

Life Among the Lowly: Measuring the Effect of  
Immigration on the Destination Country

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# Contents

<b>1</b>	<b>Hate at First Sight? Dynamic Aspects of the Electoral Impact of Migrations: the Case of the UK and Brexit</b>	<b>4</b>
1.1	Introduction . . . . .	5
1.2	Related Literature . . . . .	8
1.3	The case of Brexit . . . . .	10
1.3.1	Politics and immigration in the UK . . . . .	10
1.3.2	The framing of the European issue . . . . .	12
1.4	Econometric analysis . . . . .	13
1.4.1	Econometric strategy . . . . .	13
1.4.2	Identification strategy . . . . .	16
1.4.3	Results . . . . .	19
1.4.4	Robustness . . . . .	22
1.5	Conclusions . . . . .	25
<b>2</b>	<b>Need for Flexibility or Subsidies? Reviewing the Impact of Immigration on the Domestic Labour Market</b>	<b>29</b>
2.1	Introduction . . . . .	30
2.2	Early studies on the impact of immigration . . . . .	30
2.3	The substitutability in production between immigrants and natives . . . . .	33
2.4	The location decisions of natives in response to immigration . . . . .	38
2.5	The adjustment of the labour demand to supply shocks . . . . .	42
2.6	Conclusions . . . . .	46
<b>3</b>	<b>The Labour Demand Response to Supply Shocks. The Indirect Effect of Immigration</b>	<b>49</b>
3.1	Introduction . . . . .	50
3.2	Related Literature . . . . .	51
3.3	The Analytical Framework . . . . .	53
3.3.1	The Empirical Implementation . . . . .	55
3.3.2	The Identification Strategy . . . . .	56
3.4	Data and Descriptive Statistics . . . . .	57
3.5	Empirical Results . . . . .	62

3.5.1	Robustness Checks . . . . .	64
3.6	Conclusions . . . . .	65
<b>A</b>	<b>The labour market equilibrium decomposition</b>	<b>68</b>

# List of Figures

1.1	Google Trends in UK by Topic . . . . .	7
3.1	Immigration rate of Italian regions (NUTS2) in 2005 . . . . .	60
3.2	Immigration rate of Italian regions (NUTS2) in 2010 . . . . .	60

# List of Tables

1.1	ESS: framing over the European Union topic . . . . .	13
1.2	OLS regressions . . . . .	20
1.3	IV regressions . . . . .	21
1.4	Distributed lag model . . . . .	23
1.5	Panel Estimations on Ukip . . . . .	24
1.6	OLS on Individual Data . . . . .	26
2.1	Calculated Percentage Change in Real Wages due to Immigrant Inflows: 1990-2004 . . . . .	36
3.1	Characteristics of immigrant ethnic groups, 2005 . . . . .	58
3.2	Characteristics of immigrant ethnic groups, 2010 . . . . .	58
3.3	Immigration Rate by Region (Labour Force) . . . . .	59
3.4	Characteristics of firms in non-tradable sector . . . . .	61
3.5	Characteristics of firms in tradable and non-tradable sector . . . . .	61
3.6	Decomposition of Changes in Labor Supply at the Firm Level. Tradable Sector . . . . .	62
3.7	Decomposition of Changes in Labor Supply at the Firm Level. Tradable Sector . . . . .	63
3.8	Decomposition of Changes in Labor Supply at the Firm Level. Manufacturing Sector . . . . .	63
3.9	Decomposition of Changes in Labor Supply at the Firm Level. Manufacturing Sector . . . . .	63
3.10	Decomposition of Changes in Labor Supply on the Firm Level. Tradable Sector . . . . .	64
3.11	Decomposition of Changes in Labor Supply on the Firm Level. Tradable Sector . . . . .	64
3.12	Decomposition of Changes in Labor Supply on the Firm Level. Tradable Sector . . . . .	65
3.13	Decomposition of Changes in Labor Supply on the Firm Level. Tradable Sector . . . . .	65

# Preface

*"Life among the Lowly"* is the XIX century best-seller which strongly contributed to the anti-slavery movement. Certainly, it denounced the life and labour conditions of black slaves, but it also inspired some stereotypes on black people that still survive today. These two faces of the novel are contained in the present dissertation.

The first chapter *"Hate at First Sight? Dynamic Aspects of the Electoral Impact of Migrations: the Case of the UK and Brexit"* analyses how native political preferences are influenced by the presence of foreigners in a neighbourhood. The last European and U.S. election campaigns hinged on the migration issue and we argue that the preferences expressed through the vote might reflect some prejudicial attitudes. Instead, the second and third chapters refer to the impact of immigration on the domestic labour market. *"Need for Flexibility or Subsidies? Reviewing the Impact of Immigration on the Domestic Labour Market"* reviews all the seminal papers that have contributed to understand the effect of immigrant workers on native labour market conditions. The conclusion of this literature sustains a non negative impact of foreign labour supply on native average wage. According to these studies this effect is achieved more easily when the labour market is flexible and workers can nimbly change their occupations. Nonetheless, the crucial hypothesis of all the analysis is a perfect elastic capital supply. Studies on the reaction of investments to an increase in the immigrant labour-force are still rather scant and we try to improve the knowledge on the underlying dynamics in the last chapter. *"The Labour Demand Response to Supply Shocks. The Indirect Effect of Immigration"* investigates how industries and firms production decisions are influenced by migration inflows. The general conclusion, as suggested by the title of the review, is that policy makers should pay attention to industrial policies and not only to labour market structure.

In particular, previous studies on the impact of foreign-born population on native voting preferences have highlighted a positive effect of immigration on the electoral consensus for right-wing parties. Nonetheless, this result holds with some caveats. To overcome the limit of the existing literature we formulate the hypothesis that an anti-immigrant attitude rises only at the arrival of the migration inflows and disappears some period later. At

the basis of such a dynamics there could be material concerns about the adjustment costs of the new population or some prejudices, both denoting an "hate at first sight effect". To measure this potential mechanism we use an approach based on the standard network instrument which robustly supports our hypothesis.

With regard to the analysis on the labour market, neglecting the reaction of investments to an increase in the labour supply can lead to some misleading policy conclusions. Our contribution to the literature is to explicitly looking at the labour demand side of the market. Furthermore, contrary to the existing studies, the data that we use allow us to conduct the analysis at the firm level. We then avoid the bias that originates from the heterogeneity of production units within industries. The data refer to an important case-study such that of Italy. Although it is only a landing country for most migrants, inflows increased tremendously from 2007, deserving a specific attention from academics. The result of the empirical analysis – conducted by means of the network instrument – highlights that immigrant labour-force has been largely absorbed by the adoption of more labour-intensive technologies.

The layout with which we present the different studies depicts the order of priorities that in our opinion policy makers should follow. From the very beginning of the *refugee crisis* the economic analysis has been used in order to find political answers. Public attitudes in favour of solidarity have been linked to the ability of the market in absorbing the population shock. In doing that few attention has been given to the potential effect of the phenomenon on the political stability and social cohesion. On the contrary, we expect that public actors would build a community around shared values and consequently design the policies to overcome the market failures.

## Chapter 1

# Hate at First Sight? Dynamic Aspects of the Electoral Impact of Migrations: the Case of the UK and Brexit

Recent studies provide evidence that immigration has a significant positive effect on the vote for parties with anti-immigration agendas. However, this result does not emerge if we apply the same empirical analysis to the UK, whether in the case of Brexit, or if we consider support for Ukip or the political intentions expressed in the BES survey. To account for this and other fragmented evidence in the literature on personal attitudes towards immigration, we formulate the hypothesis that anti-immigration views resulting from the presence of immigrants in a neighbourhood is a temporary effect. Different underlying mechanisms may be at the root of such negative short-run effects, such as material concerns about the adjustment costs of new migration flows, or prejudicial attitudes, both denoting a “hate at first sight” effect. We build an econometric strategy to test for the existence of such a short-run effect in the case of Brexit and then assess the robustness of our result using a panel of the vote for Ukip and individual data from the BES survey. The evidence robustly supports our hypothesis and provides a basis for further analysis.

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## 1.1 Introduction

Immigration has recently become a key issue in European and US public debate. Though hardly a new topic, immigration has gained a significant role on the political agenda and has influenced voting preferences in various recent elections. Recent studies (Otto and Steinhardt, 2014; Barone et al., 2016; Dustmann et al., 2016; Steinmayr, 2016; Halla et al., 2017) have investigated the causal role of immigration on voting, i.e. how individual voting preferences are influenced by the stock of immigrants in the neighbourhood. Most of them provide evidence that living in an area with a higher number of immigrants increases the probability of voting for parties that promote tighter immigration policies. Nevertheless, a minority of these studies yield the opposite result for recent elections (Steinmayr, 2016; Colantone and Stanig, 2016), and the literature that has focused directly on natives' attitudes towards immigration, rather than on voting, has not observed a significant effect caused by the stock of foreign-born individuals (Scheve and Slaughter, 2001; Card et al., 2005). Anecdotal evidence relating to the latest US Presidential Election points in the same direction.<sup>1</sup> Furthermore, among the findings of the present paper, we provide evidence that if we apply the methodology used in previous literature, the positive correlation between current immigration and anti-immigration positions is not confirmed in the case of the UK. Here neither the case of Brexit nor support for the UK Independence Party (Ukip), nor the political intentions expressed in the British Election Study (BES) questionnaires provide evidence of such an impact being produced by the immigrant stock.

Basing ourselves on this puzzling framework, we formulate the hypothesis that increased opposition to immigration is a temporary effect. The effect of recent immigrant flows may be different than that produced by the overall stock of immigrants. In other words, the time dimension may hold the key to understanding the way immigration affects voting preferences. Disentangling these two effects is our paper's main innovation, and will give us insights into how immigration impacts political outcomes that could have relevant policy implications. Different underlying mechanisms may be at the root of such negative short-run effects, such as material concerns about the adjustment cost of new migrant inflows (the early phases of new immigrant integration), or prejudicial attitudes (initial attitudes not confirmed by experience), both denoting a "hate at first sight" effect. With regard to the former, it is important to note that integration does not happen overnight. In fact, initially immigration can place increased pressure on the welfare system and labour market, causing natives to react with hostility to the new immigrant flows. Over time, as local authorities and the native population

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<sup>1</sup><http://www.motherjones.com/kevin-drum/2016/11/support-trump-strongest-where-illegal-immigration-lowest>, <http://www.nytimes.com/2016/11/11/opinion/identity-over-ideology.html>

learn to cope with the process, a potential initial situation of distress may be mitigated. The extensive literature that analyses personal attitudes to immigration has pointed out the negative attitudes regarding the effects of immigration on the labour market, on crime and on cultural homogeneity (e.g. Scheve and Slaughter, 2001; Card et al., 2005). These attitudes may not reflect the effects of immigration, but may simply represent perceptions influenced by a failure to anticipate the immigrants' integration.

In the case of prejudicial attitudes, Arrow et al. (1973) suggests that individuals only resort to stereotyping immigrants when they lack information on their habits, customs and traditions. Therefore, as soon as direct information on the new immigrant neighbours is acquired, the negative attitude produced by their presence should cease. A similar argument is that political narratives on immigration may be more effective where immigration is more recent, as recent changes in the composition of a neighbourhood's population may make them more salient.

The fact that the perception of attitudes towards immigration are an issue in themselves is supported by evidence showing that the extent of the immigration (as a whole) is habitually overestimated. In the case of the UK (Mori, 2016), British citizens think that an average of 15% of UK residents were born in another European country (the figure grows to 20% among Brexiters), while the actual figure is only 5%. Moreover, they think that European citizens make up only 25% of the immigrant population as a whole, whereas the actual figure is 37%.

A recent multi-country experiment has confirmed how this powerful bias is also at work in other receiving countries (Grigorieff et al., 2016). Moreover, when subjects are provided with correct information on immigrant population proportions, their attitudes towards them immediately and permanently become more positive.

There is therefore already evidence to suggest that a process of learning about immigration may occur over time, mitigating the "hate at first sight" effect. This opens up a new area for analysis: i.e. how the resulting prejudicial attitudes are formed and how they can be overcome.

The short-run negative effects of new immigration flows can be tested by examining whether areas of more recent immigration return more anti-immigrant votes than areas where immigration has a longer history. From this analysis, we may derive some insight as to why previous studies offer contradictory results. Furthermore, the fact that migration to larger urban centres generally goes back further than migration to more rural areas may account for the differences we observe in the effects of immigration in these two different contexts.

Our case study is the 2016 UK Referendum on the country's membership of the European Union. We start from the hypothesis that people's views on immigration played a major role in the victory of "Leave" over "Remain", i.e. the victory of the Brexit camp. In figure 1.1 we show the Google News Trend

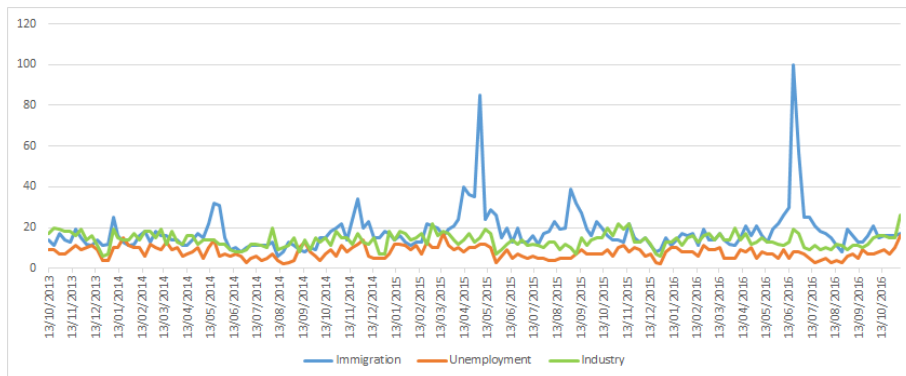


Figure 1.1: Google Trends in UK by Topic

index for three different topics: immigration, unemployment and industry. Unlike in the case of the two other topics, in the days preceding recent elections (the May 2014 European Elections and the General Election of May 2015) a surge of interest over immigration can be observed, which disappears shortly afterwards. This Index reaches its highest peak during the weeks leading up to the referendum on EU membership.

An Ipsos MORI poll from June 2016 offers reasons to think that non-rational beliefs played a substantial role in the framing of the referendum. The research company reported that 33% of subjects said they would decide how to vote in the referendum based on the issue of the number of immigrants entering Britain, whereas more than 28% said they would base their decision on economic concerns. Only 12% reported that their decision would be nationalism-related. Some commentators state explicitly that the Brexit result was more about xenophobia than Europe.

If we take these reports seriously, the referendum gives us an opportunity to observe the effects of immigration on the popular vote. Nonetheless, in Scotland and Northern Ireland the question of Britain's membership of European Union has been framed not only by the issue of immigration. Political relationship between them and England may have played a major role. This is why we focus our analysis to England and Wales.

To assess whether there is a short-run and a long-run effect of immigration we relate the percentage of votes for "Remain" to the current and the past percentage of immigrants in the region. In doing this we can face some endogeneity issues. In particular, we concern about endogenous sorting of migrants which can avoid areas with anti-immigration attitudes. To deal with this, we use estimation methodology common to recent literature (Halla et al., 2017; Barone et al., 2016) using the instrument proposed by Altonji and Card (1991), which looks at the network between immigrants. In fact, immigrants tend to move where individual of the same ethnicity already settle in order to to share the costs related to the movement (Bartel, 1989).

The exogeneity assumption is that local conditions that attracted immigrants in the distant past are uncorrelated with more recent political preferences. Data supports our hypothesis, confirming that the effect of immigration on voting is a dynamic process. The short-run effect has a stronger negative impact than the long-run effect.

To validate our results, we carry out robustness checks using two strategies: we analyse votes for Ukip, an extreme right wing party, in the 2004, 2009 and 2014 European Elections, using panel estimations with instrumental variables; then we analyse individual data on personal attitudes towards immigration and votes for Ukip and Brexit from the British Election Study.

In the next section, we begin by providing a review of the literature on the political effects of immigration and discrimination. We then offer an overview of the Brexit case, focusing on the political impact of the immigration issue, before moving on to the econometric analysis in section 1.4. The final section presents our conclusions.

## 1.2 Related Literature

This paper is related first and foremost to a literature looking at the effects of immigration on electoral outcomes. Most studies belonging to this branch (Otto and Steinhardt, 2014; Barone et al., 2016; Dustmann et al., 2016; Halla et al., 2017) find a positive correlation between the flow of immigrants to a region and votes for parties with clear anti-immigration agendas. It should be noted, however, that these results are not without caveats. For instance, the panel dataset covering six general elections in Austria - on which Halla et al. (2017) base their work - allows the authors to break down the effect for each round of voting. What they find is that *[...] the immigrants' cultural distance to Austrian society mattered (only) at the beginning of the sample period.*<sup>2</sup>

More importantly, big cities are observed to behave differently in all the studies. Barone et al. (2016) suggest three alternative explanations for this pattern. Firstly, urban areas are characterised by a more highly skilled population.<sup>3</sup> A well-known result that emerges from the studies on natives' attitudes towards immigration (Scheve and Slaughter, 2001; Mayda, 2006; Facchini and Mayda, 2009; Card et al., 2012) is that natives may perceive immigrants with skill sets similar to their own as producing greater competition in the labour market. Given that immigration to the European countries is mainly unskilled, support for parties with an anti-immigration agenda will therefore tend to emerge among the low-skilled native population. Of note is the fact that the singularity of big cities holds even when

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<sup>2</sup>Halla et al. (2017) p. 5

<sup>3</sup>In the Italian dataset of Barone et al. (2016), the share of graduates in urban municipalities is about double that of the population living elsewhere.

controlling for the skill-composition of the population. Secondly, large urban areas contain more segmented neighbourhoods. Natives benefit from the positive effects of immigration (e.g. cheaper personal services), while they do not perceive any negative side effects, such as social segregation, crime or competition for local amenities. Otto and Steinhardt (2014), however, focus on the city districts of Hamburg (Germany) and what they find contradicts this hypothesis. What emerges from their disaggregated level of analysis is that immigrants induce changes in neighbourhoods and schools, and that districts with a higher concentration of immigrant children produce significantly higher shares of votes for extreme right-wing parties. Thirdly, *"immigration in big cities may have started sooner than in small municipalities"*.<sup>4</sup> The process of integrating a foreign population into a receiving society takes time. Social and economic frictions may emerge at the beginning, but once the immigrant community has settled, additional inflows do not lead to further changes in natives' attitudes. Most studies on the effects of immigration on voting behaviour make use of a panel data model, which fails to capture such dynamics. As we will discuss in further detail later, an analysis with fixed effects can show the effect of a variation in the number of immigrants on the change in the number of votes, regardless of the size or history of an existing foreign community. Our idea is that a direct experience of the phenomenon of immigration triggers a learning and adjustment process that mitigates the initial hostility. In the same vein, Steinmayr (2016) – the only one to find a negative correlation between the presence of refugees and the share of votes for extreme right-wing parties – interprets his results in the light of the contact theory (Allport, 1954).

In our study we also refer to social psychology and behavioural economics to better analyse how the presence of immigrants affects natives' attitudes. Allport (1954) is among the social psychologists who maintain that the meeting of different identities does not necessarily trigger social conflict. While "groupness" originates as a survival strategy, rather than emerging from intergroup comparisons, the primary behaviour associated with groups is ingroup favouritism (Brewer, 1999). Individuals share stronger social preferences with members of the same group while not necessarily discriminating against members of other groups. In the absence of specific motives for outgroup hate, individuals from different groups interact only as individuals.<sup>5</sup> The results of experiments conducted on cooperation and group identity are consistent with this theory (Ahmed, 2007; Yamagishi and Mifune, 2009).

However, other factors may be at work in the interaction between individuals with different identities. One of these is statistical discrimination (Arrow et al., 1973). When individuals do not possess sufficient informa-

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<sup>4</sup>Barone et al. (2016) p. 7

<sup>5</sup>There is some evidence that points in the opposite direction. For example, subjects discriminate against outgroups in trust games with minimal group identity (Hargreaves Heap and Zizzo, 2009).

tion on the habits, customs and traditions of another group, they resort to stereotypes. There is evidence that this is indeed the case where ethnic differences are concerned. In one experiment (Castillo and Petrie, 2010) subjects had to express their preferences for partners for a cooperation game. In one test, they only knew the ethnic group of their potential partner (Black, White, Asian, etc.). In the other, they had additional information on the potential partner's behaviour in a previous cooperation game. Castillo and Petrie (2010) found discrimination at work against subjects from Black ethnic groups when the ethnic group was the only piece of information available. However, discrimination disappeared in the test where people were provided with additional information. These results support the hypothesis that prejudice can be used to explain discrimination. It also implies that individuals provided with sufficient individual-level information on the members of another group may overcome discrimination.

Another factor behind discrimination is the belief that there is a difference in status between the individual's group and another one. In this case, not only do people want to favour their own group, but also to maintain the perceived positive distinctiveness they associate with it (Tajfel and Turner, 1979). From this point of view, immigrants can be perceived as a threat, particularly if there is competition between groups over resources (Sherif et al., 1961; Campbell, 1965). Some support for this thesis comes from an experiment using an inter-group conflict game in which subjects were found to over-contribute to their own group in order to sustain intergroup conflict, even when this behaviour resulted in highly inefficient outcomes when compared to their behaviour when playing as individuals (Abbink et al., 2010). Where there is conflict over resources, inefficient competition between groups can be a lasting factor.

A recent contribution by Sekeris and Vasilakis (2016) on the impact of the refugee crisis on the Greek elections highlights the effects of pure xenophobia. The context of the analysis and the timing of the vote offer an explanation for the effects of immigrant arrivals in a municipality in terms of the discriminatory attitudes of the receiving population. The present study also considers immigrant flows. However, by also taking into account the stock of immigrants in a region, our analysis can shed a light on the dynamic aspects of the political impact of immigration.

## **1.3 The case of Brexit**

### **1.3.1 Politics and immigration in the UK**

Right from the very beginning of the national debate on the Referendum on UK membership of the European Union, the "Leave" option – which would eventually prevail on 23rd June 2016 with 17,410,742 votes, just under 52% – was linked to the issue of immigration. The two topics were linked

throughout the discussion, by both public actors and the media.

During his campaign for the 2015 General Election, David Cameron committed to calling a referendum on UK membership of the EU and renewed the Conservatives' pledge on immigration targets. Indeed, his manifesto for the 2010 election was to "...take steps to take net migration back to the levels of the 1990's".<sup>6</sup> "No ifs. No buts" was the slogan of the pledge to reduce entries to 100,000 per year. As a result of stricter controls on "bogus" colleges and a rationing of visas for non-EU citizens, immigration did begin to fall in 2011. Nevertheless, the ongoing economic crisis, which has led to a general increase in migration flows all over Europe, and the ending of European transitional arrangements for the free movement of workers from Bulgaria and Romania inverted the trend. Eurosceptics took advantage of David Cameron's failure to keep his promise and Nigel Farage used it as proof of Britain's limited ability to control its own borders as long as it remained a member of the EU.

The composition of the current population of the UK reflects immigration flows to Great Britain since the independence of the Republic of Ireland in 1922. During World War II, due to the need for a greater workforce, the government chose not to introduce restrictions on inflows. Particularly significant was the arrival of individuals coming from the Commonwealth and other countries and regions that were previously part of the British Empire – particularly India, Pakistan and the Caribbean. At that time, these people all held British passports and they established important communities throughout Britain, such as the Indian community in London and the Pakistani ones in Birmingham and Bradford.

Another important source of economic migration was the *Guest Workers Programme*, under which many Polish and Ukrainian citizens moved to the UK. These were unskilled workers and were expected to settle only temporarily. Immigration from Europe began to rise in 2004 and today European citizens living in the UK represent 37% of the total immigrant population. Less relevant in the history of the UK are asylum seekers arriving under the UN 1951 Refugee Convention.<sup>7</sup>

Cultural and social concerns about the growth of the foreign population already existed among the conservative electorate, but the shift in legislation happened with the vast increase in unemployment during the 1970's. The British Nationality Act 1981 – in force since 1983 – distinguished between British citizens and British Overseas Territories citizens. It also changed the way nationality is inherited, thereby limiting the number of immigrants and their children who could enter and live in Great Britain.

Another significant change was the points-based immigration system,

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<sup>6</sup><http://www.telegraph.co.uk/news/2016/10/04/theresa-mays-devotion-to-david-camerons-net-migration-target-is>

<sup>7</sup>OECD (2017)

introduced in 2006 for workers and students coming from outside Europe. Immigration to the UK has become officially managed and highly educated individuals who bring skills which are in short supply in the UK are favoured. As previously mentioned, in 2010 Mr Cameron's government imposed further restrictions on visas, namely on the quota of non-EU visas, and increased controls over immigration. What comes next is part of the current debate.

### 1.3.2 The framing of the European issue

Data from the 2014 European Social Survey (ESS) offers some evidence of the existence of a link between attitudes to immigration and people's attitudes towards the European Union (Table 1.1). We analyse UK data from the 2014 survey, excluding observations from Northern Ireland and Scotland. There are two questions in this survey that capture people's attitudes towards the European Union. The first, concerning people's trust in the European Parliament, asks: "Please tell me on a score of 0-10 how much you personally trust each of the institutions I read out. 0 means you do not trust an institution at all, and 10 means you have complete trust. Firstly, how much do you personally trust the European Parliament?" The second one concerns the process of European unification. It says: "Now thinking about the European Union, some say European unification should go further. Others say it has already gone too far. Using this card, what number on the scale best describes your position?". At the lower extreme, i.e. 0, the answer corresponds to "Unification already gone too far"; at the upper extreme, i.e. 10, to "Unification should go further". This second question is basically "Leave" or "Remain" with a wider number of options and with less prominence given to the actual choices.

We find that self-reported attitudes towards Europe show a high correlation to issues relating to immigration, the economy and trust in the national government, as we observed in the Ipsos MORI poll at the beginning of this paper. We also find moderate but highly significant correlations with watching TV, with subjective happiness and with trust in other people. If we perform the same analysis for other European countries, we find more or less the same set of correlations with comparable magnitudes. Here we only report results from Germany, but these are consistent with those observed in France and Italy. This suggests that people's attitudes towards the European Union do not depend on country-level political debates, but on some deeper mechanism. Therefore, the model we have suggested might capture not only a uniquely British attitude towards immigration and Europe, but rather a specific combination of psychological mechanisms and political conditions that seem to be at play in Europe during present times.

Our elaborations on European Social Survey data, 2014 wave.

There is a difference between the answers to the two questions on Europe. While correlations between trust in the European Parliament and the state



Table 1.1: ESS: framing over the European Union topic

	Trust in the European Parliament	European unification	European unification (Germany)
How satisfied with present state of economy	0.30***	0.13***	0.29***
How satisfied with the national government	0.35***	0.13***	0.35***
TV watching	-0.17***	-0.12***	-0.12***
TV watching, news/politics/current affairs	-0.06**	-0.06***	0.04**
How happy are you	0.13***	0.08***	0.19***
Most people can be trusted or you can't be too careful	0.26***	0.14***	0.24***
Allow immigrants from poorer countries in Europe	-0.34***	-0.40***	-0.38***
Allow immigrants from poorer countries outside Europe	-0.31***	-0.35***	-0.36***
Immigration bad or good for country's economy	0.41***	0.40***	0.41***
Immigrants take jobs away in country or create new jobs	0.28***	0.29***	0.29***
Immigrants make country worse or better place to live	0.32***	0.29***	0.28***
How religious are you	0.12***	0.03	0.10***
How close do you feel to the country	-0.11***	-0.01	-0.00
Employment contract unlimited or limited duration	0.01	0.04*	0.01
<i>N</i>	1993		

Authors' elaboration on European Social Survey data, 2014 wave

of the economy or trust in the national government are over 30%, they lower to 13% if we consider the unification process instead. This may be because the answers to the former question are highly correlated to answers on trust in the national parliament (coefficient: 0.53; p-value: 0.00). Immigration issues are the only ones that remain highly correlated over both questions. It should be noted that this survey was carried out before the 2015 refugee crisis. Therefore, such correlations cannot be driven by the border control emergency and the sense of panic that derived from that situation. Furthermore, there seems to be no great difference in the correlations between attitudes towards immigrants from Europe and to those from the rest of the world. Answers to these two questions show an 83% correlation. It is therefore not welfare or labour considerations related to European legislation on internal migration or social rights that are responsible for this. Overall, the answers to all questions on immigration show a high level of mutual correlation, supporting the hypothesis that it is not a specific immigration-related economic phenomenon that drives the effect of migration on political preferences over Europe.

## 1.4 Econometric analysis

### 1.4.1 Econometric strategy

Our econometric strategy extends the methodology used in previous studies, particularly in Barone et al. (2016), by analysing the effect of both current and past immigration on natives' voting behaviour. In general, the estimat-

ing equation considered in previous literature can be written as:

$$y_{it} = \alpha + \beta m_{it} + \delta x_{it} + \epsilon_{it} \quad (1.1)$$

where  $y_{it}$  is the share of votes for anti-immigration parties or policies in region  $i$  at time  $t$ ,  $m_{it}$  is the stock of immigrants (i.e. the number of immigrants divided by the native population),  $x_{it}$  is a vector of control variables, and  $\epsilon_{it}$  is the error term.

According to our hypothesis, for the same stock of immigrants we should observe a preference for tighter immigration polices where the phenomenon is more recent. Therefore, we need to build an econometric strategy to test for short-run and long-run effects of immigration. We turn this idea into a formula by adding to equation 1.1 the effect of immigration at time  $t - 1$ :<sup>8</sup>

$$y_{it} = \alpha + \beta m_{it} + \gamma m_{i,t-1} \delta x_{it} + \epsilon_{it} \quad (1.2)$$

We test whether the coefficient  $\gamma$  is negative and lower than  $\beta$ . Indeed, in our estimation we consider  $y_{it}$  to be the share of votes for "Remain" over "Leave", and thus the coefficient must be read with the opposite sign.

We can impose a structure on coefficients so the previous equation turns into the unbounded version of the following model:

$$y_{it} = \alpha + \beta m_{it} + \gamma \Delta m_{it} + \delta x_{it} + \epsilon_{it} \quad (1.3)$$

which can also be written as:

$$y_{it} = \alpha + (\beta + \gamma) m_{it} - \gamma m_{(i,t-1)} + \delta x_{it} + \epsilon_{it} \quad (1.4)$$

If this model depicts the true dynamic of immigration and votes, equation (1.1) results to be biased. Indeed, in the case of OLS, the mean of the estimated coefficient of the current stock of immigrants is  $[\beta + \gamma(1 - \rho \Delta x)]$ , where  $\rho \Delta m$  is the time autocorrelation of immigration flows. In other words, the estimation of equation (1.1) gives a coefficient which depends on a combination of two different effects, that of the stock and that of the flow. If the two effects have opposite sign, the bias may also reverse the sign of the estimated coefficient.

An alternative way to test for the negative short-run effect is to leave aside the stock of immigration and to consider a Finite Distributed Lag equation of the flows:

$$y_{it} = \alpha + \gamma_0 \Delta m_{it} + \gamma_1 \Delta m_{(i,t-1)} + \gamma_2 \Delta m_{(i,t-2)} + \dots + \gamma_L \Delta m_{iL} + \delta x_{it} + \epsilon_{it} \quad (1.5)$$

As in a standard case of a FDL equation, we impose a structure to the coefficients which is consistent with our underlying theoretical hypothesis, i.e. the distinction between the short-run and the long-run:

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<sup>8</sup>Multicollinearity has been tested. Results are available on request

$$\gamma_0 = \lambda + \sigma; \gamma_1 = \lambda + \frac{1}{2}\sigma; \gamma_2 = \lambda + \frac{1}{3}\sigma; \dots; \gamma_L = \lambda + \frac{1}{(1+L)}\sigma \quad (1.6)$$

where  $l$  is the lag,  $\lambda$  corresponds to the long-run effect (cfr.  $\beta$  in equation 1.3), while  $\sigma$  is the short-run effect (cfr.  $\gamma$  in equation 1.3) - which is decreasing with the number of lags. We can compute the following auxiliary variables:

$$\tilde{m}_{i1} = \Delta m_{it} + \Delta m_{(i,t-1)} + \Delta m_{(i,t-2)} + \dots + \Delta m_{iL}$$

$$\tilde{m}_{i2} = \Delta m_{it} + \frac{1}{2}\Delta m_{(i,t-1)} + \frac{1}{3}\Delta m_{(i,t-2)} + \dots + \frac{1}{(1+L)}\Delta m_{iL}$$

and we can write equation (1.4) as:

$$y_{it} = \alpha + \lambda m_{i1} + \sigma m_{i2} + \delta x_{it} + \epsilon_{it} \quad (1.7)$$

Equation (1.7) justifies the exclusion of the stock of  $m$  from the regression model. We will estimate the model in (1.7) as a further robustness analysis.

The vector of control variables  $x$  includes many possible determinants of the Brexit vote, recalled in the literature previously reviewed. Our analysis is at NUTS3 level, thus, in addition to the regional (NUTS2) fixed effects, we also introduced some local-unit specific controls: controls for the economic situation, such as per-capita income and unemployment; a variable capturing the effect of the urban feature, which embodies the effect of London and similar urban contexts; the socio-demographic structure represented by the share of the population aged over 65 and the share of the population with a higher level of education. An important body of previous literature (Card and DiNardo, 2000; Borjas, 2006; Peri and Sparber, 2008) argues that cross-regional analyses are invalidated by the fact that natives decide to relocate in response to immigration flows. In our case, the effect of a negative sentiment relating to immigration may have pushed natives to migrate internally, thus reducing the number of people voting "Leave" in the areas with a high concentration of immigrants. There is very scant evidence of the so-called skating rink model, according to which "each new immigrant knocks a native off the ice". However, we consider net internal migration flows in our empirical strategy to control for such potential bias. In particular, we distinguish between internal migrations of natives and foreign-born citizens, and we regress the net flows of natives on the flows of immigrants. Then, we use the fitted values, i.e. the relocation decisions of natives due only to immigration, as a control. Finally, we also consider the results of the 1975 UK referendum on the European Union. In this way, we further control, at the

1975 county council level, that the effect of immigration is not endogenously related to past historical attitudes towards Europe.

The analysis concerns England and Wales and it is performed at the Local Administrative Unit Level (LAU1) for a total of 345 territorial units. From the total 348 territorial units we have excluded the LAU of the City of London (which is a small subset of what is commonly considered as London's financial district) since, curiously, no correspondent data on immigration is available. We also exclude the Isles of Scilly and the Isle of Wight, for which income estimates are missing.

For recent immigration flows we consider the relative and absolute variations in the stock of immigrants for the period 2012-2015. This is a period not characterised by major political changes and we purposely avoided the years of the economic crisis.

The source for electoral data is the UK Electoral Commission while the other data is derived from the Office for National Statistics. Immigration, Income and Unemployment data are model-based estimates. Unemployment is the estimated rate at March 2016 by the Regional Labour Market Statistics office of the ONS. The other control variables are the latest available estimates at LAU level (2011) by the Ness (Neighbourhood Statistics), except for net internal migration flows data, which derives from the Internal Migration Dataset and refers to 2015. The dummy for the Cosmopolitan Areas concerns 50 local authorities which, in the classification for the 2011 Census, were included by the ONS in the three categories of London Cosmopolitan Central, London Cosmopolitan Suburbia and Business and Education Centres.

#### 1.4.2 Identification strategy

Comparisons between areas with different concentrations of immigrants are always problematic, as immigration flows can be endogenous to the phenomenon under analysis. Two issues in the previous body of the literature provide concerns with regard to endogeneity. Firstly, immigrants could avoid areas with anti-immigrant sentiments. The implication would be an upward bias in the effect of immigration on political outcomes. In areas with more tolerant attitudes the stock of immigrants would be higher than the expected stock predicted purely by push factors, which would in turn lead to an underestimation of the positive effect of immigration on votes for anti-immigrant agendas. Secondly, if there are underlying factors in an area that drive both sorting decisions and political preferences, there would be some spurious correlation between the effect of these factors and the effect of immigration. For example, Halla et al. (2017) suggest that an increase in votes for right-wing parties could be the result of a shift to greater *pro-business* attitudes. If these attitudes in turn determine a better economic performance in that area compared to other areas, it would create a pull factor for sorting decisions

by immigrants. More generally, structural changes in the economy create the conditions for both a political shift in preferences and the emergence of a pull factor for immigration. This correlation could determine both an upward and a downward bias on the effect of immigration on political outcomes. The direction of the bias would depend on the relation between this underlying factor and political preferences.

The sorting problem can be overcome by using an instrumental variable approach. An important body of literature argues that immigrants choose where to locate according to individual networks as well as job opportunities (e.g. Beine and Coulombe, 2014; Mayda, 2010). In other words, the location choices of people who are moving for economic reasons are driven by utility maximization strategies, which include the sharing of information to reduce the costs of migration, as well as spending time with people that speak the same language and share the same culture. Then, we exploit the tendency of migrants to move to areas where people from the same country already live (Bartel, 1989) and we predict the actual distribution of the foreign population by observing the past one. Therefore, we make use of the instrument suggested by Altonji and Card (1991), as slightly modified by Cortés and Pan (2014) and Barone et al. (2016):

$$Imm_{it} = \frac{\sum_n \lambda_{in}^{t-l} Imm_{nt,-1}}{Pop_i^t}$$

where  $Imm_{it}$  is the predicted share of current immigrants in region  $i$ . It is equal to the number of immigrants coming from group  $n$  at time  $t$  at country level, net of contribution of region  $i$  to the total, apportioned to the fraction of people coming from the same country and living in region  $i$  at time  $t - l$ ; all aggregated to the main foreign nationalities present in UK.

This instrument is exogenous at one condition. The time  $t - l$  chosen must be such that unobserved variables that determine voting today are not correlated with the determinants of immigration in that year. In other words, the historical sorting decisions of immigrants at that time need to be exogenous to current political preferences.

To validate this condition, we proceed, in line with previous studies, to the choice of a year  $t - l$  preceding a major change in political attitudes relating to the issue of immigration. We consider three aspects: major political changes such as the emergence of new parties; substantial increases in migration flows; and changes in the role of immigration in the political debate. Taking all these aspects into consideration, for the case of the UK we chose 1981 and 1991, with the latter year being used only when we needed two instruments in the same estimation.

The year 1991 precedes the Labour governments of the 1990s. In the case of 1981, we further expand our time horizon right back to the beginning of the Thatcher years. In 1991, extreme right-wing parties received well below

1% of electoral preferences, whereas now they receive over 15%. Ukip, a nationalist right-wing party that was at the forefront of the Brexit campaign with an anti-immigration agenda, was founded only in 1993. Moreover, it started as a Eurosceptic party and only later in the 2000s proposed a policy of reducing immigration. In 1991 the three major parties (Conservative, Labour and the Liberal Democrats) received more than 95% of the vote, while in recent elections their share has been less than 70%.

As to migration trends, during the entire 1970s and 1980s migration flows were relatively low. In 1981, the net total of migration was negative. More than 100,000 British people left the UK that year, while only 24,000 immigrants arrived. The percentage of immigrants in England and Wales (the parts of the UK considered in the analysis) increased from 5% to 6% during those decades.

Multicultural policies proposed by the Labour party in the early 1990s are usually considered to have helped the party to affirm itself at the national level. The loose immigration policies adopted during the Blair years produced a growing consensus in favour of the Labour party. These reforms produced a huge increase in immigration flows after 1997. The percentage of immigrants in the total population increased from just over 6% to about 13%. From the year 2004 onwards, more than 200,000 immigrants settled in the UK per year. The existence of a pro-immigration political climate in the early 1990s is also confirmed by the UK's signature of the Amsterdam Treaty in 1997 and its position in favour of the enlargement of the European Union to Central and Eastern European countries.

An example of this change in the role immigration plays in political debate is a straight comparison between the slogans used by Prime Ministers of the UK in the mid-1990s and today. Blair said that "a simple way to take measure of a country is to look at how many want in and how many want out", whereas now May argues that "the aim is to create here in Britain a really hostile environment for illegal migration." This issue is not the result of a difference between the Conservative and Labour parties. John Major, the Conservative Prime Minister who preceded Tony Blair (1990-1997), also expressed opinions in favour of immigration during his time in office: "There was a different social value placed on immigration [...] I saw immigration at very close quarters in the 1950s. They shared my house. They were my neighbours. I played with them as boys. I did not see people who had come here just to benefit from our social system. I saw people with guts and the drive to travel halfway across the world in many cases to better themselves and their families. And I think that is a very conservative instinct." Furthermore, during the Brexit referendum Major supported Remain and accused Leave supporters from his own party of using arguments more akin to those of Ukip, rather than traditional Conservative arguments.

We can therefore conclude that the role of immigration in political debate has changed in line with major changes in electoral results from the nineties

onwards, and with changes in the size of migration flows. These elements provide support to the hypothesis that the sorting of immigrants in 1981 and 1991 was not correlated to actual political preferences. This justifies the choices of 1981 and 1991 as base years for the instrument.

The figures for immigrant stocks in Local Authority Units in 1981 and in 1991 are taken from the corresponding censuses. We eliminated Harrogate from the units observed because it is missing from both censuses. These censuses divide immigrants into seven subgroups (Old Commonwealth, New Commonwealth, Pakistani, Irish, European Community, other Europeans and rest of the world).

This instrument is used in different ways to correct for the endogenous nature of equations (1.1)-(1.4). Firstly, in order to compare with previous studies, we regress equation (1.1) by using the 1981 yearly base and instrumenting the stock of immigrants. Secondly, we run the same IV estimation on equation (1.2), but without instrumenting the flow of immigrants. This specification derives from the assumption that the endogenous components are time invariant, and thus the rate of growth is exogenous to the model. Thirdly, to avoid our assumptions being too restrictive, we instrument the stock of immigrants both at time  $t$  (1991) and at time  $t - 1$  (1981). Since equation (1.4) takes the form of a Finite Distributed Lag equation, although with only one lag, to overcome the estimation problems typical of this functional form we also run a three-stage regression in order to avoid possible autocorrelation problems.

To overcome the limitations posed by the cross-sectional nature of the Brexit case, in the robustness section we applied the same procedure to a three-waves panel data on Ukip. Additionally, to overcome the limitations of aggregated data we run an ordered probit estimation on individual data. These data are taken from the British Election Study and reflect personal attitudes to immigration and the vote for Ukip and the Brexit Referendum.

### 1.4.3 Results

Tables 1.2 and 1.3 show the results of the OLS and IV estimations. The first column of both tables corresponds to the standard equation (1.1). The stock of immigrants is not significant in the OLS estimations, but it becomes significant in all specifications of the IV model. However, contrary to many previous studies (Otto and Steinhardt, 2014; Barone et al., 2016; Dustmann et al., 2016; Steinmayr, 2016; Halla et al., 2017), we do not find that the stock of immigrants has a negative effect on the vote for "Remain": the coefficient is positive in both cases.

Recent immigration flows always have a significant and negative effect, whichever model specification and identification strategy we choose. This last result provides evidence in favour of our hypothesis of a short-run effect: the coefficient of recent flows is negative and lower than the coefficient of the

Table 1.2: OLS regressions

	Remain	Remain	Remain
Stock of immigrants	0.0720 (0.108)	-0.413* (0.205)	0.170 (0.130)
Stock of immigrants 2012		0.583*** (0.116)	
Immigration flows 2012/2015			-0.583** (0.116)
Unemployment	No	No	No
Income	Yes	Yes	Yes
Cosmopolitan areas	Yes	Yes	Yes
Higher education	No	No	No
Over 65	No	No	No
Net internal migration flows	No	No	No
Vote at the 1975 referendum	No	No	No
Constant	12.65 (9.515)	13.04 (9.530)	13.04 (9.530)
Observations	345	345	345
$R^2$	0.699	0.714	0.714

*Notes:* Errors clustered at regional level in parentheses. Regional dummies are included (but not reported). We excluded 3 observations (Isle of Wright, Isles of Scilly, City of London), because of missing data. Cosmopolitan areas include London and Business and Education centres. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

stock (which is actually positive). Also the magnitude of the effect is large: if immigration grows by 1 p.p., the share of votes for "Remain" decreases by 2 p.p..

It is worth noting that columns 3 and 5 of the OLS estimations produce the same results, in spite of the fact that they correspond to different formulations of the same model (see eq. 1.3 and 1.4): the coefficient of the flows in column 5 is equal to the opposite coefficient of the lagged stock in column 3, while the coefficient of the stock in column 3 is equal to the sum of the two coefficients in column 5.

Table 1.4 shows the results of the OLS estimations of the Finite Distributed Lag model in equation (1.7). Referring to the original formulation in equation (1.5), we consider five variables, each with a three-year lag. Although we do not have sufficient instruments to run an IV estimation, this formulation allows for a less restrictive short-run assumption, since we do not implicitly assume that the short-run effect lasts exactly three years and then suddenly disappears. In this case, the results also support our hypothesis: the coefficients of immigration flows increase on the lag. Indeed, considering



Table 1.3: IV regressions

	2SLS	2SLS	2SLS
	Remain	Remain	Remain
Stock of immigrants	0.497*** (0.136)	-2.751*** (0.606)	0.488*** (0.156)
Stock of immigrants 2012		3.251*** (0.734)	
Growth rate of immigration 2012/2015			-2.018*** (0.577)
Unemployment	No	No	No
Income	Yes	Yes	Yes
Cosmopolitan areas	Yes	Yes	Yes
Higher education	No	No	No
Over 65	No	No	No
Net internal migration flows	No	No	No
Vote at the 1975 referendum	No	No	No
Constant	8.340 (7.265)	11.09 (7.268)	16.46 (7.865)
KP test	16.61	14.82	15.80
Observations	344	344	342
$R^2$	0.666	0.396	0.676

*Notes:* Errors clustered at regional level in parentheses. Regional dummies are included (but not reported). We excluded 3 observations (Isle of Wright, Isles of Scilly, City of London), because of missing data. Cosmopolitan areas include London and Business and Education centres. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

equation (1.6), the coefficients of the variations are:

$$\gamma_0 = -0,412; \gamma_1 = 0,167; \gamma_2 = 0,361; \gamma_3 = 0,457; \gamma_4 = 0,515$$

and then they turn from positive to negative when  $l = 0.551$ , i.e. after approximately five and a half years.

In all the specifications, the control variables "income" and "urban" are always significant and positive: wealthier and/or more cosmopolitan areas returned a higher percentage of votes for "Remain". Unemployment is not significant. Contrary to what has emerged from descriptive analysis on the impact of age,<sup>9</sup> once other effects are controlled for (especially income), age structure is not a significant feature. Controlling for natives' internal migration and the 1975 Referendum also finds them to be not significant.

#### 1.4.4 Robustness

We carried out two robustness checks. As ours is a cross-sectional analysis, robustness checks were needed to provide some evidence that this dynamic process does not result from the effects of unobserved variables on our data.

Firstly, we checked whether our results also held in other elections, namely with regard to votes for Ukip in the European elections. In particular, we exploited the panel nature of the data on Ukip to provide a fixed effect estimation, in line with Barone et al. (2016). Our second control used individual-level data from the British Elections Study to check whether this process was at work by looking directly at personal attitudes towards immigration and declarations of vote for Ukip and in the 2016 EU Referendum.

#### Ukip votes

Immigration must have been a relevant factor in people's support for Ukip at previous European Parliament elections, just as it was in the Brexit vote. This is true for two reasons: 1) in the 2016 Referendum, "Leave" received 52% of the vote; in 2014 Ukip received 26,8% of votes cast, in 2009 16%, and in 2004 16.1%. It thus follows that what is true for the Brexit vote should hold even more true when it comes to support for Ukip; 2) Ukip is a party with a clear anti-immigration stance. The increase in their share of the vote over time can be explained by the way in which they used the immigration issue to call the UK's continued membership of the European Union into question. If our control does not confirm our previous results, then our idea of considering "Leave" votes as anti-immigration should be dismissed.

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<sup>9</sup>see for example <http://www.independent.co.uk/news/uk/politics/brexit-why-did-old-people-vote-leave-young-voters-remain-eu-referendum-a7103996.html>

Table 1.4: Distributed lag model

	Remain
Long-run effect	0.747*** (0.137)
Short-run effect	-1.159*** (0.232)
Unemployment	No
Income	Yes
Cosmopolitan areas	Yes
Higher Education	No
Over 65	No
Net internal migration flows	No
Vote at the 1975 referendum	No
Constant	13.07 (9.550)
Observations	345
$R^2$	0.713

Errors clustered at regional level in parentheses.

Regional dummies are included (but not reported).

We excluded 3 observations (Isle of Wright,

Isles of Scilly, City of London), because of missing data.

Cosmopolitan areas include London and Business and Education centres.

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

We replicated our main model and provided an additional fixed effect panel model and then an IV panel fixed effect model. Contrary to our previous analysis on Brexit, this data permits us to use an econometric strategy that controls for unobserved fixed effects. Of course, we have to look at the sign of the coefficients in the opposite way, as more votes for Ukip here correspond to a positive coefficient. We should thus find more evidence in support of our hypothesis, with recent immigrant flows having a more positive effect than the immigrant stock.

Table 1.5: Panel Estimations on Ukip

	OLS	OLS	FE	FE-2SLS	FE-3SLS
	Ukip	Ukip	Ukip	Ukip	Ukip
Stock of immigrants	-0.152*** (0.0317)	-0.200*** (0.0344)	-0.708*** (0.119)	-4.266*** (0.926)	-1.605 (2.052)
Immigration flows		0.246*** (0.0705)	0.344*** (0.0801)	2.048*** (0.459)	
Lagged stock of immigrants					-3.758*** (1.159)
Unemployment	0.663 (0.732)	0.710 (0.763)	2.143* (1.159)	2.355** (0.993)	2.040** (0.999)
High Education	3.199 (2.026)	2.998 (2.023)			
Income	0.00456** (0.00181)	0.00562** (0.00185)			
Over 65	0.294*** (0.0753)	0.258*** (0.0533)			
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Unit fixed effects			Yes	Yes	Yes
Constant	4.997** (2.079)	5.316** (1.829)	19.48*** (0.855)	47.21*** (7.222)	33.68*** (8.419)
Observations	1031	1031	1031	1028	1028
$R^2$	0.641	0.647	0.803		0.017

Errors clustered at regional level in parentheses.

We excluded 3 observations (Isle of Wright, Isles of Scilly, City of London), because of missing data.

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

Our robustness checks conclusively support our previous results. The flow of immigrants has a positive effect on votes for Ukip, while the immigrant stock has a negative effect. Fixed effects strengthen the coefficients, which are further increased in magnitude by the use of an instrumental variable strategy. This is in line with Barone et al. (2016). The stock has a bias in the opposite direction, but the bias on flows is consistent with the theoretical

underpinnings of their results.

Given that our cross-sectional analysis on Brexit may have raised concerns regarding the dependence of our results on unobserved fixed effects, it is reassuring to see these results confirm their validity. It should be noted that this provides evidence that this dynamic process is not time-dependent, as here we also consider the 2009 and 2004 elections, which are quite far removed from 2015 in terms of time. In terms of results, they tell the same story as our analysis of the Brexit vote.

### Data at the individual level

In spite of our use of an instrumental variable approach, it is still possible that our results are produced by some spurious correlation with political preferences at a regional level. There may be additional underlying regional factors that explain both immigration flows and political preferences, which were not taken care of by our instrumental variable approach. Therefore, it is useful to consider for robustness some finer data at the individual level that directly tests personal attitudes to immigration and people's reported voting intentions with regard to Ukip and Brexit.

We merge the 7<sup>th</sup> wave of the British Election Study, conducted by YouGov in 2015, with ONS statistics on the distribution of immigrants and exclude Scotland, Northern Ireland and all immigrants from the dataset. The flows we consider is the difference in the stock of immigrants between 2011 and 2014. The model is an ordered probit model on the questions "Do immigrants make the country a better or worse place to live", "If there were a UK General Election tomorrow, which party would you vote for?", and "If there were a referendum on Britain's membership of the European Union, how do you think you would vote?", using the same variables of interest and controls as our baseline model.

This check gives relevant support to our main results, because it tests the same short-run effect with variables at the individual level. We do not find a significant effect produced by the stock of immigrants (all p-values are above 5%), which is consistent with the weak significance it had in our previous analysis and with contact theories on intergroup relations. The effect of migrant inflows in recent times is significant and negative. Therefore, even when controlling for variables such as unemployment, income and demographics at the individual level, the effect of immigration is still significant and temporary.

## 1.5 Conclusions

Arguments relating to immigration, tinged with nationalist tones, play a key role in current political debate, particularly since the onset of the economic crisis. Nigel Farage, David Cameron, Marine Le Pen, Matteo Salvini and

Table 1.6: OLS on Individual Data

	Immigration good or bad	Ukip	Remain
Stock of immigrants	0.00498* (0.00292)	0.000840 (0.00378)	0.00663* (0.00365)
Immigration flows	-0.0161*** (0.00489)	0.0128** (0.00569)	-0.0160** (0.00668)
Unemployment	No	No	Yes
Income	No	No	No
Cosmopolitan areas	No	No	No
Higher Education	Yes	Yes	Yes
Over 65	Yes	Yes	Yes
Gender	Yes	No	No
<i>N</i>	6983	6983	6983

Errors clustered at LAU level in parentheses.

We exclude all migrants from the dataset.

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

others have succeeded, not without the help of the media, in framing the question of Europe as a question of immigration. At the same time, over the last twenty years there has been an unprecedented rise in immigration flows right across Europe. Both issues determine the need to further investigate the political impact of migration. In particular, we wanted to analyse the dynamic aspects of the impact of migrant inflows on votes, testing for a negative short-run effect. In considering this issue, we have taken into account the potential role of prejudices - stereotypes born out of a lack of information and destined to fade over time, as people become more familiar with the new immigrant population. We have also mentioned how the integration of immigrants may take time because welfare systems and job markets are slow to adjust to the increased population. Given these processes, it is relevant to assess whether the effect of immigration on voting depends merely on the stock of immigrants *per se*, or whether it is influenced by the time-path of the immigration process.

Our results show that the time-path is indeed the key. The effect of recent immigration flows is more negative than the effect of the stock of immigrants and of the lagged flows, thereby confirming a short-run effect. In general, while there are correlations between stocks and flows, estimates based on the stock alone may be biased. Trying to understand the effects of immigration on the popular vote by simply analysing the stock of immigrants *per se* can be deceptive. In the case of Brexit, where stock and flows are only weakly correlated, the effects on the electorate of the stock of immigrants *per se* would have returned a positive effect on votes, although one that was barely significant. Taking immigrant flows into account, however, enables us to find evidence that, in line with reports by research companies and evidence from the BES, immigration was indeed a key factor in the result of the Brexit referendum. Excluding income and the case of cosmopolitan areas, immigration seems to have been the referendum's main determining factor.

This paper also contributes to the emerging body of literature on the political outcomes of immigration by proposing an explanation as to why there are differences between the impact of immigration in large cities and in small towns. In fact, migration to large cities goes back further than migration to small towns, with the result that the short-run effect that we have found may have long ago been overcome. Therefore, we suggest that by considering the time process of immigration it is possible to investigate this issue without having to distinguish between areas by density of population.

In conclusion, we wish to point out that our analysis is necessarily only a starting point. We interpreted the evidence on Brexit as supportive of our hypothesis, but plenty of work is still required to analyse the factors that determine immigration's effect on the vote. The elements underpinning the short-run and long-run effects and the relationship between the two are still to be investigated. For example, which aspect is more relevant: prejudice

or material concerns? As for the former, there may be attitudes rooted in culture that may derive from historical events, such as decolonisation or racism. However, it could also be that failures in integration policies are responsible for these effects. Moreover, are we fully aware of the role played by the media and by political narratives? Given the current relevance of "post-factual" phenomena, there is a need to investigate this issue. It could be that there is no correlation between watching television and personal attitudes towards migration; alternatively, it could be that the media and political narratives influence people's perceptions or that, more subtly, they validate previously-held beliefs, facilitating their propagation.

In the 1930s, alternative facts and propaganda in Europe were already fuelling prejudices against ethnic or religious minorities. Back then, the same arguments over minorities were being propagated as over immigrants now. There would appear to be nothing new under the sun! However, given that the current popularity of anti-immigration agendas corresponds to increased immigration flows in recent years, there is need to better understand this relation. Our contribution to the subject is the conclusion that the effect of immigration on voting patterns depends on the specific time-path of immigration.



## Chapter 2

# Need for Flexibility or Subsidies? Reviewing the Impact of Immigration on the Domestic Labour Market

The migration issue is drawing increasing attention from all the social sciences. As economists we would like to contribute to the debate by analysing and explaining the reaction of the markets to this shock. Here we review the most important papers that have tried to answer to the question "Do immigrants worsen the labour market conditions of natives?". They concern three broad arguments: the competition between native and immigrant workers, the location decision of natives, and the reaction of firms. Together they contribute to draw a complete framework within which we can understand the reaction of the domestic labour market to a migration inflow. In particular, the tentative conclusion of a non-negative effect of foreign workers on native average wage in the context of a flexible labour market is based on the assumption of a perfect elastic capital supply. We conclude that this is a crucial hypothesis which plausibility needs to be further analysed.

## 2.1 Introduction

In 2015 there were about 21 millions refugees all over the world,<sup>1</sup> meaning that at least 21 millions *forced migrants* lived in a country different of that of birth. These figures are the highest from the Second World War and the European "refugee crisis" is drawing large attention from all the social sciences. Economics is giving new insight to the current situation, as witnessed by the increasing literature on the effect of refugees and immigrants on welfare and on political preferences.(e.g. Dustmann et al., 2016; Barone et al., 2016). Furthermore, economics can give its contribution by analyzing and explaining the reaction of the markets to this shock. Indeed, the economic literature has been looking at the effects of immigration on the receiving economy from long time, motivated by the great relevance that the phenomenon has always had for the American society. Among others, many studies have concerned the impacts of immigration on economic growth, on international trade and on domestic labour market. The main concern of labour economists has been the effects of immigrant workers on the labour market outcomes of natives, especially on wages. The answer to the question "Do immigrants worsen the labour market conditions of natives?" is not unique neither in theory nor in the data.

In this article, we review some of the seminal papers that in various way have tried to answer to the previous question. As it will be more clear in what follows, these contributions can be split into three streams – the competition between natives and immigrants, the location decisions of natives, and the reaction of firms. Each of them deserves to be analysed separately. Nonetheless, they are mutually related and together they depict a general framework within which we can understand the reaction of the domestic economy to a migration flow.

The paper is organized as follows. Section 2.2 reviews the early economic studies on the effect of immigration on native workers, which have started the ongoing debate. Section 2.3 synthesizes researches that have focused on the degree of competition between immigrants and natives in the labour market. Section 2.4 and section 2.5 present respectively the empirical studies on the natives location decisions and on the firms reaction following a migration shock. Section 2.6 concludes.

## 2.2 Early studies on the impact of immigration

At the very beginning of the economic analysis of immigration, the issue was studied from a theoretical point of view. Johnson (1980) trivially distinguished between the short-run and the long-run effect. The short run was defined as the time period in which wages are fixed and the actual out-

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<sup>1</sup><http://www.unhcr.org/figures-at-a-glance.html>

put could be different from the potential one. In this case, an increase in the supply of low-skilled workers, due to an immigration shock, simply results in a higher unemployment rate. Instead, to evaluate the effects of the same shock in the long run the author made three alternative assumptions. First, he supposed that wages are free to adjust so that the labour market clears. This scenario is called the *frictional unemployment model*. Second, he hypothesized that real wages are fixed, due to labour market institutions or to the presence of asymmetric information, so the final result does not differ from the one in the short-run. This is the *structural unemployment model*. Finally, he assumed that the labour supply is not inelastic, but upward sloped, so immigrants that enter the labour market lead some natives to exit. This case is defined the *induced unemployment model*. On the basis of previous studies of labour economics, the author concluded that the first one is the “[...]most accurate analytical description of most labour markets in the United States”.<sup>2</sup> This expectation came from the perfect competition hypothesis from both the supply side and the demand side of the labour market. Most of the early researches shared this framework and so they expected to measure a contraction of native real wages in order to accommodate for the increased labour supply.

The first attempt to empirically evaluate the variation in native wages due to a change in the share of immigrants was by Grossman (1982). Following the standard theory, he estimated the elasticity of substitution between two labour inputs distinguished by immigration status. The empirical strategy consisted of exploiting the different concentration of immigrants across American cities to measure the reaction of native wage to a change in the foreign labour supply. Grossman’s estimates suggested that workers disaggregated by immigration status are substitutes in production – with natives more substitutable with second generation immigrants than with the newly arrived. This result reflected the standard assimilation process to the host society described by Chiswick (1978). However, the effect of an increase in immigrant labour supply on native wages resulted only negligible.

Borjas (1987) arrived to the same conclusion. The author tried to better understand the relationship in production between immigrants and natives and he repeated the estimates implemented by Grossman (1982), but he further disaggregated workers by ethnicity. So, instead of having three competing groups (native, first- and second-generation), the author had to estimate the elasticities of substitution between eight groups of workers (white-, black-, hispanic- and asian-natives and white-, black-, hispanic- and asian-immigrants). As in Grossman, Borjas (1987) did not find any sizable impacts of immigrant workers on native wages. Nonetheless, immigrants have a notable effect on the determination of their own wage levels, implying that foreign workers compete more with themselves than with natives.

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<sup>2</sup>See Johnson (1980) pag. 335

The inconsistency between the theoretical prediction of a reduction in native wages to accommodate for the increased labour supply and the empirical findings of a negligible effect of immigration on the prices of native labour inputs was addressed for the first time by David Card in two papers which have become seminal in the literature on labour migration – Card (1990) and Altonji and Card (1991). In the first one, the author gave the insight according to which immigrants do not choose exogenously where to locate, but they move to cities where the growth in labour demand can accommodate for their supply. Furthermore, natives can respond to the migration inflow by emigrating to cities with low immigrant density. Both arguments weaken the validity of the analyses that use the correlation across cities between native wages and immigrant density in order to evaluate the impact of foreign workers on the labour outcomes of natives.

As a solution the author suggested to exploit a natural experiment, such that of the Mariel Boatlift,<sup>3</sup> which better corresponded to an exogenous change in labour supply to a particular labour market. However, the study based on the data from the Miami experience showed again only a weak correlation between the share of immigrants and the reduction in native wages. This result was confirmed by the second paper (Altonji and Card, 1991) which addressed the problem of the endogenous migration choice with an instrumental variable approach. A common feature of migration flows, indeed, is that immigrants tend to live where previous immigrants from the same country settled (Bartel, 1989). So, in order to capture only the exogenous variation in the share of foreign workers, Altonji and Card (1991) instrumented the current immigration with the fraction of foreign population of the same ethnicity in the previous time period. The coefficient obtained with the IV estimator was higher than the one estimated by OLS – but still very small.

Another important contribution of the aforementioned paper was the analysis of the industry-specific labour markets within cities. In general, what emerged from the study was that the competition between immigrants and natives is diminished by the fact that less-skilled natives and immigrants are not employed in the same industries. This is a result of a native displacement from immigrant-intensive industries, which is clear from the comparison of the industry distribution of less-skilled natives in cities with relatively high and relatively low immigrant densities. Furthermore, the authors found that the falling employment trend in these industries at the national level slowed down in cities with high immigrant density, suggesting that some low-wage industries survived thanks to the availability of immigrant labour.

From the early contributions reviewed we can highlight three key adjust-

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<sup>3</sup>In April 20, 1980 Fidel Castro declared that Cubans wishing to emigrate were free to leave from the port of Mariel. Nevertheless the choice of the destination country remained up to the individuals. The result of this policy change was that half of the emigrants settle in Miami and the labour force of the city increases by 7%.

ment processes of the local economies to immigration – changes in factor prices, natives relocation across industries and across local labour markets, change in labour demand. These adjustment channels have been examined in depth in the economic literature on labour migration and we are going to examine them separately.

### 2.3 The substitutability in production between immigrants and natives

There are two important sources of bias in the regional analyses of the impact of immigration on the labour market outcomes of natives – the positive growth in wages that attracts immigrants and the native decision to move away from high immigrant density areas. To overcome these problems, Borjas (2003) suggested a sharp solution. Since emigration rate in the U.S. is quite low, the national labour market can be considered closed for natives. Furthermore, the skill-composition of immigrants differs from that of natives and this variation can be considered more exogenous than the geographic one. The intuition was to divide workers by educational attainment and by years of job experience and to measure the effect of an increase in the immigrant share on the marginal productivity of natives within a particular skill-group. This approach is based on the assumption that workers who have the same schooling but differ in the experience level are imperfect substitutes in production and this is a standard assumption in the studies of the structure of wages outside the migration context (e.g. Card and Lemieux, 2001).

Since the approach proposed by Borjas (2003) has been followed by a lot of subsequent papers studying the impact of immigration on native wages, it is useful to recall it here. Suppose that the aggregate production function at the national level can be represented by a CES technology like

$$Q_t = [\lambda_{Kt}K_t^\nu + \lambda_{Lt}L_t^\nu]^{\frac{1}{\nu}} \quad (2.1)$$

where  $Q_t$  is the output at time  $t$ ,  $K_t$  is the capital and  $L_t$  denotes the aggregate labour input. The elasticity of substitution between inputs is regulated by  $\nu = (1 - \frac{1}{\sigma_{KL}})$ , with  $\sigma_{KL} \in (0, +\infty)$  being the elasticity of substitution between capital and labour.  $\lambda_{Kt}$  and  $\lambda_{Lt}$  are time-variant technology parameters.  $L_t$  incorporates the contributions at time  $t$  of workers who differ in education and experience. So let

$$L_t = [\sum_i \theta_{it}L_{it}^\rho]^{\frac{1}{\rho}} \quad (2.2)$$

where  $L_{it}$  gives the number of workers with education  $i$  which in turn is given by

$$[L_{it} = [\sum_j \alpha_{ijt}L_{ijt}^\eta]^{\frac{1}{\eta}} \quad (2.3)$$

where  $L_{ijt}$  is the number of workers in education group  $i$  and experience group  $j$ .

In this model the parameters of interest are  $\rho = 1 - \frac{1}{\sigma_E}$  and  $\eta = 1 - \frac{1}{\sigma_X}$ , with  $\sigma_E$  and  $\sigma_X$  being the elasticities of substitution between workers with respectively different education and different experience. If their value is smaller or greater than zero (or equivalently  $\sigma < 1$  or  $\sigma > 1$ ), the various groups of workers are imperfect complements or imperfect substitutes in production. Furthermore, if the parameters  $\rho$  and  $\eta$  approach one (or equivalently  $\sigma \rightarrow \infty$ ) the various labour inputs are perfectly substitutes. In other words, the values of  $\rho$  and  $\eta$  regulate the sign and the magnitude of the supply effects on wages.

From the first order conditions of the theoretical model we can derive the following empirical strategy. First, assuming that the cross-elasticities are constant between experience groups,  $\sigma_X$  can be estimated by

$$\log\omega_{ijt} = \delta - \left(\frac{1}{\sigma_X}\right)\log L_{ijt} + \varepsilon_{ijt}$$

where the vector  $\delta$  of fixed effects absorbs any region-specific, skill-specific, and time-specific factors that affect the evolution of the native workforce in a particular skill-group. Then, assuming that the cross-elasticities are constant between education groups,  $\sigma_E$  can be estimated by

$$\log\omega_{it} = \delta - \left(\frac{1}{\sigma_E}\right)\log L_{it} + e_{it}$$

Merging the data from various waves of the Public Use Microdata Samples (PUMS) and the Current Population Surveys (CPS), the estimated values of the regression coefficients by Borjas (2003) were respectively equal to  $-0.288$  (*s.e.* 0.115) and  $-0.741$  (*s.e.* 0.646). In turns, these measures imply that  $\sigma_X$  is around 3.5 and  $\sigma_E$  is about 1.3. Therefore, the evidences indicate that workers with different level of experience are imperfect substitutes. Furthermore, there is a greater degree of substitution among workers with the same education but different experience than between workers who differ by the education level. Borjas (2003) then used the estimated wage elasticities to simulate the impact of the immigrants influx to U.S. between 1980 and 2000. On average, the effect of immigration on the native wages has been negative and equal to  $-0.032$ , meaning that an increase of 10% in the immigrant share has produced a reduction in wages by about 3%. The effect has been greater for the highest and the lowest educated group of workers because immigrants to U.S. clustered in these two categories.

Ottaviano and Peri (2006) built their analysis on the same model presented here. They added two important elements which significantly modify several results of the related study. First of all they stressed the importance of using a *general equilibrium* framework to evaluate the effects of immigration on wages of workers who differ by education, experience and nationality.

In particular, they suggested to take into account the interaction between all type of workers as well as between labour and capital. On the contrary, in the paper by Borjas (2003) capital was ignored and considered fixed. The complementarity between labour and capital implies that, if investments do not adjust to the increase in labour supply, the labour share of income decreases in favour of capital owners. Second, they removed the assumption that foreign- and U.S.- born workers are perfect substitutes within the same education-experience group and they tested it empirically. So, to the theoretical model presented above, Ottaviano and Peri (2006) added another level of labour aggregation and  $L_{ijt}$  is given by

$$L_{ijt} = [\varphi_{Hijt}H_{ijt}^\mu + \varphi_{Fijt}F_{ijt}^\mu]^\frac{1}{\mu} \quad (2.4)$$

where  $H_{ijt}$  and  $F_{ijt}$  denote respectively the number of native and foreign workers with education  $i$ , experience  $j$  at time  $t$ . The elasticity of substitution between natives and immigrants is ruled by  $\mu = 1 - \frac{1}{\sigma_N}$ . While Borjas (2003) assumed  $\sigma_N \rightarrow \infty$ , Ottaviano and Peri (2006) tested in the data whether the regression coefficient of the following model is effectively equal to zero:

$$\log\left(\frac{\omega_{Hijt}}{\omega_{Fijt}}\right) = \delta - \left(\frac{1}{\sigma_N}\right)\log\left(\frac{H_{ijt}}{F_{ijt}}\right) + u_{ijt}$$

The various estimates of the regression coefficient obtained by Ottaviano and Peri (2006) were significantly different from zero. They indicate that  $\sigma_N$  assumes a determined value and strongly support the idea of imperfect substitutability between U.S.- and foreign-born workers. Furthermore, the estimates suggest a value of  $\sigma_N$  between 5 and 10, hence reasonably greater than the substitutability between educational groups, and only slightly higher than the substitutability between experience groups. Then they used the estimated value of  $\sigma_N$  to simulate the effect of the migration influx to the U.S. from 1990 to 2004 on wages and some of them are presented in Table 1 together with the results for  $\sigma_N = \infty$ .

The preferred estimates by Ottaviano and Peri (2006) are those for  $\sigma_N = 6.6$  and a perfectly elastic supplied capital (bottom right panel of Table 1), while the results by Borjas (2003) are in line with those for  $\sigma_N = \infty$  and a fixed capital (top left panel of Table 1). The short-run effect implies a partial redistribution of the national income in favor of capital owners and a greater negative impact on all type of workers. The adjustment of the investments in the long-run attenuates the negative effect of immigration on wages in general and in the case of perfect substitutability between immigrants and natives it is almost null. Indeed, the hypothesis of a constant return-to-scale production function implies that the migration shock cannot be pareto-improving, unless it changes the technology parameters. In the current framework, immigration has simply a redistributive effect which increases the wage dispersion in all cases. Furthermore, the effect of immigration can be considered positive on average if we take into account only

Table 2.1: Calculated Percentage Change in Real Wages due to Immigration  
Inflows: 1990-2004

Short-run Effects (Fixed K)			
$\sigma_N = \infty$		$\sigma_N = 6.6$	
High school dropout	-7.9	High school dropout	-4.8
High school	-2.6	High school	-1.2
College dropout	-1.2	College dropout	-0.2
College	-5.2	College	-2.9
<b>Average</b>	<b>-3.5</b>	<b>Average</b>	<b>-1.9</b>
<b>Immigrants</b>	<b>-4.7</b>	<b>Immigrants</b>	<b>-23.4</b>
Long-run Effects ( $\frac{\dot{K}}{K} = 0$ )			
$\sigma_N = \infty$		$\sigma_N = 6.6$	
High school dropout	-4.2	High school dropout	-1.1
High school	1.0	High school	2.4
College dropout	2.4	College dropout	3.4
College	-1.5	College	0.7
<b>Average</b>	<b>0.1</b>	<b>Average</b>	<b>1.8</b>
<b>Immigrants</b>	<b>-0.9</b>	<b>Immigrants</b>	<b>-19.8</b>

native wages and we neglect immigrants economic outcomes. However, this is a mistake not only from a moral perspective, but also because of all the economic costs emerging from social and economic exclusion.

Ottaviano and Peri (2006) ignored another important aspect of the model. They developed their analysis in the context of a neo-classical growth model<sup>4</sup> where, thank to the constant returns to scale, we can consider only per-capita variables and conclude that the dynamics of the system follows the population rate of growth. In other words, the immigration shock is absorbed like a standard increase in the number of people. Nevertheless, from every simulation clearly emerges a redistribution from the most disadvantage segment of the income distribution, where immigrants are located, in favor of more advantage native groups. The propensity to consume and to save are different along the income distribution and thus some demand deficits or saving surplus, which are not part of the representative agent model, can arise and they have to be explicitly considered in order for the simulations to be plausible.

Turning back to the substitutability between immigrants and natives within skill-groups, we have to cite another important paper that again tried to empirically measure it, that of Borjas et al. (2008). Actually, the authors

<sup>4</sup>They specifically cited Solow (1956) and Ramsey (1928).



argued that the estimates presented by Ottaviano and Peri (2006) were seriously biased. They demonstrated that including high-school enrolled workers into the category of high-school dropout, like Ottaviano and Peri (2006) did, led to a misspecification problem. Indeed, high-school enrolled workers show less labour-market attachment than high-school dropouts and they exit the market more easily when they face a wage decrease. In other words, they show a greater supply elasticity which biases the estimation of the regression coefficient and leads to the conclusion of imperfect substitutability between immigrants and natives. All the adjusted estimates presented by Borjas et al. (2008) could not reject the null hypothesis and so the assumption of  $\sigma_N = \infty$ .

The reply of Ottaviano and Peri (2008) to these arguments was that of using a simpler classification of educational categories – high- and low-educated workers. The first includes workers with some college or higher education and the second all other workers. This simplification diluted the adverse impact that immigrants have on the lowest and on the highest educated workers (high-school dropout and college graduates) and it arrived again to the conclusion of imperfect substitutability in production.

Besides the empirical debate on the measure of the elasticity of substitution, we need a theory that justifies the imperfect substitutability between immigrants and natives. This arrived with the contribution of Peri and Sparber (2008). In their analysis the authors supposed that the production function combine high-skilled and low-skilled labour. The first requires only communication tasks while the second is a mix of communication and manual tasks. They focused on low-skilled labour which is supplied by native and immigrant workers who differ by their efficiency in the two tasks. By maximizing their returns to labour, natives specialize in jobs which require more language skills while immigrants in jobs with more manual tasks. This job differentiation reduces the competition between the two groups of workers in the labour market and therefore it alleviates the negative impact that immigration can have on native wages. To demonstrate the theoretical prediction the authors regressed the average native supply of manual and communication tasks on the immigrants share across time and states. The results obtained led the authors to conclude that immigration does not bring any negative effects on natives who can relocate in the labour market. Therefore, in order to neutralize the predicted adverse impact of immigration on native wages labour market has to be flexible, meaning in particular low hiring and firing costs.

Nevertheless, imperfect substitutability have been questioned again by Dustmann et al. (2013) with their study on immigration in UK. The authors started from the observation that immigrants' skills substantially downgrade when they arrive in the destination country. Indeed, immigrants are on average better educated than natives but their observed location is at the lower end of the distribution of wages. Their intuition was to identify skill types

with the position in the wage distribution rather than with the educational attainment, and to measure the effect of immigration on the various percentile of the wage distribution. The estimated effects were in line with the observed location on immigrants – while immigration depresses wages below the 20<sup>th</sup> percentile, it contributes to wage growth above the 40<sup>th</sup>. They also found a positive effect on average wage. Immigrants are paid less than their marginal productivity and this give rise to a native surplus, shared by workers and capital owners.

This last study has the advantage to be free from the standard Walrasian hypothesis, according to which workers are divided by homogenous groups and where marginal conditions determine the equilibrium. More realistically, we can imagine that immigrants and natives do not compete in the same labour market not only because of different productivity levels, but also because of different protections, different job opportunities, personal networks, and discrimination.

## 2.4 The location decisions of natives in response to immigration

After the 1965 Immigration Act which changed the face of U.S. immigration, in the political and social debates started to emerge the so called *balkanization hypothesis*. The term balkanization was originally used to describe the process of fragmentation or division of a region into a smaller sub-regions that are often hostile or uncooperative with one another. This reflected the concern that the characteristics of immigrants to locally cluster deterred natives to reside in the same area. In the economic literature, the importance of this issue was not limited to understand the direct question of native location decision and employment opportunities. It was also informative about the validity of performing cross-regional analyses of the wage effects of immigration. We discuss here two seminal contributions to the topic - Card and DiNardo (2000), which has been recalled in Card (2005) and Card (2007), and Borjas (2006).

In the first one the authors analyse the causal relationship between immigrant inflows and native outflows. In particular, what they want to ascertain is if the arrival of one immigrant of a given skill type to a local labour market leads one native of the same skill type to leave. The relative share of a particular skill group is determinant for the real wage of that group, and the authors want to verify if the relocation of natives leave that share unchanged. Given the following decomposition,

$$\Delta \log \left( \frac{P_{ij}}{P_j} \right) = \left( \frac{\Delta M_{ij}}{P_{ij}} - \frac{\Delta M_j}{P_j} \right) + \left( \frac{\Delta N_{ij}}{P_{ij}} - \frac{\Delta N_j}{P_j} \right) \quad (2.5)$$

where  $P_{ij}$  is the number of workers of skill type  $i$  in region  $j$ ,  $M_{ij}$  and  $N_{ij}$

are respectively the number of foreign- and native-born workers of skill type  $i$  in region  $j$ , Card and DiNardo (2000) posit a simple behavioral equation that can be empirically tested:

$$\frac{\Delta N_{ij}}{P_{ij}} - \frac{\Delta N_j}{P_j} = a + b \left( \frac{\Delta M_{ij}}{P_{ij}} - \frac{\Delta M_j}{P_j} \right) + v_{ij}$$

$N_{ij}$  and  $M_{ij}$  keep the same meaning,  $v_{ij}$  is the idiosyncratic error term and  $b$  regulate the causal relationship. If native-born location decisions fully offset immigrant inflows, the coefficient  $b$  is equal to  $-1$ . At the opposite extreme, a value of  $b$  equal to  $0$  implies that the relative share of native-born workers of a particular skill-type does not change in response to the increase in the foreign labour force. The estimates based on the 1970, 1980 and 1990 decennial Censuses show no evidences that native out-migration rises in response to immigrants arrive. Perhaps surprisingly, the estimated value of  $b$  is significantly positive, meaning that native workers are attracted by the same regions where immigrants decide to locate. Therefore, the authors conclude that "[...]the local labour market impacts of unskilled immigration are mitigated by other avenues of adjustment, such us endogenous shifts in industry structure, rather than by rapid adjustments in the native population".<sup>5</sup>

Here we have to underline two facts. The first is that the data available to Card and DiNardo (2000) may not be sufficiently detailed to make emerge the real dynamic of native relocation. As demonstrated by Monras (2015), the share of low-skilled workers decreases in high- and low-immigration states. This reflects the well-known secular increase in education levels. Nevertheless, the native low-skilled population decreases less fast in high-immigration states. This is why in Card and DiNardo (2000) a positive correlation between native- and foreign-born low-skilled workers emerges from the geographic comparison. Endogenous shifts in the labour demand can be the driving forces, as suggested in the conclusions. Monras (2015) also shows that in the two years after the migration shock, the share of native low-skilled workers stay stable or even increases slightly in low-immigration states for the effect of internal relocation. This dynamic is too fast to be captured by the decennial dataset of Card and DiNardo (2000). Second, the theoretical framework in Card and DiNardo (2000) does not represent the causal relationship between migration inflows and native-born location decisions. Instead, it refers to the so called *skating rink model* - each new immigrants knocks a native off the ice. Suppose that native labour force responds to wage differentials moving across regions even before the arrival of the foreign workers. Then, what we have to identify is the effect of immigration on those movements, and not only on the decisions of leaving a particular labour market. In other words, the aim of the study should be the counterfactual distribution of native labour force across regions. Clearly this goal

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<sup>5</sup>see Card and DiNardo (2000) pag. 366

is very difficult to achieve. Borjas (2006) tries to give a contribution in this direction. His theoretical framework jointly models the native-born location decisions and wage determination in local labour markets. Let us see it in details.

The wage for skill group  $i$  in region  $j$  at time  $t$  is given by:

$$\omega_{ijt} = X_{ijt} L_{ijt}^\eta \quad (2.6)$$

where  $X_{ijt}$  is a demand shifter which we suppose that is both time- and region-invariant, so  $X_{ijt} = X_i$ . This simplification implies that wages for skill group  $i$  differ across regions only because the stock of workers is not evenly distributed geographically. We suppose that immigration occurs at time  $t = 0$  and we define the following quantities:

$N_{ij,-1}$  the number of native workers of skill type  $i$ , in region  $j$ , in the pre-immigration period,

$\Delta N_{ijt}$  the net migration of natives belonging to skill group  $i$  between  $(t - 1)$  and  $t$  experienced by region  $j$ ,

$M_{ijt}$  the influx of immigrants of skill type  $i$  to region  $j$  at time  $t$ .

The immigration flows continue in the same number every year, so  $M_{ijt} = M_{ij}$ . We further suppose that immigrants do not migrate internally within the United States. We can rewrite the labour demand function given by Equation (2.6) as follow:

$$\log \omega_{ijt} = \log X_i + \eta \log [N_{ij,-1} + (t + 1)M_{ij} + \Delta N_{ij0} + \dots + \Delta N_{ijt}] \quad (2.7)$$

which can be approximated by:

$$\log \omega_{ijt} \approx \log \omega_{ij,-1} + \eta [(t + 1) m_{ij} + \nu_{ij0} + \nu_{ij1} + \dots + \nu_{ijt}] \quad (2.8)$$

where we have divided every term by  $N_{ij,-1}$  and we put  $\nu_{ijt} = \frac{\Delta N_{ijt}}{N_{ij,-1}}$ . This last term is the net migration rate of natives. We assume that the internal migration response of native workers occurs with a lag:

$$\nu_{ij0} = \varepsilon (\log \omega_{ij,-1} - \log \bar{\omega}_i) \quad (2.9)$$

where  $\varepsilon$  is the labour supply elasticity and  $\bar{\omega}_i$  is the theoretical equilibrium wage observed throughout the national economy once all migration response have been made. Given  $\bar{N}_i$  the number of native workers of skill type  $i$  that would live in each region since the theoretical equilibrium wage is attained, the previous equation can be rewritten as:

$$\nu_{ij0} = \eta \varepsilon \lambda_{ij} \quad (2.10)$$

with  $\lambda_{ij} = \log \left( \frac{N_{ij,t-1}}{N_i} \right)$ .

Native net migration continues concurrently with the immigrant influx and from  $t = 1$  ahead it is shown to be equal to:

$$\nu_{ijt} = \eta\varepsilon (1 + \eta\varepsilon)^t \lambda_{ij} + [1 - (1 + \eta\varepsilon)^t m_i] - [1 - (1 + \eta\varepsilon)^t m_{ij}] \quad (2.11)$$

with  $m_i = \frac{M_i}{N_i}$ , and  $M_i$  gives the per-period flow of immigrants in skill group  $i$ .

Unfortunately the available data are not sufficiently detailed to allow Borjas (2006) to estimate the dynamic evolution of the native workforce and the wage structure as summarized by Equations (2.8) and (2.11). Nonetheless, the effects of many variables are absorbed by including appropriately defined vectors of fixed effects in the regressions. The resulting empirical model is then estimated using three different definitions for the geographic area  $j$ : the Census division, the State, and the metropolitan area. The conclusion to draw by comparing the three estimates is that the negative impact of immigrant share variable on native net migration gets numerically stronger the smaller the geographic boundaries of the labour market. Symmetrically, the measured wage impact of immigration gets larger as one expand the size of the market.

Although Borjas (2006) gives important theoretical insights, the empirical evaluation poses severe limitations. To understand the main shortcoming of the model we follow Peri and Sparber (2011). They rewrite the regression estimated by Borjas (2006) as follow:

$$\begin{aligned} \log N_{ijt} = & \alpha + \beta \left( \frac{M_{ijt}}{N_{ijt} + M_{ijt}} \right) + \gamma X_{ijt} + s_i + r_j + \tau_t \\ & + (s_i \times r_j) + (s_i \times \tau_t) + (r_j \times \tau_t) + \xi_{ijt} \end{aligned}$$

It is easy to notice that  $N_{ijt}$  appears at both sides of the equation. It raises the dependent variable while decreasing the explanatory variable. This would induce a negative correlation independently of any true causal relationship.

Peri and Sparber (2011) focuses on how specify the explanatory and dependents variable in the regression model that aim at estimating *displacement* - how many native workers respond to the arrival of a single immigrant by leaving their region of residence. The authors simulate a world in which they know whether or not displacement exists. They assume the data generating process given by the following model

$$\Delta N_{ijt} = \alpha + \beta \Delta M_{ijt} + u_{ijt}$$

and they create several dataset with unique assumed values of  $\beta$ . Negative values, according to their definition, imply displacement. Positive values imply that immigrants somehow attract natives. The results make the authors

to conclude that Borjas (2006) specification exhibits a large bias in favor of displacement. Despite they succeeded in identifying the formal problem in the estimates by Borjas (2006), they fail in understanding the theoretical difference of the work. As highlighted before, Borjas (2006) does not refer simply to the skating rink or displacement model. Also Beine and Coulombe (2014) show that the reaction of domestic workers in terms of internal mobility materializes mainly through the decrease in the immigration on natives in the provinces receiving more immigrants. On the contrary, Peri and Sparber (2011) seek to verify if natives response to immigration by emigrating out of the region where immigrants settle, and their test critically depend on the theoretical assumptions made.

Whether or not the local labour markets adjust to immigration through relocation is still debated and with it the validity of the area-approach to the impact of immigration on wages. Anyway, it remains to evaluate another important channel of adjustment which is often mentioned as a driving force - the change in labour demand. To conclude as in Borjas (2006), we can say "*[...]Although native migration can explain a good part of the adjustment mechanism, it is likely that flows of good or capital are also important ingredients in the story*".<sup>6</sup>

## 2.5 The adjustment of the labour demand to supply shocks

The negligible effect of immigration on native wages can have one last important explanation – the labour demand response. The channels through which we can observe an increase in the labour demand are two. First, the greater availability of unskilled workers can induce labour-intensive industries in expanding their production. This is a well known result of the international trade theory. The Heckscher-Ohlin model concludes that, given technologies and preferences, the different factor endowments will lead to a specialization (full or partial) in the production of the good that uses more intensively the relatively more abundant factor.<sup>7</sup> Therefore, after a migration shock we should observe a change in the output mix in favor of industries that employ unskilled labour more intensively. Second, due to the substitutability between unskilled labour and some kind of capital, the increase in the supply of low-skilled workers can lead to an endogenous technological change that is capital-saving. In other words, after a migration shock we should observe a more intensive use of unskilled labour.

The theory behind the second effect is offered by Lewis (2011), which analyses the effect that skill mix has on technology use, rather than the more commonly studied reverse relationship. Focusing on manufacturing

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<sup>6</sup>see Borjas (2006) pag. 225

<sup>7</sup>For a thorough discussion of the HO model see Feenstra (2015).

production, the final output is a function of automation machinery ( $K_M$ ) and two types of labour – high skill ( $H$ ) and low skill ( $L$ ):

$$P = A(K_M^\theta - L^\theta)^{\frac{\alpha}{\theta}} H^{1-\alpha}$$

where  $\theta$  and  $\alpha$  are the parameters that regulate the substitutability and complementarity between the various inputs, like in a more general CES production function. For a positive value of  $\theta \leq 1$  machinery and unskilled labour are substitutes in production. This implies that an increase in the supply of low skilled labour that reduces its rate of return will make machinery relatively more costly. In turn, this will lead the demand for production factors to shift in favor of unskilled labour. This adjustment mechanism will persist till the factors relative price will come back to the original level. In other words, the model predicts that the higher the substitutability between low-skill labour and automation, the less sensitive relative wage will be to local changes in skill mix induced by immigration.

Both theories have been tested by the empirical literature, and what follows tries to review them. One of the first attempt to measure the relative contribution of the two effects – change in output mix and change in production technology – is that of Quispe-Agnoli and Zavodny (2002). The two authors examine the change between 1982 and 1992 in value added in the low-skilled sector, as well as the change in capital investments and labour productivity, by regressing the various dependent variables on a measure of immigration to US states. Because of the concern that the measure of output used – value added – can confound changes in price and quantity, the change in fraction of employment in the low-skilled sector is also examined. The results indicate that immigration inflows do not affect output mix between low- and high-skilled manufacturing industries across states. However, it appears that the fraction of employment in low-skilled manufacturing industries has slightly increased and at the same time productivity has risen more slowly in states that received more immigrants relative to other states.

The study of Hanson and Slaughter (2002) arrives to different conclusions. The two authors suggest an exercise for examining the labour-market adjustment in open economies – a decomposition of state factor-supply changes into portions due to changes in traded and non-traded output and to national and state-specific changes in industry production techniques. In particular, in each state factor-market equilibrium implies:

$$V = CX \tag{2.12}$$

where  $V$  is a vector of factor supplies,  $X$  is a vector of outputs, and  $C$  is a matrix of unit factor requirements (industry production techniques). Taking the first differences, they obtain:

$$\Delta V = \bar{C}\Delta X + \Delta C\bar{X} \tag{2.13}$$

where  $\bar{C}$  and  $\bar{X}$  represent across-time means of unit factor requirements and outputs. The first term of the right-hand-side of equation indicates output mix changes, while the second term expresses production-techniques changes. In order to distinguish between output adjustment in traded and non-traded sectors and to separate changes in production technique attributable to national general shocks from those idiosyncratic to a state, the authors further decompose (3.2) and they get:

$$\Delta V - (\bar{C}\Delta X^{NT} + \Delta C\bar{X}^{NT}) = \bar{C}\Delta X^T + \Delta C_G\bar{X}^T + \Delta C_I\bar{X}^T \quad (2.14)$$

The quantities presented in the previous decomposition are measured with data on employment and value added by state, industry, and educational category. The resulting descriptive analyses indicates that "[...] *state change in employment are accommodated largely through generalized changes in production techniques and through changes in the output mix of traded good. State-specific changes in production techniques, in contrast, play a relatively small role in factor absorption.*"<sup>8</sup> Unfortunately, the study lack of an inferential analyses and a more rigorous exam is conducted only on the correlation between state technologies to corroborate the importance of general technological changes in factor-supply shocks absorption. Nonetheless, besides the numerous limitation of the model, the analytical decomposition introduced has shown the way for further empirical analyses.

A more refined version of the just analysed decomposition is offered by Lewis (2003). It uses only data on employment and it allows to better identify the two distinct effects because it ignores any measures of value added. We review here the example presented in Card and Lewis (2007).

Let  $s^d(c)$  being the *fraction of dropout workers employed in city c*. By definition, it is equal to:

$$s^d(c) = \frac{1}{N(c)} \sum_i N_i^d(c) \quad (2.15)$$

where  $N(c)$  is the total employment in city  $c$  and  $N_i^d(c)$  is the number of dropouts employed in industry  $i$  in city  $c$ . We can rewrite the definition in (2.15) as:

$$s^d(c) = \frac{1}{N(c)} \sum_i N_i^d(c) = \sum_i \frac{N_i(c)}{N(c)} \frac{N_i^d(c)}{N_i(c)} = \sum_i \lambda_i(c) s_i^d(c) \quad (2.16)$$

where  $\lambda_i(c)$  is the employment share of industry  $i$  in city  $c$  and  $s_i^d(c)$  is the share of dropout workers in industry  $i$  in city  $c$ . It follows that the gap between the share of dropouts employed in city  $c$  and the national mean can

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<sup>8</sup>see Hanson and Slaughter (2002) p. 19



be rewritten as a sum of a *between-industry (or extensive) component*,  $B(c)$ , a *within-industry (or intensive) component*,  $W(c)$ , and an interaction term,  $I(c)$ . In formula:

$$s^d(c) - s^d = B(c) + W(c) + I(c) \quad (2.17)$$

where

$$B(c) = \sum_i s_i^d [\lambda_i(c) - \lambda_i] \quad (2.18)$$

$$W(c) = \sum_i \lambda_i [s_i^d(c) - s_i^d] \quad (2.19)$$

$$I(c) = \sum_i [s_i^d(c) - s_i^d] \times [\lambda_i(c) - \lambda_i] \quad (2.20)$$

The traditional effect predicted by the Heckscher-Ohlin model is captured all by the between-industry component. In other words, an increase in the share of dropout workers in an area is absorbed by a growth in the employment share of low-skilled industries. On the contrary, following the model by Lewis (2011), we expect to measure a more important within-industry effect, that is an increase in the relative fraction of dropouts in each industry.

In order to evaluate the relative weight of the two effects, Card and Lewis (2007) estimate a series of cross-city regressions of the form:

$$B(c) = a_B + b_B [s^d(c) - s^d] + e_B(c)$$

$$W(c) = a_w + b_W [s^d(c) - s^d] + e_W(c)$$

$$I(c) = a_I + b_I [s^d(c) - s^d] + e_I(c)$$

Because equation (2.17) holds an identity, the coefficients  $b_B$ ,  $b_W$ , and  $b_I$  sum to one. The estimated values are respectively 0.22, 0.76, 0.02, revealing that most of the migrant inflows to US states have been absorbed by city-specific-within-industry increase in the use of unskilled labour. On the contrary, HO-style changes in industry structure have played a relatively small role.

The question "how do new vacancies are created when supply shocks occur?" is also at the center of the study conducted by Dustmann and Glitz (2015). The focus is posed at the firm level. Within an industry, heterogeneous firms operate, meaning that they produce the same output with different technologies. With this in mind, it easy to imagine that a scale adjustment between firms can be confounded with a factor intensity adjustment within an industry. This occurs if the rate of growth of a firm is correlated with the production technology used. At the aggregate level the contribution of new firms entering the production process and that of dying firms leaving it is also ignored. Therefore the decomposition offered

by Lewis (2003) should be estimated at the unit level. This is exactly what-Dustmann and Glitz (2015) do. Furthermore, they take into account also the price effect, that is the variation in wages. More precisely, the authors estimate through a regression model the effect of immigration on wages separately for the tradable and non-tradable sector. What emerges is that in the non-tradable sector the effect of a migration inflow on the wage of the similar educated group of workers is significantly negative. In that sector the price effect totally absorbs the supply shock and there is no change in output mix or in production technology. On the contrary, the estimated effect of immigration on wages in the tradable sector is effectively null. Therefore a further analysis of the labour demand response is possible and necessary.

The distinction between the tradable and the non-tradable sector appears to be fundamental in studies that try to estimate the effect of immigration on the domestic labour market conditions. The effect on wages and unemployment depends critically on the good market structure and an analysis that focuses only on the degree of competition in the labour market is at least short-sighted.

From the estimation of the decomposition by Lewis (2003) at the firm level with social security record data in Germany, Dustmann and Glitz (2015) conclude that 70% of the change in skill-mix employment is absorbed by changes in relative factor intensities, and another 18.1% by the contribution of new firms. One explanation for this last effect can be due to the fact that the use of a more labour-intensive technology can allow small firms to overcome credit constraints. Indeed, if some inefficiencies exist in the absorption of labour supply shocks, they can be addressed also to the credit market. Nonetheless, before analyzing it, the production decisions of firms have to be studied more carefully. The economic literature is still at an early stage and there is ample room for further researches.

## 2.6 Conclusions

Based on the reviewed contributions, it is useful to make some concluding remarks. In particular, in order to give some policy suggestions, we summarize the results of the existing literature making explicit the consequences of the immigration shock for each group involved in the adjustment process. The first one, obviously, is composed by the native workers. Their labour market opportunities and conditions are the main subject of all the cited papers. The common conclusion is undeniably a greater wage dispersion after the migration shock. Nevertheless, it is worth noting that an analysis of the causal relationship between migration and the wage inequality indicates immigration to be not the major responsible of the increased wage gap witnessed in the last decades (Card, 2009).

The debated point in the literature is the immigration effect on the *aver-*

*age wage*. The studies reporting a positive or null effect, among which that of Peri and Sparber (2008), are based on the idea that immigration induces native to specialize. Thanks to a greater productivity, they get a higher wage. The results of other analyses (e.g Foged and Peri, 2016) suggest that the specialization pattern does not occur within the same firms for which natives worked before the immigration shock. Although, it takes place first by loosing the job and later by finding one better. This is why the policy conclusions of these studies are in favour of a more flexible labour market which can thus spread this positive effect. The underlying hypothesis is that inefficiencies reside only in the labour market, while in the goods market everything works as expected. Actually, the crucial assumption for a null effect of immigration on the average wage is the perfect elasticity of capital supply. Various studies have analysed the effect of immigration on the wages of native workers separately for the tradable and non-tradable sector (Borjas and Ramey, 1995; Cortes, 2008), clearly characterized by a different degree of competition between firms. Only the first one follows the "Factor-Price-Equalization" hypothesis, while in the second one the adjustment process occurs through wages. The reaction of investments to labour supply shocks, or more in general the change in the labour demand, is not yet well studied and there is ample room for further research.

The second group involved in the adjustment process following the migration shock is that of foreign workers. Every analysis agrees on the fact that they face worse conditions because of the increased competition in the labour market. Nevertheless, many authors seem not to be concerned. They conclude that foreign workers can gain in terms of social networks and anyhow they get a greater wage with respect to that in the origin country (Ottaviano and Peri, 2008). We have already stressed that this conclusion has the limit to not consider the economic and political consequences that can emerge because of a segmented society.

The third group is that of capital owners. From the analysis of the existing literature, what convince us most is that the labour demand accommodates the labour supply by a more intensive use of the relative more abundant factor – the low-skilled workers. Instead, the adjustment through an increase in the output of low-skilled firms seems a lesser important effect. From the theoretical point of view, we can expect the opposite only if the immigration shock induces also a change in the aggregate demand. Nonetheless, the redistribution of income from the more disadvantage part of the distribution – with a higher marginal propensity to consume – to the more advantage contradicts this hypothesis.

To conclude, the increased inequality for native workers, the greater poverty and the social segregation of the foreign population, the possible exploitation of power positions by firms or the inefficient reaction of the demand side of the labour market, all needs the intervention of the policy maker that cannot leave the market to freely adjust to the shock. In particular, it

is required to foster the economic and social inclusion of the newly arrived by means of integration policies, in education and in the labour market. The labour conditions of low-skilled natives need to be enhanced through labour market policies and investments must be encouraged to foster the economic growth.

## Chapter 3

# The Labour Demand Response to Supply Shocks. The Indirect Effect of Immigration

The economic literature is debating from long time on the identification of the impact of immigration on native wages and recent studies seem to validate the result of an average null effect. Nonetheless, the adjustment mechanisms of the labour market need to be further analysed. In particular, we want to study how firms respond to an increase in the foreign labour supply, focusing on the Italian case. We contribute to the ongoing debate by replicating the methodology of Dustmann and Glitz (2015) with RIL data – a firm-level panel dataset on Italian firms. The aim of the study is to measure to which extent the labour demand accommodates to a supply shock with an increase in the total production or with the adoption of more labour-intensive technologies. Our result – obtained with an instrumental variable approach – shows that the second effect is dominant. In line with the reference literature, the result holds in particular for the manufacturing sector, while in sectors less-exposed to international competition we can suppose a greater effect on prices than on quantities.

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### 3.1 Introduction

The current refugee crisis, which is challenging all the Western economies, demands from researchers a more profound knowledge of the determinants and the potential effects of the phenomenon. Among the challenges that such a big movement of people may pose for the receiving country, there is the effect of foreign-born individuals on the domestic labour market. The economic literature is debating from long time on the identification of the impact of immigration on native wages and recent studies seem to validate the result of an average null effect (e.g Foged and Peri, 2016). Beyond the heterogeneity of this impact on different groups of workers and along the distribution of wages (Card, 2009; Dustmann et al., 2013), also the adjustment mechanisms of the labour market need to be further analysed. In particular, we want to study how firms respond to an increase in the foreign labour supply, focusing on the Italian case.

We contribute to the ongoing debate by replicating the methodology of Dustmann and Glitz (2015) with data from *Rilevazione longitudinale su Imprese e Lavoro* (RIL) – a firm-level panel dataset that contains numerous information about employment and investment of the Italian firms. Italy has long been an emigration country – during the century 1876-1976, 24 millions people left the country and such a big flow has been called the *Italian exodus*. Mainly due to the return of its citizens, at the end of '70s Italy registered for the first time a slightly positive net migration. At that time no constraints on entry existed. The first mass immigration that affected Italy was at the beginning of the '90s, when the Eastern Bloc collapsed and thousands of Albanians crossed the Italian borders. Due to its geographic characteristics, which make Italy very close to Eastern European countries and the arrive of the Mediterranean routes, in that period immigration started to increase also from North Africa. Nowadays refugees coming from Maghreb are at the center of a strongly debated European plan for relocation. Although Italy represents for most asylum-seekers only a landing country, immigration in general increases tremendously from 2007 (OECD, 2017), making Italy a noteworthy case study.

To our knowledge we are the first to study the labour demand adjustment mechanisms in Italy with the use of the decomposition method proposed by Hanson and Slaughter (2002). Furthermore, we are the first – together with Dustmann and Glitz (2015) – to implement it at the firm level, making our estimates more representative. The aim of our study is to measure to which extent the labour demand accommodates to a supply shock with an increase of the total production or with the adoption of more labour-intensive technologies.

The channels through which we can observe an increase in the labor demand are two. First, the greater availability of unskilled workers can induce labor-intensive industries in expanding their production. This is a well

known result of the international trade theory (i.e. Rybczynski effect). Second, due to the substitutability between unskilled labor and some kind of capital, the increase in the supply of low-skilled workers can lead to an endogenous technological change that is capital-saving. In other words, after a migration shock we should observe a more intensive use of unskilled labour. Our result – obtained with an instrumental variable approach (Card, 2001) – shows that the second effect is dominant. From 2005 to 2010, low-skilled immigration increased the number of low-skilled workers employed by the Italian firms while the total employment remained quite stable. In line with the reference literature, the result holds in particular for the manufacturing sector, while in sectors less-exposed to international competition we can suppose a greater effect on prices than on quantities.

The paper is organized as follows. In the next section we review the existing studies on the labour demand reaction to an increase in the foreign labour supply. In section 3.3 we illustrate the analytical framework and the empirical strategy. In section 3.4 we present the data and some descriptive statistics. Section 3.5 includes the empirical results and section 3.6 concludes.

## 3.2 Related Literature

One of the main issue of the economic debate on the impact of immigration on the destination labour market has been the effect of foreigners on native wages. Beginning with Borjas (2003), the workhorse of all the subsequent studies has been a standard CES production function – where the labour-factor combines the contributions of workers who differ in education, experience, and potentially immigrant origins. The various disaggregations of  $L$  lead Borjas (2003) and Borjas et al. (2008) to find a negative effect of foreign labour supply on native wages, while Ottaviano and Peri (2006, 2008) a positive one. The two analyses diverge also because of different assumptions made on the supply of capital – fixed the first and perfectly elastic the second. Furthermore, Peri and Sparber (2008) show that the aforementioned positive effect originates because immigrants induce native to specialize in occupations that incorporate more *complex tasks* (for example tasks that require communicative abilities). So that this pattern accomplished, the total output has to increase and similarly the supply of capital.

Various papers are dedicated to the reaction of capital to an increase in the immigrant labour supply. They relate on a more consolidated literature on the complementarity between labour and capital (e.g. Doms and Lewis, 2006) and we are going to review them briefly. Nonetheless, the results remain controversial and our analysis wants to shed new light on the issue, adding some empirical evidence with an important new case study.

According to the existing literature, after a shock that changes the skill

composition of the domestic workforce we can observe two potential effects: an increase in the output of industries that use more intensively the relative more abundant factor or an endogenous technological change that implies a general more intensive use of the relative more abundant factor. We can refer to the former as the *extensive effect* and to the latter as the *intensive effect*.

One of the first attempts to measure the relative importance of the two adjustment channels is that of Quispe-Agnoli and Zavodny (2002). The authors consider a panel dataset of US low-skilled industries covering the period from 1982 to 1992. The linear regressions implemented for various indicators of the industry performances – such as average value added, capital investments, labour productivity and the fraction of employment – highlight firstly no effect of immigration on capital investments and on value added. The latter variable can confound effects on quantities with effects on prices, so the fraction of employment is also analysed. The results show a positive effect of immigrant labour supply on the fraction of employment in low-skilled industries and also a negative effect on productivity. Specifically, the labour productivity has risen more slowly in those States that received more immigrants during the period under analysis.

A similar methodology is used by De Arcangelis et al. (2015) for a panel dataset of the Italian provinces (NUTS3). The IV regressions shows that the manufactures' value added was positively affected by foreign-born workers during 1995-2006. Nonetheless, this measure of the industry performance needs the underlying hypothesis that output prices and wages are given to be reliable.<sup>1</sup> This is a credible assumption with regard to the *tradable sector* – which is exposed to the international competition. Firms in it take advantage of every opportunity of extra-profit. On the contrary, in the *no-tradable sector* the labour market adjust to a supply shock reaching a new equilibrium with a lower wage. This is clearly demonstrated by Cortes (2008) and Dustmann and Glitz (2015).

Hanson and Slaughter (2002) suggest an alternative analytical framework to examine the labour market adjustment in open economy – a decomposition of factor-supply changes into components due to change in output and change in production technology – that has been proposed again by different authors in more refined versions. According to Hanson and Slaughter's results the first effect is dominant, while Lewis (2003) indicates the second as the more relevant one. Card and Lewis (2007) suggest that most of the immigration flows to US States have been absorbed by a within-industry increase in the use of unskilled labor. On the contrary, HO-style changes in industry structure have played a relatively small role. All these studies relate to the US labour market and many others implemented the same methodol-

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<sup>1</sup>The insensitivity of native relative wage to immigration in Italy is tested in appendix (see Arcangelis et al. (2015) p. 58)



ogy to different case studies – Gandal et al. (2004) for Israel, Gonzalez and Ortega (2011) for Spain and Dustmann and Glitz (2015) for Germany.

Nonetheless, heterogeneous firms operate within industries, meaning that they produce the same output with different technologies. With this in mind, it is easy to imagine that a scale adjustment between firms can be confounded with a factor intensity adjustment within an industry. This occurs if the rate of growth of a firm is correlated with the production technology used. Therefore the suggested decomposition should be estimated at the unit level. This is exactly what Dustmann and Glitz (2015) do in their analysis for the German labour market in the period 1985-1995. The estimated results confirm a greater role of the *intensity effect*.

The contribution of the present paper is to implement the suggested decomposition at the firm-level for the Italian case. In the next section we are going to illustrate it in details.

### 3.3 The Analytical Framework

Following the related literature, the analysis of the various adjustment channels of the labour market to a supply shock starts from the decomposition of the equilibrium condition:

$$X = \sum_{j=1}^J C^j(w, A^j) Y^j \quad (3.1)$$

where  $X$  is a vector of factor supplies,  $C^j$  is a vector of unit factor demands and  $Y^j$  is the output of production unit  $j$ . Clearly, the demand depends from factor prices  $w$  and the technology used  $A^j$ .

Totally differentiating (3.1), we obtain all the possible adjustment mechanisms through which the labour demand accommodate to a supply shock:

$$dX = \sum_{j=1}^J dC_w^j(w, A^j) Y^j dw + \sum_{j=1}^J dC_{A^j}^j(w, A^j) Y^j dA^j + \sum_{j=1}^J C^j(w, A^j) dY^j \quad (3.2)$$

In other words, after a change from the supply side, the equilibrium is reached again through three different channels or three potential effects of immigration.

First, an impact on wages, which can be defined as the *redistributive effect*. The average wage decreases and the labour market reaches a new equilibrium along the demand curve. Firms employ labour at lower costs and this situation may become stable in case of scarce competition in the goods market. Cortes (2008) and Dustmann and Glitz (2015) – focusing on

the non-tradable sector – find this result. On the contrary, for the tradable sector we can suppose that the *Factor Price Equalization* hypothesis holds and thus we should observe an upward shift of the labour demand curve. This is coherent with the negligible effect of foreign labour supply on native wage and it is due to the following two (alternative) mechanisms.

Second, an impact on the technology used, which can be defined as the *intensity effect*. Given the relative abundance of low-skilled labour, firms adopt in general more labour-intensive technologies. This effect is common to all firms in the tradable sector and it is not industry-specific. From a theoretical point of view, this is represented by a rotation of the isoquant in favour of a relative more intensive use of labour, while the slope of the isocost remains unchanged. More specifically, the slope of the isocost is due to the average wage, which – under the FPE hypothesis – is fixed. However, the relative wage of the more abundant skill-group of workers decreases and it induces a technological change.

Third, an impact on production output which can be defined as the *scale effect*. Thanks to the comparative advantage of labour-intensive industries, firms in these sectors may increase their output. Similarly to the previous effect, this implies a new labour-market equilibrium with an higher employment and the same level of wage. Theoretically, this translates in an upward shift of the isocost and the allocation of production to an higher isoquant. The well-known result of the Heckscher-Ohlin model of international trade theory predicts exactly this effect.

We focus on the tradable sector, in which the first channel is effectively null. Therefore, we can rewrite (3.2) for a particular skill-group  $i$  as follows:

$$\frac{dX_i}{X_{i_0}} = \sum_{j=1}^J \frac{C^j Y^j}{X_{i_0}} \frac{dC_{A^j}^j}{C^j} + \sum_{j=1}^J \frac{C^j Y^j}{X_{i_0}} \frac{dY^j}{Y^j} \quad (3.3)$$

where  $X_{i_0}$  represents the labour supply of skill-group  $i$  in the base period, while the other variables hold the same meaning.

The common term  $\frac{C^j Y^j}{X_{i_0}}$  represents the demand for labour type  $i$  in production unit  $j$  over the total supply of skill-group  $i$  at the base period. It can be approximated by  $\alpha_{i_0}^j = \frac{X_{i_0}^j}{X_{i_0}}$ , that is the relative employment of skill-group  $i$  in production unit  $j$  in the base period. In other words, we weight the contribution of each firm by its relative size with respect to total employment. Similarly, we approximate  $\frac{dC_{A^j}^j}{C^j} \approx \frac{\Delta X_i^j}{X^j}$ , namely the percentage change the employees of skill-group  $i$  relative to total employment in production unit  $j$ , and  $\frac{dY^j}{Y^j} \approx \frac{\Delta X^j}{X^j}$ , that is the percentage change of total employment of production unit  $j$ . Thus, equation (3.3) becomes:

$$\frac{\Delta X_i}{X_{i_0}} = \sum_{j=1}^J \alpha_{i_0}^j \frac{\Delta X_i^j}{X^j} + \sum_{j=1}^J \alpha_{i_0}^j \frac{\Delta X^j}{X^j} + \sum_{j=1}^J R_i^j \quad (3.4)$$

Where the first component shows the *intensity effect*, the second the *scale effect*, and the  $R_i^j$  is the residual term and it represents the interaction of the other two.<sup>2</sup> The empirical strategy that we are going to illustrate in what follows will try to assess the relative importance of the two channels.

### 3.3.1 The Empirical Implementation

We proceed now by regressing each component of the previous decomposition on the relative change of labour supply. In other words, in order to evaluate the relative importance of the various adjustment channels we relate them one to one with the variation in the local labour market supply – the left-hand side of the equilibrium decomposition. We consider the local labour market as relative to a specific region and a particular industrial sector. So for instance, the equation for the scale effect is given by:

$$\sum_{j=1}^J \alpha_{i_0}^j \frac{\Delta X_{rs}^j}{X_{rs}^j} = \psi_i + \rho_r + \sigma_s + \beta_1 \frac{\Delta X_{ir}}{X_{i_0,r}} + \epsilon_{ir} \quad (3.5)$$

The total change in employment of region  $r$  and sector  $s$ , weighted for the relative employment of skill-group  $i$  in the base period, is related to the variation of skill-group  $i$  supply in region  $r$  and sector  $s$ .  $\psi_i$ ,  $\rho_r$ , and  $\sigma_s$  are skill-group, region, and sector fixed effects, capturing the heterogeneity of worker, geography, and sector units.  $\epsilon_{ir}$  is the error term.  $\beta_1$  represents the proportion of the supply shock that is absorbed by a change in the relative size of firms, i.e. what we have called the *scale effect*.

The same estimating equation is then implemented for the other two channels – the *intensity effect* and the residual term. In the first case, the dependent variable becomes the relative change of employees of skill-group  $i$  and in the second one the interaction of the other two components. The underlying decomposition – which holds as identity – makes the estimated coefficients to sum to one. Therefore each regression coefficient expresses the relative contribution of the various mechanisms in absorbing local labour market supply shocks.

The level of the analysis is the Italian regions (NUTS2), sectors are distinguished by ATECO07 system, and workers are divided in three skill-groups: low-, medium- and high-skilled. The first includes high-school dropout workers, the second is the group of high-school graduates and the third encompasses who attended the college. Regressions are estimated using the OLS method.

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<sup>2</sup>For the derivation of the labour market equilibrium decomposition see Appendix A

### 3.3.2 The Identification Strategy

What we have to notice is that from both sides of the estimating equations (see e.g. equation 3.5) we have the same variable, but differently specified. This implies that by construction the independent variable is endogenous to the model and the estimated coefficients have no statistical meaning. To overcome the limit of the OLS method, we can use an instrumental variable approach. The idea is that of making use of the well-known network instrument proposed by Card (2001) in order to capture only the exogenous part of supply shock induced by immigration.

In general, this instrumental variable is applied in migration studies to predict the current immigrant share with the past one. There are various issues that make the present immigration a biased regressor. For instance, immigrants can locate where the labour demand is growing so that a comparison between areas with different immigration share would show no effect of foreign labour force on labour market outcomes. The same applies to our specific case – immigrants can locate in expanding regions, so that there could be a spurious correlation between the current immigration in a region and the performance of firms in the same area.

A common feature of migration flows is that the new immigrants tend to settle where previous immigrants already live (Bartel, 1989). Sharing experiences and information about the new place of residence are all advantages that reduce the cost of movement. We can then use the past location to predict the exogenous part of current immigration – that part that depends from the network between people and not from the actual conditions of local labour markets.

In formula, our instrument is defined in the following way:

$$z_{ir} = \frac{\sum_c \lambda_{cr} \theta_{ci} \Delta I_c}{X_{i_0,r}} \quad (3.6)$$

The current probability of being of skill-group  $i$  and living in region  $r$  is proportional to the probability of belonging to ethnic group  $c$  and living in region  $r$  in 1991,  $\lambda_{cr}$ , and to the probability of belonging to ethnic group  $c$  and being of skill-group  $i$  in the current period,  $\theta_{ci}$ .  $\Delta I_c$  is the actual flow of immigrants of ethnicity  $c$  and  $X_{i_0,r}$  is the skill-group  $i$  labour-supply in the base period. Differently from most papers that share this instrumental variable, we use it in the first stage to regress the overall labour-supply.

The exogeneity of the instrument relates to the specific history of the phenomenon. From one hand, the current flow is calculated on the years 2005-2010. This is a very crucial period for the Italian immigration history. Indeed, as explained before, in 2007 immigration increased tremendously – because of the agreement of free movement of workers from Bulgaria and Romania (OECD, 2017) – making our case study an important occasion to evaluate the impact of an immigration shock. On the other hand, the base

period has to refer sufficiently in the past, so that to consider the previous immigrant location independent from current local conditions. We have chosen the year 1991. The beginning of the '90s – consequently the collapse of the Eastern Bloc – is the period when Italy faced for the first time a mass arrival. From that date to the present, two important policy shocks changed significantly the legislation on immigration, so that they make our instrument reasonably exogenous to the current conditions. In 1998, *temporary residence centers* were established to deter illegal immigration. Immigrants who arrived in Italy without a Visa were held and were not allowed to freely move on the territory. The legislation became even more strict in 2002, when the possibility of an *immediate expulsion* was set up.

### 3.4 Data and Descriptive Statistics

The main dataset used to implement the analysis is the *Rilevazione longitudinale su Imprese e Lavoro* (RIL), a panel dataset provided by the ISFOL research centre. It contains detailed information on the employment, investments, and other characteristics of Italian firms. We consider the years 2005 and 2010 for the aforementioned motives and we keep only firms that are present in both waves. This is because if a firm exits the sample we cannot distinguish the death of that firm from attrition. Similarly, when a new firm enters we do not know if it is a newly constituted firm or just a newly sampled one. The survey concerns approximately 22,000 firms and the panel size of the sample is about half of the full size. It is representative of the Italian firms in all industrial sectors apart from agricultural. We focus on the tradable sectors, especially on manufacturing, so we can neglect it.

More specifically, by firm we know the total number of employees and the number of employees for each skill-group. Skills are identified by occupations and divided in three groups. We do not know the ethnic origin of immigrant workers. Therefore, in order to define our instrumental variable we take data of another survey – the *Rilevazione sulle Forze Lavoro*. It is provided by the Italian National Statistics Institute from the 2004 every three months. We consider the first quarter both for 2005 and 2010. In this dataset skills are defined by the education, grouped in order to be coherent with the skill classification of the main dataset.

Immigrants are divided in nine ethnic groups, which distribution in terms of importance and skill is reported in tables (3.1) and (3.2). As expected, the most numerous groups are those of Central-Eastern Europe and North Africa.

Ethnic groups are classified based on the categories of the other dataset that we use – the Italian census data. In it we can find information about the allocation of immigrants in 1991.

In general, around 90% of the Italian immigrants falls in the low-skilled

Table 3.1: Characteristics of immigrant ethnic groups, 2005

	Share of Immigrants	Low-Skilled	Medium-Skilled	High-Skilled
Central and Eastern Europe	36.36	93.56	1.58	4.85
North Africa	18.21	94.07	2.17	3.75
Asia	14.43	92.77	0.75	6.48
Africa others	7.31	93.10	1.97	4.93
Central and South America	7.16	88.94	2.01	9.05
Europe 12	6.70	60.22	5.38	34.41
Europe others	5.47	71.05	6.58	22.37
North America	2.59	81.94	.	18.06
Europe EFTA	1.76	73.47	4.08	22.45
All Immigrants	100.00	89.06	2.16	8.78

Author's elaboration on RCFL (ISTAT) 2005

Table 3.2: Characteristics of immigrant ethnic groups, 2010

	Share of Immigrants	Low-Skilled	Medium-Skilled	High-Skilled
Central and Eastern Europe	43.25	94.41	1.43	4.16
North Africa	14.86	93.19	1.24	5.57
Asia	14.67	90.50	2.06	7.44
Europe others	8.67	81.67	3.64	14.70
Central and South America	6.65	86.76	2.57	10.67
Africa others	6.41	94.88	1.02	4.10
Europe 12	3.60	58.39	4.01	37.59
North America	1.27	88.66	1.03	10.31
Europe EFTA	0.60	63.04	4.35	32.61
All Immigrants	100.00	90.51	1.84	7.65

Author's elaboration on RCFL (ISTAT) 2010

group, therefore we can argue that the analysis highlights especially the mechanisms of absorption of unskilled workforce.

From 2005 to 2010 immigration to Italy increased substantially. Looking at the last row of table (3.3) we can notice that immigration rate has more than tripled from 2005 to 2010. In the last column of the same table the rate of growth of immigration is shown. With respect to the Italian workforce in 2005, immigration has increased by roughly 4 p.p.. Between regions there is a huge variance both in the share of immigrants and in its variation. Immigrants has settled mainly in the Centre-North of Italy. This is clearly depicted in figures (3.1) and (3.2).

Table 3.3: Immigration Rate by Region (Labour Force)

	2005	2010	2010-2005
Piemonte/Valle d'Aosta	2.61	9.73	5.72
Lombardia	3.54	12.76	7.04
Trentino Alto Adige	4.04	11.04	5.29
Veneto	4.97	11.81	4.83
Friuli Venezia Giulia	5.09	10.30	4.66
Liguria	3.17	7.81	3.10
Emilia Romagna	4.11	14.49	7.63
Toscana	3.46	11.94	7.44
Umbria	4.48	14.30	7.30
Marche	3.55	10.27	7.13
Lazio	2.62	9.12	5.02
Abruzzo	1.44	6.68	3.48
Molise	0.38	2.06	1.17
Campania	0.89	3.18	1.43
Puglia	0.76	1.94	0.92
Basilicata	0.33	1.40	0.94
Calabria	0.71	3.44	2.23
Sicilia	0.72	2.13	1.19
Sardegna	0.39	1.41	1.14
All	2.44	8.26	3.79
Observations	117991	105607	223598

Authors' elaboration on RCFL-ISTAT 2005 and 2010.

Firms operating in the tradable sector have grown during the period under analysis – passing from about 53 employees per firm to more than 65. Looking at the skill composition of them, we notice the relevant proportion of unskilled workers and the decrease in the percentage of high-skilled (table 3.4). This is even more exacerbated in the non-tradable sector (table 3.5). These two features offer some insights for both effects, so in the next section we will try to empirically evaluate them.

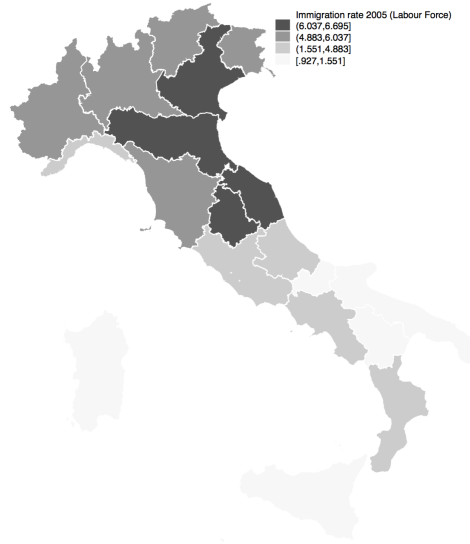


Figure 3.1: Immigration rate of Italian regions (NUTS2) in 2005

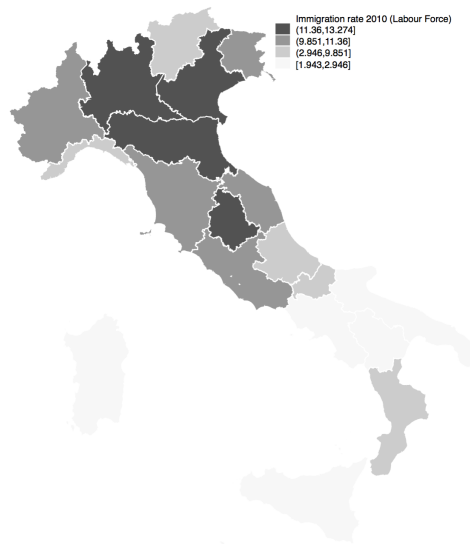


Figure 3.2: Immigration rate of Italian regions (NUTS2) in 2010



Table 3.4: Characteristics of firms in non-tradable sector

	2005	2010
Average size	53.19 (509.09)	65.26 (587.09)
% low skill	44.98 (36.91)	48.14 (39.60)
% medium skill	45.03 (37.08)	47.13 (37.75)
% high skill	9.99 (18.73)	4.73 (12.42)
Observations	3970	4160

Authors' elaboration on Isfol-Ril: 2005,2010. Standard deviations in parenthesis.

Table 3.5: Characteristics of firms in tradable and non-tradable sector

	2005	2010
Average size	51.43 (403.50)	61.25 (472.53)
% low skill	46.20 (35.47)	58.27 (36.04)
% medium skill	45.20 (35.41)	37.77 (34.08)
% high skill	8.60 (17.27)	3.96 (10.73)
Observations	6979	6979

Authors' elaboration on Isfol-Ril: 2005,2010. Standard deviations in parenthesis.

### 3.5 Empirical Results

Tables (3.6) and (3.7) report the main results of our empirical analysis which has still ample room to be enhanced. The OLS specification suggests that the labour supply variation has been absorbed by the increase in the proportion of low-skilled employment. More specifically, we can say that from 2005 to 2010 firms absorbed two thirds of the change in the labour supply because of a more intensive use of unskilled workers. Output growth has contributed to employ the remaining variation of the labour supply. As we explained before, the result has not any statistical meaning, so that we have to implement an IV estimation strategy in order to empirically assess which of the two theoretical effects has prevailed. The IV estimate reinforces previous results and we conclude that the labour supply change induced firms to adopt more capital-saving production technologies. In this case, the instrumental variable specification allows us to capture only the exogenous part of the supply shock generated by migration flows. This is why we can call it the "indirect effect of immigration".

Table 3.6: Decomposition of Changes in Labor Supply at the Firm Level. Tradable Sector

	[Firm Scale Effect]	[Firm Intensity Effect]	[Residual Term]
OLS	0.29** [0.13]	0.64*** [0.07]	-0.01 [0.10]
R-squared	0.340	0.631	0.199
Obs.	390	390	390

*Notes:*All regressions include a full set of skill and province fixed effects. Robust standard errors are reported in parentheses. Regressions are weighted by  $(1/N_{rs}^{05} + 1/N_{rs}^{10})^{-1/2}$ , where  $N_{rs}$  represents overall employment in tradable industries in region r and sector s in year t. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

The results refer to the tradable sector, in which firms are exposed to the international competition. Certainly, the most narrow definition of the tradable sector corresponds to the manufacturing sector. So, to better identify the model, we replicate the analysis only for firms in the manufacturing industries and regression outputs are illustrated in tables (3.8) and (3.9). Our main results are confirmed by both estimates, which are comparable to those of Dustmann and Glitz (2015). However, differently from us they can identify new constituted firms which have played some role in absorbing the new labour supply.

Table 3.7: Decomposition of Changes in Labor Supply at the Firm Level.  
Tradable Sector

	[Firm Scale Effect]	[Firm Intensity Effect]	[Residual Term]
IV	0.07 [0.05]	1.02*** [0.12]	-0.09 [0.13]
R-squared	0.292	0.498	0.188
Obs.	390	390	390

*Notes:*All regressions include a full set of skill and province fixed effects. Robust standard errors are reported in parentheses. Regressions are weighted by  $(1/N_{rs}^{05} + 1/N_{rs}^{10})^{-1/2}$ , where  $N_{rs}$  represents overall employment in tradable industries in region r and sector s in year t. The first-stage F-statistic of the instrument is 22.969. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Table 3.8: Decomposition of Changes in Labor Supply at the Firm Level.  
Manufacturing Sector

	[Firm Scale Effect]	[Firm Intensity Effect]	[Residual Term]
OLS	0.13** [0.05]	0.57*** [0.11]	0.10** [0.05]
R-squared	0.400	0.640	0.236
Obs.	333	333	333

*Notes:*All regressions include a full set of skill and province fixed effects. Robust standard errors are reported in parentheses. Regressions are weighted by  $(1/N_{rs}^{05} + 1/N_{rs}^{10})^{-1/2}$ , where  $N_{rs}$  represents overall employment in tradable industries in region r and sector s in year t. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Table 3.9: Decomposition of Changes in Labor Supply at the Firm Level.  
Manufacturing Sector

	[Firm Scale Effect]	[Firm Intensity Effect]	[Residual Term]
IV	0.05 [0.04]	1.02*** [0.12]	-0.09 [0.13]
R-squared	0.378	0.502	0.159
Obs.	333	333	333

*Notes:*All regressions include a full set of skill and province fixed effects. Robust standard errors are reported in parentheses. Regressions are weighted by  $(1/N_{rs}^{05} + 1/N_{rs}^{10})^{-1/2}$ , where  $N_{rs}$  represents overall employment in tradable industries in region r and sector s in year t. The first-stage F-statistic of the instrument is 21.810. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

### 3.5.1 Robustness Checks

Using more capital-saving technologies can be necessary to overcome liquidity constraints. So, we can argue that the results obtained in the previous section is driven by small firms, that are likely those which encounter more difficulties in attracting investment capitals. Furthermore, they are also an important part of the Italian business sector. On the contrary, big firms that dispose of greater financial resources can react with an increase in investments. To assess if the effect can be heterogeneous along the size distribution of companies, we restrict the analysis only to firms with more than 15 employees. The OLS and IV regression outputs – presented in tables (3.10) and (3.11) – are both similar to the baseline so that we can claim that the result is robust for the entire sample.

Table 3.10: Decomposition of Changes in Labor Supply on the Firm Level.  
Tradable Sector

	[Firm Scale Effect]	[Firm Intensity Effect]	[Residual Term]
OLS	0.14 [0.11]	0.76*** [0.23]	0.05 [0.13]
R-squared	0.289	0.706	0.080
Obs.	336	336	336

*Notes:*All regressions include a full set of skill and province fixed effects. Robust standard errors are reported in parentheses. Regressions are weighted by  $(1/N_{rs}^{05} + 1/N_{rs}^{10})^{-1/2}$ , where  $N_{rs}$  represents overall employment in tradable industries in region r and sector s in year t. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Table 3.11: Decomposition of Changes in Labor Supply on the Firm Level.  
Tradable Sector

	[Firm Scale Effect]	[Firm Intensity Effect]	[Residual Term]
IV	0.03 [0.03]	1.10*** [0.11]	-0.20** [0.09]
R-squared	0.238	0.575	.
Obs.	336	336	336

*Notes:*All regressions include a full set of skill and province fixed effects. Robust standard errors are reported in parentheses. Regressions are weighted by  $(1/N_{rs}^{05} + 1/N_{rs}^{10})^{-1/2}$ , where  $N_{rs}$  represents overall employment in tradable industries in region r and sector s in year t. The first-stage F-statistic of the instrument is 14.209. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

A final interesting test can be conducted to evaluate the goodness of fit of our estimates. Indeed, we have supposed that in the tradable sector the effect

on wages is negligible while in the non-tradable is dominant. To offer some evidence to support these hypotheses, we decided to replicate the analysis for all the firms – both in the tradable and in the non-tradable sector. In other words, we realize a placebo test. Because of the confounding effect of firms in the no-tradable sector, we should observe no impact of supply shocks on the adjustment mechanisms considered since so far. Nevertheless, our instrument is too weak to let us take into account the test results (see tables 3.12 and 3.13).

Table 3.12: Decomposition of Changes in Labor Supply on the Firm Level.  
Tradable Sector

	[Firm Scale Effect]	[Firm Intensity Effect]	[Residual Term]
OLS	0.31*** [0.09]	0.35*** [0.09]	0.05 [0.13]
R-squared	0.293	0.318	0.215
Obs.	435	435	435

*Notes:*All regressions include a full set of skill and province fixed effects. Robust standard errors are reported in parentheses. Regressions are weighted by  $(1/N_{rs}^{05} + 1/N_{rs}^{10})^{-1/2}$ , where  $N_{rs}$  represents overall employment in tradable industries in region r and sector s in year t. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Table 3.13: Decomposition of Changes in Labor Supply on the Firm Level.  
Tradable Sector

	[Firm Scale Effect]	[Firm Intensity Effect]	[Residual Term]
IV	0.72*** [0.26]	0.69** [0.28]	-0.43 [0.32]
R-squared	0.045	0.136	.
Obs.	435	435	435

*Notes:*All regressions include a full set of skill and province fixed effects. Robust standard errors are reported in parentheses. Regressions are weighted by  $(1/N_{rs}^{05} + 1/N_{rs}^{10})^{-1/2}$ , where  $N_{rs}$  represents overall employment in tradable industries in region r and sector s in year t. The first-stage F-statistic of the instrument is 2.08. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

### 3.6 Conclusions

Existing studies on the impact of immigration on native labour market outcomes have tentatively concluded that on average native wages are not negatively affected by immigrant labour supply. How labour market clears is still

to be examined in depth and we try to give some evidence on the adjustment mechanism at work. We want to appraise two alternative hypotheses. First, from international trade theory we learn that the increase in the supply of one production factor induces industries that use it more intensively to expand their output. The result is a change in the output mix between industries. Second, a technological change in favour of the relative more abundant factor could occur after a supply shock. In this case, industries can adopt production technologies that incorporate a more intensive use of unskilled labour.

To implement our analysis we follow Dustmann and Glitz (2015). According to their analytical framework, an increase in the total employment of firms reflects a growth of the output, while an increase in the proportion of low-skilled workers points at a technological change. Similarly to them, our investigation is at the firm level. Indeed, within industries different firms with different production technologies operate. Consequently, an increase in the proportion of unskilled employees originated by the output growth of more labour-intensive firms can be erroneously interpreted as a support of the second potential effect. Furthermore, another possible bias originates from the endogenous increase in the labour supply. To overcome this limit and capture only the exogenous part of the supply shock we use an instrumental variable approach. We replicate the network instrument proposed by Card (2001), so the current growth in the local labour supply is related to the past allocation of immigrant workers.

Based on the ISFOL-RLIL dataset covering the period 2005-2010, our results show that half of the foreign labour supply has been absorbed through a capital-saving technological change, while the rest of the mechanism remains unexplained. In addition, the premise of our analysis is that this effect emerges only if we consider the tradable sector, where international competition between firms realizes the *factor price equalization*. So, we expect to observe a stronger effect when we focus on a narrower definition of the tradable sector, i.e. the manufacture. Our regression outputs point in this direction, but they have been enhanced. On the contrary, the main result is slightly weaker when we consider only big firms. Indeed, we can suppose that small firms tend to invest less because of a more limited ability in attracting capital. Anyway, evidence in favour of the *intensity effect* is robust also to this model specification.

The present paper contributes to the existing literature by offering new evidence on the important case-study of Italy. Previous studies concerned especially the US labour market. Nevertheless, the current European situation deserves a specific analysis and ours is the first using a firm-level dataset.

In conclusion, some policy considerations have to be made. An important body of the literature (e.g. Peri and Sparber, 2008; Fogel and Peri, 2016) concluded that in order to have a non negative effect of immigration on wages, the labour market has to be sufficiently flexible to allow native workers

to specialize in more productive occupations. Whereas, our analyses would put some attention also on the degree of competition between firms and their propensity to invest. Indeed, to have a reshuffle of occupations and let immigrants to be employed in low-skilled jobs, the total output has to increase. In other words, we should find a strong *extensive effect*. Anyhow, also in this case we should be worried not only of labour market flexibility but also to integration and redistributive policies in order to mitigate the risk of marginalisation.

## Appendix A

# The labour market equilibrium decomposition

We decompose the percentage variation of employment of skill-group  $i$  in the tradable sector as follows:

$$\frac{\Delta X_i}{X_{i_0}} = \sum_j \frac{X_{i_0}^j}{X_{i_0}} \frac{\Delta X_i^j}{X_{i_0}^j} = \sum_j \alpha_{i_0}^j \frac{\Delta X_i^j}{X_{i_0}^j} \quad (\text{A.1})$$

Let  $Y_j$  be a measure of the size of firm  $j$  (e.g. the total employment of firm). Then for each firm the term  $\frac{\Delta X_i^j}{X_{i_0}^j}$  can be expanded into:



$$\frac{\Delta X_i^j}{X_{i_0}^j} = \frac{X_i^j - X_{i_0}^j}{X_{i_0}^j} = \frac{X_i^j}{X_{i_0}^j} \frac{X_{i_0}^j}{X_{i_0}^j} = \frac{X_i^j}{X_{i_0}^j} - 1 = \frac{X_i^j Y^j}{X_{i_0}^j Y^j} - 1 = \frac{X_i^j Y_0^j}{X_{i_0}^j Y_j^j} +$$

(A.2)

$$+ \frac{X_i^j (Y^j - Y_0^j)}{X_{i_0}^j Y_j^j} - 1 = \frac{X_i^j Y_0^j}{X_{i_0}^j Y_j^j} + \frac{X_i^j Y_0^j}{X_{i_0}^j Y_j^j} \frac{(Y^j - Y_0^j)}{Y_0^j} - 1 = \frac{Y^j - Y_0^j}{Y_0^j} +$$

(A.3)

$$+ \frac{X_i^j Y_0^j}{X_{i_0}^j Y_j^j} - 1 + \frac{Y^j - Y_0^j}{Y_0^j} \left( \frac{X_i^j Y_0^j}{X_{i_0}^j Y_j^j} - 1 \right) = \frac{Y^j - Y_0^j}{Y_0^j} + \frac{X_i^j Y_0^j}{X_{i_0}^j Y_j^j} - 1 +$$

(A.4)

$$+ \frac{Y^j - Y_0^j}{Y_0^j} \left( \frac{X_i^j Y_0^j}{X_{i_0}^j Y_j^j} - 1 \right) = \frac{Y^j - Y_0^j}{Y_0^j} + \frac{X_i^j Y_0^j - X_{i_0}^j}{X_{i_0}^j Y_0^j} + \frac{Y^j - Y_0^j}{Y_0^j}$$

(A.5)

$$\left( \frac{X_i^j Y_0^j - X_{i_0}^j}{X_{i_0}^j Y_0^j} \right) = \frac{Y^j - Y_0^j}{Y_0^j} + \frac{X_i^j}{Y_j^j} - \frac{X_{i_0}^j}{Y_0^j} + \frac{Y^j - Y_0^j}{Y_0^j} \left( \frac{X_i^j}{Y_j^j} - \frac{X_{i_0}^j}{Y_0^j} \right)$$

(A.6)

which can be rewritten as:

$$\frac{\Delta X_i^j}{X_{i_0}^j} = \frac{\Delta Y^j}{Y_0^j} + \frac{\Delta X_i^j}{Y_j^j} + \frac{\Delta Y_j^j}{Y_0^j} \times \frac{\Delta X_i^j}{Y_j^j} \frac{Y_j^j}{X_{i_0}^j Y_0^j}$$

(A.7)

Putting A.7 into A.1 we get:

$$\frac{\Delta X_i}{X_{i_0}} = \sum_j \alpha_{i_0}^j \frac{\Delta Y^j}{Y_0^j} + \sum_j \alpha_{i_0}^j \frac{\Delta X_i^j}{Y_j^j} + \sum_j \alpha_{i_0}^j \frac{\Delta Y_j^j}{Y_0^j} \times \frac{\Delta X_i^j}{Y_j^j} \frac{Y_j^j}{X_{i_0}^j Y_0^j}$$

(A.8)

which recalls the decomposition of labour market equilibrium given by eq. (3.4) in par. (3.3).

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