and statistical significance of the import shock coefficient are unaffected. At the same time, the acceleration does have a positive and statistically significant association with Leave vote share. To understand this further, we estimate the model in log scale, including separately both the (log) arrivals in 2005 and the (log) arrivals in 2015. This is equivalent to estimating a model with the log acceleration, as  $\log A = \log \frac{Arrivals_{2015}}{Arrivals_{2005}} = \log Arrivals_{2015} - \log Arrivals_{2005}$ . It emerges that the relationship between acceleration and Leave share is driven only by the denominator (i.e., arrivals of foreign workers in 2005). In other words, the association between acceleration in arrivals and Leave share seems to be just another manifestation of the lower popularity of Leave in areas with more non-UK born residents, i.e., those in which past arrivals were higher.

Table 1: Regional-level results

VARIABLES	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)	
	Leave	Share	Leave	Share	Leave	Share	Leave	Share	Leave	Share	Leave	Share	Leave	Share	Leave	Share	Leave	Share	Leave	Share
Import Shock	12.233**		12.225***		12.965***		12.085***		11.073***		12.299***		15.985***		10.848***		13.361***		13.275**	
	[4.763]		[4.091]		[4.543]		[3.890]		[3.861]		[3.726]		[4.520]		[3.869]		[4.723]		[5.244]	
Immigrant Share							-0.490***		-0.513***		-0.491***		-0.453**		-0.585**		-0.058		-0.529**	
							[0.165]		[0.155]		[0.154]		[0.189]		[0.221]		[0.304]		[0.196]	
Immigrant Arrivals							-0.066		0.496		-0.058		-0.224		-0.028		0.790		0.025	
							[0.741]		[0.801]		[0.691]		[0.796]		[0.965]		[1.844]		[0.780]	
Temporary													0.114							
													[1.393]							
Unemployment															1.017**					
															[0.400]					
High Skilled																				
Agriculture																				
Agriculture * Import Shock																				
NUTS-1 Fixed effects	Y		Y		Y		Y		Y		Y		Y		Y		Y		Y	
NUTS-2 Random intercepts	N		Y		N		N		Y		N		N		N		N		N	
Observations	167		167		167		167		167		167		144		166		139		158	
R-squared	0.573				0.573		0.646		0.646		0.646		0.581		0.673		0.341		0.658	
Kleibergen-Paap F statistic					662.7						614									
Number of groups			39						39											
Model	Linear	Hierarchical	Hierarchical	IV	Linear	Hierarchical	IV	Linear	Hierarchical	IV	Linear	IV	Linear	Linear	Linear	Linear	Linear	Linear	Linear	Linear

Standard errors clustered by NUTS-2 area in all columns except 2 and 5.

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



In the remaining columns of Table 1, we augment the specification of column (4) with additional controls. We start in column (7) by including the variable *Temporary*, i.e. the inflow of temporary immigrant workers disaggregated at the NUTS-3 level. This variable is meant to account for the possibility that the anti-immigration backlash could be driven more by competition with seasonal workers rather than with settled immigrants, as captured by our main immigration variables. While temporary immigrants are not significantly associated with Brexit vote, the coefficient on the import shock is still positive and statistically significant. If anything, its magnitude is slightly larger than in column (4). This could be due to the fact that we lose all the 23 observations for the NUTS-3 regions of Scotland, due to data availability on temporary immigrant workers.

In column (8) we include in the specification *Unemployment*, which is the unemployment rate at the NUTS-3 level, measured in the most recent year prior to the referendum (2015). Data are from the Office for National Statistics. As expected, a higher unemployment rate is significantly associated with higher support for Leave. Yet, its inclusion does not eliminate the effect of the import shock, which is still positive and significant, even if slightly smaller in magnitude. The unemployment rate in a region is clearly post-treatment with respect to the import shock. However, its inclusion allows us to show that globalization, with the ensuing decline of manufacturing, is a long-term structural process whose effects work beyond an increase in the unemployment rate, that could also be largely reflecting the temporary economic downturn of the recent crisis. Overall, our evidence suggests that globalization drove support for the Leave option through a broader type of impact, possibly involving increasing uncertainty, reduced income, and even higher mental distress on top of unemployment, as found in a recent study on the UK by Colantone et al. (2015).

Besides the role of globalization, skill-biased technical change in the recent past might have led regions with a less educated workforce to be left behind. To account for that, in column (9) we include in the specification the variable *High Skilled*, i.e. the share of the population with a higher education degree in the oldest available year (2000). Higher ed-

ucation is defined as levels 5 to 8 of the International Standard Classification of Education (ISCED), which cover from short-cycle tertiary education up to doctoral degree or equivalent. Data are drawn from Eurostat and are only available at the NUTS-2 level of regional disaggregation. For this reason, we do not include NUTS-1 fixed effects in column (9), as there would not be enough variation left for identification. We also lose 28 observations due to data availability (7 from North West England, and 21 from Greater London). Despite this, the result for the import shock is unchanged. At the same time, skills seem to be a strong predictor of the Brexit vote, in the expected direction. Indeed, if we compare two areas located in NUTS-2 regions that differ by one standard deviation in higher education levels, the area in the more skilled region is expected to support the Leave option by five percentage points less than the area in the less skilled region, *ceteris paribus*.

Finally, in column (10) we include the variable *Agriculture*, the share of agriculture in regional GDP, and its interaction with the import shock. The agricultural share of GDP is measured at the NUTS-3 level, based on Eurostat data, and averaged over the period 2004-2013. Regardless of the import shock, more agricultural areas are somewhat more in favor of Leave, albeit not statistically significantly so. More importantly for our argument, vote share for Brexit is less sensitive to the import shock in more agricultural areas. In fact, in regions above the 90th percentile of importance of agriculture in GDP, the effect of the import shock is no longer statistically distinguishable from zero. This further reassures us that our measure of the Chinese import shock is picking up the actual effect of import competition, which strongly affects areas that are traditionally specialized in manufacturing, and from which more agricultural regions are to some extent sheltered.

## **5.2 Individual-level data**

We now turn to the individual-level analysis. While this relies on self-reported vote intentions, rather than official referendum results, individual-level information allows us to investigate more in depth the patterns underlying the effect of the import shock at the regional level.

Table 2 reports the baseline estimation results of eq. (3), where the dependent variable is an indicator equal to one if the respondent declares the intention to vote for the Leave option. We proceed as above. Columns 1-3 refer to a parsimonious specification in which we only include the import shock, NUTS-1 fixed effects  $\alpha_{j(\ell)}$ , and those basic background covariates at the individual-level that are either clearly pre-treatment (*Age* and *Gender*), or plausibly pre-treatment (education level). Specifically, education is controlled for through 5 dummies indexing increasing levels of attainment, with the control group made up by individuals with no qualifications.<sup>9</sup> Column (1) reports results from a probit estimation with clustered standard errors. Column (2) refers to a multilevel linear probability model with NUTS-3 random intercepts in addition to NUTS-1 fixed effects. Column (3) shows results from an IV probit with the same specification as in column (1), where Chinese imports to the UK are instrumented through Chinese imports to the US.

In line with regional-level results, the effect of the import shock on the propensity to vote Leave in the referendum is positive and statistically significant, regardless of the estimation method. Also in this case, the IV probit yields approximately the same coefficient as the plain probit, further reassuring us about the absence of a clear endogeneity bias, and about the validity of a causal interpretation of our results. Consistent with earlier evidence, our findings suggest that older people and males are more likely to vote for Leave. Higher educational attainments reduce the probability to vote in favor of Brexit. In columns 4 to 6, we augment the models of columns 1 to 3, respectively, by adding the two variables on immigration. Results on the import shock and other covariates are essentially unchanged. Moreover, we do not find any significant association between the stock or influx of immigrants in the NUTS-3 region of residence, and the propensity of individuals to vote for Leave.

The British Election Study database contains information on the political orientation of respondents. In particular, we know which party they feel closest to (i.e. their party ID), as well as their left-right self-placement. These variables are post-treatment to the extent

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<sup>9</sup>Dummy ED1 refers to GCSE D-G; ED2 to GCSE A\*-C; ED3 to A-level; ED4 to undergraduate; ED5 to post-graduate. GCSE stands for “General Certificate of Secondary Education”.

that people choose or revise their political orientation or affiliation due to the globalization shock. Nevertheless, their inclusion in the specification does not alter our probit results, i.e. the coefficient on the import shock remains positive and statistically significant. Not surprisingly, we find that supporters of the UKIP and, to a lesser extent, Tory identifiers, are significantly more in favor of Leave (by almost 40 percentage points in the case of UKIP). In addition, our evidence shows that in general more right-wing individuals favor Leave at higher rates. We also interact the import shock with dummies for party ID. As one might expect, we find that the import shock has a particularly strong effect on Labour and Scottish National Party identifiers (two groups whose party directorates officially sided with Remain) and with non-identified voters.<sup>10</sup>

In Table 3 we show how the effect of the Chinese import shock varies across individuals depending on their labor market status and occupation. We do so by augmenting the probit model of column 4 in Table 2 with dummies for specific categories of people, as well as interactions of these dummies with the import shock variable. In particular, we consider six dummies indicating, respectively: retired people (column 1); students (column 2); unemployed (column 3); manual workers (column 4); self-employed (column 5); service workers (column 6).<sup>11</sup>

Results in column 1 suggest that retired people are essentially sheltered from the import shock. There is also evidence that, regardless of the shock, students are less likely to vote for Leave (column 2), while manual workers are more likely to do so (column 4). Besides that, in columns 2 to 6 all the interactions between our dummies and the import shock are not statistically different from zero. At the same time, the coefficient on the linear term of the shock is still positive and significant across the board. Overall, this evidence suggests that the impact of import competition is not restricted to a specific category of voters, e.g. the unemployed, who might be most directly affected by the shock. Rather, the effect is not statistically different from the average even for service workers, whose jobs are not

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<sup>10</sup>All these results are available upon request.

<sup>11</sup>Service workers are identified as reporting one of the following occupations: intermediate sales and service occupations; semi-routine sales occupations; semi-routine service occupations; semi-routine childcare occupations; routine sales and service occupations.

Table 2: Individual-level results

VARIABLES	(1) Leave	(2) Leave	(3) Leave	(4) Leave	(5) Leave	(6) Leave
Import Shock	0.247** [0.104]	0.084** [0.039]	0.227** [0.108]	0.246** [0.104]	0.085** [0.039]	0.222** [0.106]
Immigrant share				-0.006 [0.005]	-0.002 [0.002]	-0.006 [0.005]
Immigrant arrivals				0.011 [0.024]	0.003 [0.008]	0.010 [0.024]
Age	0.014*** [0.001]	0.005*** [0.000]	0.014*** [0.001]	0.014*** [0.001]	0.005*** [0.000]	0.014*** [0.001]
Gender	-0.048* [0.028]	-0.017* [0.010]	-0.048* [0.028]	-0.050* [0.028]	-0.017* [0.010]	-0.049* [0.028]
ED1	-0.094 [0.085]	-0.029 [0.029]	-0.094 [0.085]	-0.097 [0.085]	-0.029 [0.029]	-0.098 [0.085]
ED2	-0.183*** [0.059]	-0.060*** [0.020]	-0.183*** [0.059]	-0.186*** [0.059]	-0.061*** [0.020]	-0.186*** [0.059]
ED3	-0.445*** [0.059]	-0.164*** [0.020]	-0.445*** [0.059]	-0.449*** [0.059]	-0.164*** [0.020]	-0.450*** [0.059]
ED4	-0.728*** [0.059]	-0.268*** [0.020]	-0.728*** [0.059]	-0.729*** [0.059]	-0.268*** [0.020]	-0.730*** [0.059]
ED5	-1.072*** [0.066]	-0.380*** [0.021]	-1.072*** [0.066]	-1.072*** [0.066]	-0.380*** [0.021]	-1.073*** [0.066]
NUTS-1 Fixed effects	Y	Y	Y	Y	Y	Y
NUTS-3 Random intercepts	N	Y	N	N	Y	N
Observations	16,331	16,331	16,331	16,331	16,331	16,331
Kleibergen-Paap F statistic			819.8			826.4
Number of groups		167			167	
Model	Probit	Linear Hierarchical	IV Probit	Probit	Linear Hierarchical	IV Probit

Standard errors clustered by NUTS-3 area in all columns except 2 and 5.

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

directly affected by manufacturing imports from China.<sup>12</sup> By and large, this evidence is consistent with a sociotropic reaction of voters to the globalization shock, rather than a purely pocketbook one. In other words, individuals seem to respond broadly to the general economic conditions of their region, regardless of their specific condition.

<sup>12</sup>The results for the import shock are unchanged if we estimate the multi-level version of the model or the IV probit, i.e. augmenting columns 5 and 6 of Table 2.

Table 3: Individual-level results with labor market interactions

VARIABLES	(1) Leave	(2) Leave	(3) Leave	(4) Leave	(5) Leave	(6) Leave
Import Shock	0.322*** [0.119]	0.228** [0.103]	0.219** [0.111]	0.230** [0.110]	0.232** [0.104]	0.217** [0.111]
Retired	0.027 [0.078]					
Retired * Import Shock	-0.407** [0.200]					
Student		-0.456** [0.178]				
Student * Import Shock		-0.103 [0.475]				
Unemployed			-0.081 [0.239]			
Unemployed * Import Shock			0.700 [0.695]			
Manual				0.230** [0.096]		
Manual * Import Shock				-0.137 [0.282]		
Self-employed					-0.055 [0.134]	
Self-employed * Import Shock					0.227 [0.428]	
Non-tradable						-0.079 [0.167]
Non-tradable * Import Shock						0.481 [0.473]
Immigrant share	-0.006 [0.005]	-0.005 [0.005]	-0.006 [0.005]	-0.004 [0.005]	-0.006 [0.005]	-0.006 [0.005]
Immigrant arrivals	0.012 [0.024]	0.011 [0.024]	0.012 [0.024]	-0.006 [0.024]	0.011 [0.024]	0.011 [0.024]
Individual controls	Y	Y	Y	Y	Y	Y
NUTS-1 Fixed effects	Y	Y	Y	Y	Y	Y
Observations	16,331	16,331	16,331	14,763	16,331	16,331
Model	Probit	Probit	Probit	Probit	Probit	Probit

Standard errors clustered by NUTS-3 area.

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

### 5.3 The role of immigration

In the results shown so far, there is no evidence that the incidence of immigration in a region is a driver of Leave votes. This may seem surprising, given the importance of immigration as a self-reported motivation of Leave supporters (Ipsos MORI 2016; Lord Ashcroft 2016). The British Election Study database allows us to investigate this issue further, since we have data on the perceptions of and attitudes towards immigration at the individual level. In particular, we employ four variables based on four different BES survey items. These variables relate to: (1) the belief that immigration is good for Britain's economy (*Immig Econ*); (2) the belief that immigration is good for Britain's cultural life (*Immig Cultural*); (3) the perception as to whether immigration is getting higher (*Immig Change*); (4) the stance as to whether more immigrants should be allowed in the UK (*Immig Policy*).<sup>13</sup> The underlying survey questions are answered, respectively, on a 7-point scale for the first two, a 5-point scale for *Immig Change*, and an 11-point scale for *Policy*. Higher values on *Immig Change* denote a stronger perception of increasing immigration. For the other three variables, higher values are associated to more positive views of immigration.

In Table 4 we augment the probit model of column 4 in Table 2 with these variables, including them one at the time. Results show that more positive views of immigration are associated with a lower probability of Leave vote. Moreover, individuals who have stronger perceptions of an increasing level of immigration are also more likely to support Brexit. This evidence is consistent with the prominence of immigration as a self-reported reason for voting Leave. In addition, when we include these variables on perceptions and attitudes towards immigration, the coefficient on the import shock is no longer statistically significant. However, we next find evidence that the import shock itself is a strong determinant of perceptions and attitudes about immigration.

Table 5 shows results from linear multilevel regressions where the dependent variable

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<sup>13</sup>The reference survey questions are, respectively: (1) "Do you think that immigration is good or bad for Britain's economy?"; (2) "And do you think that immigration undermines or enriches Britain's cultural life?"; (3) "Do you think that the level of immigration is getting higher, getting lower or staying about the same?"; (4) "Some people think that the UK should allow many more immigrants to come to the UK to live and others think that the UK should allow many fewer immigrants. Where would you place yourself and the parties on this scale?"

is, alternatively, one of the four variables capturing attitudes and perceptions on immigration.<sup>14</sup> On the right-hand side, the specification is the same as in column 5 of Table 2, including baseline demographic characteristics, the stock and inflow of immigrants in the NUTS-3 area, the import shock, and NUTS-3 random intercepts in addition to NUTS-1 fixed effects. The random intercepts capture any remaining correlation across the errors for pairs of respondents residing in the same NUTS-3 region.

In all the regressions, we find that individuals in NUTS-3 areas that have witnessed a stronger import shock tend to have more negative attitudes and perceptions with respect to immigration. The effect of the import shock is in itself substantively modest in size, but nonetheless far from negligible. For instance, if we compare two otherwise similar respondents, residing in the *same* NUTS-1 macro-region, and respectively in a NUTS-3 region at the 10th and at the 90th percentiles of import shock, they are expected to differ by around one tenth of a standard deviation of Immig Econ.<sup>15</sup>

In addition, the coefficients for background individual characteristics are predictive of immigration attitudes and beliefs in unsurprising directions given the extant results in the literature (e.g., Mayda 2006): more educated, younger, and female respondents are in general less concerned with immigration, less supportive of restrictions, and perceive smaller trends in immigration.

The stock and inflow of immigrants in the area in which the respondent resides have a somewhat counter-intuitive association with attitudes and beliefs about immigration. In particular, the measure of the inflow of immigrants is statistically significantly associated with more favorable views of immigrants, and also with a smaller perceived trend in immigration. The stock of immigrants, conditional on the rate of new arrivals, is instead significantly and positively associated with a perceived stronger trend in immigration.

While this piece of analysis does not aim at being a comprehensive exploration of im-

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<sup>14</sup>These variables refer to survey questions that are asked on a numerical scale, and with numerical labels visible to the respondent, hence it is legitimate to treat them as numerical (see Gelman and Hill 2006). Our findings are robust to estimating ordered probit models. Results are available upon request.

<sup>15</sup>It is worth pointing out that the results are substantially unchanged, in terms of direction and statistical significance, if we omit the NUTS-1 fixed effects. Hence they are not just an artifact of a specific modeling choice.



migration attitudes in Great Britain, the evidence we provide suggests that attitudes and beliefs about immigration are formed based on processes that are complex, and not necessarily directly related to the incidence of the immigration phenomenon in a given region. This finding lines with existing studies showing that attitudes and preferences about immigration are to some extent unrelated to the actual presence of immigrants. For instance, Sides and Citrin (2007) find that opposition to immigration is slightly lower in countries that have larger numbers of immigrants; in addition, it has been shown that direct contact with immigrants reduces perceived threat and restrictionist preferences regarding immigration (Fetzer 2000; McLaren 2003).

Overall, our findings suggest that concerns about immigration may act as a mediator for the effect of globalization on voting. The study of mediation effects is far from straightforward, and requires a good deal of assumptions that might be too strong for the present analysis (see Imai et al. 2010). We therefore do not formally claim, based on our results, that immigration attitudes are a proper mediator for the import shock. Our evidence, though, explains why, at a superficial level, one might be tempted to conclude that immigration concerns drove the Brexit vote. At a deeper level of analysis, however, the Chinese import shock seems to be not only causally related to Brexit, but also a stronger predictor of immigration concerns than immigration itself. This finding is consistent with extant evidence in the literature. In fact, it has been shown that anti-immigration sentiments and concerns are largely driven by perceptions of the state of the economy (e.g., Citrin et al. 1997). In particular, there are three main (non-mutually-exclusive) mechanisms that might have generated the relationship we identify between the import shock and immigration attitudes in the United Kingdom.

First of all, increased scarcity of employment opportunities, driven by the crisis of traditional manufacturing due to globalization, might have triggered concerns about increased competition from immigrants. Evidence exists that immigration to the UK has had no effect on native employment rates or wages (Dhingra et al. 2016). Yet, workers might hold a “lump-of-labor” belief: they might think that the labor market is a zero-sum game, so that

if someone wants to get a job, he or she needs to take it away from someone else (Kemmerling 2016; see also Kapteyn et al. 2004; Litwin et al. 2009). In that case, regardless of the real effects of immigration, voters would be acting with the goal of protecting their employment prospects.

Second, and relatedly, we might be observing a “scapegoating” phenomenon like the one detected by Cochrane and Nevin (2014), who show how anti-immigrant sentiments are systematically associated with the combination of high unemployment and the presence of a radical right party. This would be involved in shifting blame for unemployment and, in general, for labor market downturns, towards immigrants. The main proponent of Brexit was the UK Independence Party, which can be uncontroversially classified also as a populist anti-immigrant party.

Third, an increased reliance on existing welfare state provisions, related to the globalization shock, might spur concerns that immigration creates overcrowding and congestion for users of public services. The role of this type of concern in creating anti-immigrant attitudes is documented by Hainmueller and Hiscox (2010).

We are agnostic regarding which one of the mechanisms is most important. It might even be that anti-immigration sentiments and the Brexit vote are spuriously related, being held together only by party politics and policy bundling. Golder (2003) shows that immigration, especially when combined with high unemployment, leads to support for populist extreme-right parties. The UKIP happens to be, at the same time, a populist anti-immigration party, and the main agitator behind the campaign to leave the European Union. It is beyond the scope of this paper to empirically adjudicate among the mechanisms, or estimate their relative importance in the British electorate at the time of Brexit.

Table 4: Referendum vote and attitudes towards immigration

VARIABLES	(1) Leave	(2) Leave	(3) Leave	(4) Leave
Import Shock	-0.111 [0.112]	0.017 [0.115]	0.091 [0.113]	-0.002 [0.114]
Immig Econ	-0.436*** [0.010]			
Immig Cultural		-0.417*** [0.010]		
Immig Change			0.651*** [0.027]	
Immig Policy				-0.296*** [0.010]
Age	0.009*** [0.001]	0.008*** [0.001]	0.007*** [0.001]	0.006*** [0.001]
Gender	-0.187*** [0.030]	-0.051 [0.031]	-0.071** [0.029]	-0.085** [0.033]
ED1	-0.047 [0.091]	-0.042 [0.088]	-0.151 [0.098]	-0.076 [0.101]
ED2	-0.047 [0.068]	-0.068 [0.069]	-0.179** [0.077]	-0.119 [0.074]
ED3	-0.155** [0.068]	-0.214*** [0.070]	-0.388*** [0.075]	-0.186** [0.077]
ED4	-0.325*** [0.068]	-0.341*** [0.067]	-0.611*** [0.079]	-0.372*** [0.076]
ED5	-0.470*** [0.077]	-0.565*** [0.077]	-0.814*** [0.098]	-0.521*** [0.081]
NUTS-1 Fixed effects	Y	Y	Y	Y
Observations	15,703	15,819	15,801	15,026
Model	Probit	Probit	Probit	Probit

Standard errors clustered by NUTS-3 area.

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

Table 5: Determinants of attitudes towards immigration

VARIABLES	(1) Immig Econ	(2) Immig Cultural	(3) Immig Change	(4) Immig Policy
Import Shock	-0.454*** [0.140]	-0.471*** [0.152]	0.125** [0.064]	-0.435* [0.234]
Immigrant Share	-0.005 [0.006]	-0.004 [0.006]	0.008*** [0.003]	-0.018* [0.010]
Immigrant Arrivals	0.093*** [0.031]	0.089*** [0.033]	-0.055*** [0.014]	0.211*** [0.051]
Age	-0.014*** [0.001]	-0.019*** [0.001]	0.012*** [0.000]	-0.031*** [0.001]
Gender	-0.216*** [0.024]	0.051* [0.026]	0.055*** [0.012]	-0.072* [0.038]
ED1	0.201*** [0.068]	0.184** [0.074]	-0.055* [0.033]	0.154 [0.107]
ED2	0.390*** [0.049]	0.322*** [0.053]	-0.069*** [0.024]	0.326*** [0.077]
ED3	0.962*** [0.051]	0.868*** [0.055]	-0.284*** [0.025]	1.204*** [0.080]
ED4	1.499*** [0.048]	1.458*** [0.052]	-0.473*** [0.023]	2.056*** [0.075]
ED5	1.985*** [0.057]	1.904*** [0.062]	-0.648*** [0.028]	2.856*** [0.090]
NUTS-1 Fixed effects	Y	Y	Y	Y
NUTS-3 Random intercepts	Y	Y	Y	Y
Observations	20,299	20,467	20,623	19,339
Number of groups	167	167	167	167
Model	Hierarchical	Hierarchical	Hierarchical	Hierarchical

Standard errors in brackets

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

## 6 Discussion and conclusion

In this paper, we show how the globalization-induced shock to the British manufacturing sector drove the vote for Brexit. This relationship emerges both in the analysis of disaggregated vote shares, and in the individual-level analysis. We instrument for imports from China into the UK with Chinese exports to another advanced economy, the United States. These are exogenous to the political leanings and other confounders at the regional level in the UK. Hence, we can claim that globalization of trade, as captured by our import shock measure, is causally driving support for Brexit. In addition, voters seem to react sociotropically to the globalization-induced shock.

We also show how actual immigration rates –measured both as the stock of immigrants in a given region, and as the inflow of new immigrants in a region in the most recent year– are not associated with variation in the support for Brexit. Moreover, the analysis of individual level data finds that, while actual presence or inflows of immigrants in an area are not related to referendum vote choice, perceptions and attitudes about immigration are. Yet, we show that these same perceptions and attitudes are strongly related to the globalization shock, but not to the actual regional incidence of immigration.

The evidence we provide leads to two main considerations. The first one is that in order to understand Brexit, but also analogous phenomena like support for radical right parties in Western Europe, or the remarkable success of the Trump bid in the 2016 presidential race in the United States, it is important to allow for a central role for “globalization without compensation”. While trade globalization –and, more directly, imports from China and other emerging economies– is estimated to have made a significant contribution to the economies of advanced countries, it is also true that the benefits of globalization have been distributed highly unequally, leaving some social groups, and, importantly, some geographic areas, much worse off. The inability or unwillingness of governments to set up compensation schemes for the losers from trade openness might have led to a reaction that takes the form of isolationism, protectionism, identity-based nationalism, and a serious crisis of “embedded liberalism”.

The second implication of our findings is that, even though in the public discourse and in opinion surveys concerns with immigration play a central role, immigration might be better understood as a scapegoat for a malaise that has different origins, in the context of large scale economic transformations that inflict disproportionate losses onto some sectors of society.

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## A List of low-income countries

Table A1: Low-income countries

Afghanistan	Ethiopia	Moldova
Albania	Gambia	Mozambique
Angola	Georgia	Nepal
Armenia	Ghana	Niger
Azerbaijan	Guinea	Pakistan
Bangladesh	Guinea Bissau	Rwanda
Benin	Guyana	Samoa
Bhutan	Haiti	Sao Tome
Burkina Faso	India	Sierra Leone
Burundi	Kenya	Somalia
Cambodia	Lao PDR	Sri Lanka
Central African Rep	Lesotho	St. Vincent
Chad	Madagascar	Sudan
China	Malawi	Togo
Comoros	Maldives	Uganda
Congo	Mali	Vietnam
Equatorial Guinea	Mauritania	Yemen
Eritrea		

## B NACE subsections

Table A2: Nace Revision 1.1 manufacturing subsections

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<u>DA</u>	Manufacture of food products, beverages and tobacco
<u>DB</u>	Manufacture of textiles and textile products
<u>DC</u>	Manufacture of leather and leather products
<u>DD</u>	Manufacture of wood and wood products
<u>DE</u>	Manufacture of pulp, paper and paper products; publishing and printing
<u>DF</u>	Manufacture of coke, refined petroleum products and nuclear fuel
<u>DG</u>	Manufacture of chemicals, chemical products and man-made fibres
<u>DH</u>	Manufacture of rubber and plastic products
<u>DI</u>	Manufacture of other non-metallic mineral products
<u>DJ</u>	Manufacture of basic metals and fabricated metal products
<u>DK</u>	Manufacture of machinery and equipment n.e.c.
<u>DL</u>	Manufacture of electrical and optical equipment
<u>DM</u>	Manufacture of transport equipment
<u>DN</u>	Manufacturing n.e.c.

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