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# Has Eastern European Migration Impacted UK-born Workers? \*

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## Abstract

The 2004 accession of 8 Eastern European countries to the European Union (EU) was accompanied by fears of mass migration. The United Kingdom - unlike many other EU countries - did not opt for temporary restrictions on the EU's free movement of labour. We document that following EU accession more than 1 million people (ca. 3% of the UK working age population) migrated from Eastern Europe to the UK. We show that they mostly settled in places that had limited prior exposure to immigration. We provide evidence that these areas subsequently saw smaller wage growth at the lower end of the wage distribution and increased pressure on the welfare state, housing and public services. Using novel geographically disaggregated data by country-of-origin, we measure the effects of Eastern European migration on these outcomes for the UK-born and different groups of immigrants. Our results are important in the context of the UK's Brexit referendum and the ongoing EU withdrawal negotiations in which migration features as a key issue.

**Keywords:** POLITICAL ECONOMY, MIGRATION, GLOBALIZATION, EU

**JEL Classification:** R23, N44, Z13

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# 1 Introduction

After decades of deepening of the political, economic and social ties between the European Union (EU) and its member countries, the referendum on the membership of the United Kingdom in the European Union held on 23 June 2016 marks a turning point in European history. Economists and political scientists rushed to interpret the referendum results and many blamed immigration, especially after the 2004 EU enlargement to Eastern Europe, as a key factor affecting voter behavior. In the run-up to the EU Referendum, the Leave side campaigned on the slogan “Take back control” and pushed the idea that immigrants were putting pressure on public services. [Becker et al. \(2017\)](#) use a machine learning exercise to analyze which factors are the strongest predictors of the vote to leave the EU. Economic fundamentals such as low income and high unemployment are key predictors, but also public service delivery such as waiting times at the UK’s National Health Service and pressure on the housing market were found to be important predictors.<sup>1</sup>

Migration between EU countries is of a different nature compared to other migration flows as free movement of labour is a right enshrined into the founding treaties of the EU. While many countries have rigid immigration regimes and only admit migrants based on visa systems, or permit refugees to enter on humanitarian grounds, it is less common for migration to be essentially unrestricted between sovereign countries based on the agreement of those countries to give mutual access to their labour markets, as the EU does. Of course, also the US has free mobility between its 50 states, but they are part of the same nation state, whereas the EU is a supra-national entity. Free movement of labour between a large group of sovereign countries (the EU) can thus be seen as a unique ‘globalization experiment’ that has not often been considered as what it is: an unusual institutional setting whereby 28 EU countries allow mutual and non-discriminatory access to their labour markets (and in extension public services and housing markets). With the UK’s Brexit vote in mind, and with Euroskeptic

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<sup>1</sup>When only looking at different variables that capture the UK’s relationship with the EU (see [Becker et al. \(2017\)](#), Table 1), the increase in the share of migrants from EU accession countries positively predicts Leave votes. But when using further economic predictors, those crowd out the EU accession migration variable. This is consistent with the idea that the effect of migration on voting in the Brexit vote works is mediated through effects on labour markets, housing and public services.

parties on the rise across the EU, it is therefore particularly interesting to analyze the impact of migration in a setting like this where it is unrestricted by virtue of the EU treaties. Is it fair to read the UK's Brexit vote as a backlash against this particular form of globalization because of effects on labour markets, public service provision and housing?

This paper uses quasi-experimental variation to study the effect of immigration from Eastern Europe on a broad set of outcomes, covering the labour market, public services and the housing market, all of which were salient issues in the run-up to the UK's referendum on EU membership. We exploit the 2004 EU enlargement to Eastern Europe as our source of variation in the exposure of local authority districts to EU migration.<sup>2</sup> Free movement of labour is one of the four economic freedoms guaranteed by the EU common market: free movement of goods, services, labour and capital. With the EU accession of 10 new member countries in 2004, the United Kingdom, as opposed to many other continental European countries, decided not to impose temporary restrictions on the free movement of labour. The possibility of temporary restrictions was included as part of the accession treaties because neighbouring countries, such as Germany and Austria expected significant pressures on local labour markets due to migration from Eastern Europe. We can thus use the timing of the EU accession in 2004, together with a measure of exposure to EU migration, to perform a difference-in-differences analysis. Using data for multiple points in time before 2004 permits us to check for pre-trends.

While migration is expected to yield overall gains in living standards, there are likely to be distributional effects. The first main mechanism is through the labour market: migrants from EU accession countries may add pressures on the labour market, resulting in weaker wage growth, especially in the low skill segment. Second, population increases may put additional stress on public services, such as schooling and health care.<sup>3</sup> While the UK's National Health Service (NHS) was spared spending cuts in the immediate aftermath of the financial crisis, it seems to have struggled

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<sup>2</sup>The UK consists of 382 local authority (LA) districts, with an average population of ca. 157,000. We exclude Northern Ireland and Gibraltar, and use 380 LAs in our empirical analysis.

<sup>3</sup>See for example [Hainmueller and Hiscox \(2010\)](#), who study the relative effect of labour market competition versus access to services on the perception of immigrants to the US.

to keep up with increasing demand following stronger immigration. Third, we expect effects on the housing market. The UK is known for very restrictive zoning laws and regulation, making the housing supply very inelastic not only in London, but also in the rest of the country. As a consequence, home ownership – central to Britain’s vision of “a country of homeowners” – may be less attainable. Looking at these issues, we document that migration from EU accession countries is associated with mild downward pressure on wage levels, concentrated at lower quantiles of the wage distribution. We also show that migration is associated with increases in the demand for benefits.

We go a step further in studying the distributional effects of the migration from EU accession countries, through newly acquired data on key socio-economic indicators across 344 local authorities in England and Wales, derived from the 2001 and 2011 censuses. These data provide detailed tabulations that are disaggregated by *country of origin*, thus allowing us to study the effects of migration on outcomes *between* and *within* different country-of-origin groups. It is important to highlight that such an analysis is usually not possible as administrative data, e.g. on home ownership, demand for benefits, or on the labour market is not published by country-of-origin at such a regionally disaggregated level. The *between country-of-origin* group analysis allows us to study the effect of migration from Eastern Europe on UK-born individuals compared to its effect on migrants from different countries-of-origin. This sheds light on the extent to which migration may affect the composition of demand for benefits or services. Similarly, the *within country-of-origin* group analysis allows us to explore how, for example, rates of long-term unemployment among UK nationals were affected in local areas that experienced a significant inflow from EU accession countries relative to rates of long-term unemployment of UK nationals in areas that did not see a significant inflow in migration. This provides insights into the performance of natives in areas affected by migration, relative to natives who live in areas less affected by migration.

A central observation of methodological relevance is provided by the distinct geographic concentration of Eastern European migration after 2004 across the UK. We document that the baseline distribution of Eastern European migrants across the UK

as measured in the 2001 census is *a very weak proxy* for subsequent inflows of Eastern European migrants. This suggests that using shift-share instruments, as is common in this literature, is unlikely to do a good job in predicting the flow of migrants across space, or may pick up a very specific part of the migration flows. Furthermore, we see that the profile of Eastern European migrants arriving after 2004 is significantly different compared to those Eastern Europeans that had already lived in the UK in 2001. The vast majority of migrants from Eastern Europe is classified as having "Other qualifications" that do not map into the standard UK system of educational qualifications (the exception being No qualification and University degrees). We use a machine learning method to systematically identify the vector of an area's baseline characteristics that do a good job *predicting the inflow* of migrants and use this to inform alternative difference-in-differences estimation strategies.

The substantive results from our analysis are threefold. First, we document that migration from Eastern Europe is associated with a negative effect on wages at the bottom end of the wage distribution. The effects are statistically significant, but overall, relatively small indicating a relative fall in wages by around 1.5% for overall average wages in a district that received an average migrant inflow. We do not find any systematic evidence suggesting that areas that received lots of immigrants were on diverging trends prior to the migrants arriving. Second, we document significant positive impacts on the demand for benefits, in particular on the number of job seeker allowance claimants. Again, we do not find systematic evidence of diverging pre-trends. This suggests that immigration is associated with both increasing pressures on the labour market and on the welfare state.

Third, the *between group* and *within group* analysis suggests distributional effects of Eastern European migration operating through the labour market. We document those for both the extensive and intensive margins of employment. To understand non-employment, we look at non-participation (i.e. out of labour force); long-term unemployment; having never worked; and being a student. Then, we look at intensive margin of employment: conditional on working, what kind of jobs do different population groups hold? The *between group* shows that the 'market share' of Eastern Europeans in different non-employment states and across all occupation groups

and sectors goes up more strongly in areas with a larger influx of Eastern Europeans by virtue of the stronger increase in their absolute number compared to the UK-born. What seems to be most interesting from a policy perspective, is the *within group* comparison of natives in different parts of the country, as this is informative about a potential feeling of ‘being left behind’ when natives in a high-immigration areas compare themselves to natives in low-migration areas. Areas that received lots of migration from Eastern Europe, saw an increase in the share of UK-born residents classifying themselves as being long-term unemployed, suggesting some ‘crowd-out’. However, there are also positive effects: while the share of the UK-born working in routine occupations goes down, the share working in ‘intermediate occupations’ increases, suggesting some mobility into higher-quality jobs.

We also study the implications of migration on pressures on the housing market, documenting a negative effect of Eastern European migration on home ownership rates of UK born residents and an increase in private rented housing arrangements. We do not find any significant effects on crime rates and no systematic evidence of impacts of Eastern European migration on transactions-based house price data.

The rest of the paper is organized as follows. Section 2 discusses the existing literature and how our analysis complements and goes beyond exiting work. Section 3 provides further institutional context and describes our data sources. Section 4 explains our empirical strategy. Section 5 looks at the effects of Eastern European migration to the UK on labour markets, public services and housing markets. Section 6 discusses how the results might relate to Brexit, and concludes.

## 2 Literature

This paper relates to a large literature on immigration and labour market outcomes. Immigration is often found to have only minor effects on wages, if any. Yet, even if overall labour market effects of immigration are minor or positive, it is important to consider distributional effects. The state of knowledge on this issue is summarized in the ample contributions of [Borjas \(2014\)](#) and [Card and Peri \(2016\)](#). [Borjas and Monras \(2017\)](#) argue that, in line with the canonical model of a competitive labour market, ex-

ogenous supply shocks adversely affect the labour market opportunities of competing natives in the receiving countries, and often have a favorable impact on complementary workers. In the UK context [Dustmann et al. \(2013\)](#) look at migration to the UK between 1997 and 2005, and find a pattern of effects whereby immigration depresses wages below the 20th percentile of the wage distribution. Our results will show similar findings in the context of Eastern European migration after 2004. Further effects of immigration on the British Labour Market until the year 2000 have been studied by [Dustmann et al. \(2005\)](#). They show, for the years 1983 to 2000, that the overall skill distribution of immigrants is remarkably similar to that of the native born workforce. In the next section we will provide ample evidence that this is not the case for migration from Eastern Europe after 2004. Further, [Dustmann et al. \(2005\)](#) find no strong evidence that immigration has overall effects on aggregate employment, participation, unemployment and wages. They do find some distributional effects across education groups: negative employment effects on those with intermediate education levels are, however, offset in the aggregate by positive effects on employment among the better qualified. In our analysis, we look at labour force participation and unemployment as well as employment by sector and job quality. To the best of our knowledge, these outcomes have not been considered in the context of migration from Eastern Europe to the UK after 2004, that is institutionally warranted under the EU's freedom of movement of labor. The sudden influx of large numbers of immigrants from Eastern Europe may have had different effects from those of previous migration flows.

Turning to public service provision, one perspective is that on the fiscal impact of migration to the UK which reflects on the contributions to and use of public services. [Dustmann and Frattini \(2014\)](#) consider migration to the UK over the years 1995 to 2011 and find that immigrants from the European Economic Area (EEA) have made a positive fiscal contribution, while Non-EEA immigrants, not dissimilar to natives, have made a negative contribution. For immigrants that arrived since 2000, contributions have been positive throughout, and particularly so for immigrants from EEA countries. Notable is the strong positive contribution made by immigrants from countries that joined the EU in 2004. The latter finding is also discussed in [Dustmann et al. \(2010\)](#) who focus on immigrants from the eight Eastern European countries that

joined the EU in 2004 (A8 countries) who made a positive contribution to UK public finances. The authors explain this by the fact that A8 immigrants have a higher labour force participation rate, pay proportionately more in indirect taxes and make much less use of benefits and public services. Despite their positive fiscal impact, immigrants might still have distributional effects on public service access and usage. [Giuntella et al. \(2018\)](#) use Hospital Episode Statistics (2003-2012) to analyze pressure on NHS services from migration to the UK. In the years immediately following the 2004 EU enlargement, average waiting times increased in more deprived areas, but this effect vanishes in the medium-run (3 to 4 years).

An important study on the effect of immigration to the UK on housing markets is [Sa \(2015\)](#). Using migration and population data from the UK Labour Force Survey and house price data from the Land Registry for the years 2003 to 2010, she finds that immigration has a negative effect on house prices at the local level. Specifically, an increase in the stock of immigrants equal to 1% of the local initial population leads to a reduction of 1.7% in house prices, when using immigration data from the LFS. The negative effect of immigration on house prices is confirmed also when looking specifically at migration of workers from AC8 countries (the 8 Eastern European countries that joined the EU in 2004), using data from the Worker Registration Scheme (WRS). We look at various other outcomes describing effects of immigration on the housing market. Instead of looking at house prices, which have already been covered by [Sa \(2015\)](#), we look at which type of housing people live in: social housing, private rental housing and home ownership.

In summary, our main contributions are threefold: first, our focus is on the economic effects of the institutionalized right to migration within the EU and specifically the effect of the opening-up of the British labour market to immigrants from Eastern Europe after EU accession in 2004 documenting new stylized facts capturing the type and geographic distribution of this migration wave; second, we look at a large set of outcomes, above and beyond those studied in individual papers, and using a common empirical setup; third, we use regionally disaggregated data by country-of-origin, unlike the previous literature, to document distributional effects.

### 3 Context and a First Look at the Data

In this section, we describe the historical context and present our data.

#### 3.1 The European Union and Freedom of Movement for Workers

The European Union traces its origins to the 1950s. In 1957, (West) Germany, Italy, France, Belgium, the Netherlands, and Luxembourg signed the Treaty of Rome, which created the European Economic Community (EEC) and established a customs union. In Article 48, the Treaty of Rome states:

Freedom of movement for workers shall be secured within the Community by the end of the transitional period at the latest. Such freedom of movement shall entail the abolition of any discrimination based on nationality between workers of the Member States as regards employment, remuneration and other conditions of work and employment.

Free mobility of labour is thus enshrined in the DNA of the EEC and its current incarnation, the European Union.

The UK negotiated access to the EEC during the 1960s. The process was interrupted twice due to French vetoes, but ultimately the UK joined the EEC in 1973. The February 1974 general election yielded a Labour minority government, which then won a majority in the October 1974 general election. Labour pledged in its February 1974 manifesto to renegotiate the terms of British membership in the EEC, and then to consult the public on whether Britain should stay in the EEC on the new terms, if they were acceptable to the government. A referendum on 5 June 1975 asked the electorate: “Do you think that the United Kingdom should stay in the European Community (the Common Market)?”. 67.2 percent of the electorate answered ‘Yes’. The 1975 referendum is described in detail in [Butler and Kitinger \(1976\)](#).

The UK was instrumental in bringing about the Single Market guaranteeing the freedom of movement of goods, capital, labour, and services in the EEC. Since the 1975 Referendum, the European Economic Area has evolved into the central pillar of what became the European Union with the Maastricht Treaty of 1992. The further

political and economic integration was formalized through the treaties of Amsterdam in 1997, Nice in 2001 and Lisbon in 2009.

### **3.2 Scale of migration from Eastern Europe to the UK**

On 1 May 2004, eight Eastern European countries plus Malta and Cyprus joined the European Union.<sup>4</sup> The United Kingdom, along with Ireland and Sweden, was one of only three countries that did not opt to impose temporary restrictions on the freedom of movement.<sup>5</sup> Most continental European countries decided for a phase-in period, allowing freedom of movement only after the accession countries had been a member of the European Union for up to seven years. In 2007, Romania and Bulgaria joined the European Union. Here, the UK decided to opt into restricting their freedom of movement. While our measure of migration from Eastern Europe includes Romania and Bulgaria, their numbers barely matter in reality because of the UK's phase-in for these two countries; further, throughout we obtain very similar results when focusing only on migration from Poland.

The decision to open the borders in 2004 to Eastern Europeans was taken by Tony Blair's government. A central reason for opening the borders were the thriving UK economy and a misunderstanding of the consequences of the decision of other big EU countries to keep their borders closed to Eastern European workers for a transition period. A study commissioned by the [Home Office \(2003\)](#) computed different scenarios of expected migrant numbers under the assumption that other big EU countries, in particular Germany, would open up their borders as well, which was the proclaimed policy at the time the report was written (summer - autumn 2003). This assumption is clearly spelled out, yet the government later ignored this crucial assumption and

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<sup>4</sup>The Eastern European countries were Poland, the Czech Republic, Slovakia, Hungary, Slovenia along with the three Baltic states, Estonia, Latvia and Lithuania. Malta and Cyprus were the smallest accession countries in terms of population and have contributed only marginally to migration to the UK.

<sup>5</sup>By registering in the "Accession State Worker Registration Scheme", immigrants were able to claim some basic benefits, such as Housing Benefit, Council Tax Benefit and Tax Credits. However, immigrants had to be employed to claim these benefits. If the worker was able to prove that they had worked legally for at least a 12-month period (without a break in employment of more than 30 days), then they gained the ability to claim social security benefits such as Jobseeker's Allowance.

instead used a prediction of “only around 5,000-13,000 Eastern Europeans to arrive to the United Kingdom per year” to justify their political decision of allowing free movement of Eastern Europeans from 1 May 2004.

Migration from EU accession countries to the United Kingdom was significantly larger than the UK Government had anticipated. Figure 1 uses data from the 2011 Census and makes use of self-reported information time of arrival of migrants from different countries of birth. This data is available for England and Wales only.<sup>6</sup> By virtue of using the stock of residents in 2011, it does not count migrants who arrived in England and Wales before 2011 but left England and Wales before 2011 or who died before the census date in 2011.

According to these data (which are likely to underestimate the true extent of the labour market impact of immigration by ignoring temporary migration), the stock of individuals who were born in any of the AC10 countries and arrived up to 2003 was under 200,000. Around 30% of this stock consists of Eastern Europeans who migrated to the UK prior to 1981. Of this stock, the largest group were people born in Poland, who made up 42% of the stock of Eastern Europeans having arrived prior to 2004. Historically, the UK had a large Polish population due to the second World War. After Poland’s defeat against Germany and the Soviet Union, the Polish government in exile was set up in London. The remainder of the Polish Army fled to the UK and was fighting alongside the British army. After 2004, there was a strong up-tick in arrivals from Eastern Europe. The number of Polish-born migrants increased by a factor of 7, while the overall number of AC12 migrants in the UK increased by a factor of 5, up to 1,036,116 or approximately 2% of the 2001 population. In comparison to 2001 this entails a net-inflow of 842,936. This compares with a net immigration from (old) Western European EU member countries of 214,736.

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<sup>6</sup>Furthermore, in this figure only, which has several detailed brackets for year of arrival, Cyprus is not included among the accession countries (because the ONS added Cyprus to Greece). We still keep the AC10 and AC12 labels when discussing this graph, to avoid confusion in the notation.

### 3.3 Geographic distribution of Eastern European migrants to the UK

The geographic distribution of the incoming migrants from Eastern Europe displays a significant deviation from past migration patterns. According to the 2011 census data, 46% of migrants from the AC8 countries who arrived prior to 2003 and were still living in the UK by 2011 were concentrated in the London region. Of the net inflow that arrived to the UK from AC8 countries after 2004 and were still living there by the census date in 2011, only 28% moved to London. This suggests a distinct geographic concentration of migrants from countries that joined the EU from 2004 onwards. The locational preference of migrants from the EU15 countries is remarkably stable over time: the majority of the EU15 migrants (around 57%) settle in the London region.

The geographic heterogeneity of the distribution of the stock versus the subsequent inflow of immigrants between the 2001 and 2011 census dates can be further visually established. Figure 2 plots the distribution of the overall population shares of three groups of migrants in 2001, by quintiles of the respective migrant group. There are several takeaways. First, the stock of migrants from the AC12 countries in 2001 is very small and concentrated in the south of the UK, and in particular around London.<sup>7</sup> Second, migration from the EU15 member countries is equally concentrated around London. Third, in 2001, the stock of migrants from ROW countries is considerably higher than that of the other two migrant groups in many parts of the country, and is particularly concentrated in the South and across a few other urban centers.

Figure 3 shows that the distribution of *new* AC12 immigrants over the period 2001 to 2011 follows distinctly different patterns compared to immigrants coming from the EU15 and the Rest of World. The underlying data is the change between the 2001 and 2011 censuses (relative to the 2001 levels) in the share of migrants residing in a local authority area, by region of origin. Importantly, the shading intensity is identical across the three groups, by quintiles of the change over the period 2001 and 2011. The figure shows that migration from AC12 countries (a) exceeds that of EU15 and ROW migrants in the vast majority of local authorities and (b) followed a distinct geographical pattern. New AC12 migrants are more likely to move into rural areas

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<sup>7</sup>All our results are robust to dropping London, as will be discussed in detail in the robustness section.

(the ‘larger’ local authorities of the map that are less densely populated) whereas newly arrived EU15 and ROW migrants seem to be more likely to be attracted to urban areas. The size of the migration ‘shock’ from AC12 countries together with its distinct geographic pattern shows why it is worth studying this particular period of immigration, as we can expect it to be economically and socially relevant. The distinct nature of the geographic pattern of migration of Eastern Europeans also illustrates why a classical shift-share analysis in the spirit of [Bartel \(1989\)](#) and [Altonji and Card \(1991\)](#); [Card \(2001\)](#) is problematic since it is likely to pick up only a specific part of the migration wave from Eastern Europe.<sup>8</sup>

Using data from the 2011 and 2001 censuses, we define our Accession shock measure as capturing the population growth in a local authority district  $c$  that is due to migration from EU accession countries, that is we measure:

$$\text{AccessionShock}_c = \frac{\text{EU accession migrants}_{c,2011} - \text{EU accession migrants}_{c,2001}}{\text{Population}_{c,2001}}$$

The numerator captures the change between the 2001 and 2011 censuses in the size of the resident population that were born in EU accession countries. Since, as indicated in [Figure 1](#), the number of immigrants from EU accession countries prior to EU accession is essentially flat, we can think of the bulk of the variation in the numerator as stemming from the migration post 2004.<sup>9</sup>

**What drives the geographic pattern of migration of Eastern Europeans?** In [Table 1](#), we look at which variables, measured in the baseline year 2001, best predict our treatment variable,  $\text{AccessionShock}_c$ . We identify the most robust predictors of the  $\text{AccessionShock}_c$  measure via a best subset selection (BSS) procedure. Best subset selection is a machine learning method used to perform ‘feature selection’ in settings

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<sup>8</sup>In particular, high skilled migration from Eastern Europe post 2004 follows more closely the pattern of migration prior to 2004, implying that a shift-share analysis would capture the economic effects of the relatively small share of high skilled migration from Eastern Europe, while ignoring the bulk that had non-university degrees.

<sup>9</sup>Note again that, while we include migration from Bulgaria and Romania who joined the EU in 2007, in the numerator, their numbers barely matter because the UK opted for a seven-year phase-in in their case, hence free movement of labour only applied to them from 2014.

where the aim is to reduce dimensionality of a feature space (Guyon and Elisseeff, 2003). Starting from a set of predictor variables, the idea of best subset selection is to estimate all possible regressions including all combinations of variables and return the statistically optimal model, which minimizes an information criterion.

The fundamental difference between prediction, which generally takes advantage of machine learning methods, and causal inference is as follows. While causal inference focuses on the internal validity of causally estimated reduced-form (or structural) parameters  $\beta$ , prediction and thus machine learning is concerned with the external validity of the estimated fitted values  $\hat{y}$ . Causal inference seeks to obtain a set of estimated parameters  $\hat{\beta}$  that are typically studied in isolation. Thus they often do not render themselves useful for predictive exercises since the out-of-sample model fit is generally poor. Instead, good model fit typically requires a multitude of regressors, and machine learning can often substantially improve out-of-sample predictive performance (Mullainathan and Spiess, 2017). The underlying estimated parameters that yield good model fit are typically of limited interest per se.<sup>10</sup>

The best subset selection algorithm we employ finds the solution to the following non-convex combinatorial optimization problem:

$$\min_{\beta} \underbrace{\sum_{c=1}^C (y_c - \beta_0 - \sum_{j=1}^p x_{cj}\beta_j)^2}_{\text{Residual sum of squares}} \text{ subject to } \sum_{j=1}^p \mathbf{I}(\beta_j \neq 0) \leq s, \quad (1)$$

where  $p$  is the set of regressors of which a subset  $s$  is chosen to maximize overall model fit. The result is a sequence of models  $\mathcal{M}_1, \dots, \mathcal{M}_s, \dots, \mathcal{M}_p$ , where the overall optimal model  $\mathcal{M}_{s^*}$  is chosen by using either cross validation or some degree-of-freedom-adjusted measure of goodness of fit such as the Akaike information criterion (AIC). Throughout, we use the AIC to decide upon the overall optimal model  $\mathcal{M}_{s^*}$  robustly explaining the variation in the dependent variable.

Best subset selection proceeds as follows: the first model estimates – using OLS – all  $\binom{p}{1} = p$  different models containing a single regressor and chooses as optimal the

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<sup>10</sup>Some machine learning methods are non-parametric to the extent that the methods do not even produce any model parameters in a classical regression sense.

model that results in the largest reduction in the residual sum of squares. Coefficient estimates from this exercise are displayed in column (3) of Table 1. The second model estimates all possible  $\binom{p}{2}$  models containing exactly two regressors, in column (4), and so on. The variable with the highest predictive power is the share of residents (in 2001) from ROW countries. The stock of ROW migrants in 2001 turns out to be a good summary statistic of what makes a place attractive to migrants. Further strong predictors are the availability of council and private rented housing. Instead of discussing each set of  $s$  strongest predictors, let us describe what best subset selection (BSS) does. BSS compares the various models of different complexity and selects the one that offers the best tradeoff between predictive power and parsimony, which turns out to be the model presented in column (2) that can be compared to the estimates from a model containing all predictor variables in column (1).

Looking at the BSS column (2), AC12 migrants are not attracted by urban districts, but by areas with a larger share of agriculture, a lower share of finance and manufacturing, a less academically educated population (lower share of individuals with university degrees (qualification level 4+) and to areas with a larger share of households living in council rented housing and private rental housing. These findings are interesting in their own right as they describe the locational pattern of new AC12 migrants. Most importantly, the past migrant stocks from AC12 in 2001 is not included in the best subset of variables in column (2), again suggesting that new AC12 are not systematically attracted to the same locations as earlier AC12 migrants. This suggests that conventional shift-share instrumentation would be underpowered.

Due to the problems that this exercise illustrates about the possibility to use conventional shift-share instrumentation for causal identification, we use the analysis of factors predicting inflow of new AC12 migrants in two additional ways to inform our difference-in-difference estimations. First, starting from a simple difference-in-difference analysis, we add interactions of the BSS predictor variables with year dummies as controls in our regressions, in order to ‘control for’ potentially confounding factors and trends in these variables that seem to predict the flow of migrants. Second, we use the BSS specification in a matching analysis, where we define treated regions as regions in the upper quartile of the  $\text{AccessionShock}_c$  distribution and look for near-

est neighbors among the lower three quartiles of the treatment intensity distribution. We will return to this point further below.

### **3.4 Characteristics of incoming Eastern European migrants**

We have already shown that new AC12 immigrants have a distinctive geographical settlement pattern. We want to see whether also their characteristics differ from earlier AC12 migrants and those of new migrants from EU15 and ROW countries, and from UK-born people.

Figure 4 shows the age distribution of AC12 migrants in the 2001 and 2011 censuses (as density plots), alongside the same figures for those born in EU15, ROW or in the UK. The bulk of the 2011 residents born in AC12 countries is between 20-40 years old, whereas ten years before the age distribution was distinctively flatter. In contrast, the age distribution on migrants from EU15 and ROW countries varies very little between the 2001 and 2011 censuses. Furthermore, the age distribution for EU15 and ROW is less pronounced in the 20-40 age range as that of AC12 migrants. The age distribution of the UK-born population, which we display for completeness, shows very nicely how the age profile of the 2001 population moves to the right over the course of 10 years, with the big hump of 25-45 year olds in 2001 becoming a big hump of 35-55 year olds in 2011.

We produce similar graphs, as histograms, for the qualification profiles of AC12, EU15 and ROW migrants and the UK-born, in Figure 5. Several things are noteworthy: the bulk of the 2011 residents born in AC12 countries has "Other" qualifications that do not directly map into the UK system of qualifications. While for EU15, ROW and the UK-born the share of those with the highest level of qualifications (at least a university degree as level 4+) has gone up between 2001 and 2011, it has gone down for AC12 migrants.

Looking at the census categorization of socio-economic status based on the respondent occupations, Figure 6 shows that the bulk (40%) of residents born in AC12 countries is working in routine- or semi-routine occupations in 2011. This is in stark contrast with both the 2001 situation for AC12 residents as well as with all other groups (EU15, ROW, UK-born) in both 2001 and 2011.

All of this suggests that migration from Eastern Europe after enlargement was (a) very sizable and (b) very different both in terms of geographic pattern and in terms of age, education, and job characteristics making this an episode of migration. We expect this migration episode to have potential effects on the local labour market, but possibly also on public services and the housing market.

## 4 Empirical strategy

This section details two different empirical strategies we pursue.

**Simple difference-in-differences** The first one is a simple difference-in-differences design that uses as treatment the Accession Shock variable defined above. The specification we estimate is:

$$y_{crt} = \alpha_c + \beta_{rt} + \gamma \times Post_t \times AccessionShock_c + \epsilon_{crt} \quad (2)$$

where  $\alpha_c$  captures local authority district fixed effects and  $\beta_{rt}$  captures region by year fixed effects. The local authority district fixed effects absorb any location specific underlying fixed differences in economic outcomes. The time fixed effects are specific by NUTS1 region. There are twelve total regions across the United Kingdom: 10 in England, including a separate region for London, and one each for Wales and Scotland.<sup>11</sup>

The main coefficient of interest is the one on the difference-in-differences interaction,  $\gamma$ . The central concern for the causal interpretation of the estimate  $\gamma$  is that migration might be endogenous to underlying economic conditions.

We address these concerns in three complementary ways. First, we check the robustness of our results in the basic difference-in-differences design by estimating specifications that exploit the information obtained from the machine learning exercise earlier by controlling for interaction terms of year dummies and the sets of

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<sup>11</sup>The results are robust to using less demanding fixed effects, these are available upon request.

baseline characteristics that have been identified to predict  $\text{AccessionShock}_c$ :

$$y_{crt} = \alpha_c + \beta_{rt} + \gamma \times \text{Post}_t \times \text{AccessionShock}_c + \sum_t \mathbf{b}_t \times \mathbf{X}_c + \epsilon_{crt} \quad (3)$$

where  $\mathbf{X}_c$  is the vector of twelve cross-sectional variables that have been identified by the BSS routine and  $b_t$  is a set of time fixed effects, thus allowing for differential non-linear time trends in these baseline characteristics. This is a very demanding specification as we allow each of the twelve BSS predictors identified in column (2) of Table 1 to have a non-linear time varying effect on the outcomes of interest. Second, we further present evidence in support of the underlying common trends assumption by showing that there are no systematic pre-trends in the outcomes we look at. Third, we also perform a propensity-score matched difference-in-difference exercise, as described next.

### **Propensity-score matching for regions in upper quartile of the “accession shock”**

Since all local authorities received sizable inflows of migrants from the AC12 countries, there is no natural distinction into a treated and a control group. For the matching exercise, we therefore deliberately concentrate on the local authorities that received accession shocks in the upper quartile of the distribution of  $\text{AccessionShock}_c$  and designate them as ‘treated observations’. We construct matched pairs of local authority districts that are observationally equivalent prior to EU accession. More precisely, we do nearest neighbor matching without replacement, using the BSS variables determined earlier in the paper,<sup>12</sup> and impose a caliper of 0.05. Nearest-neighbor matching implies that, for every local authority in the upper quartile of the accession shock distribution, we search for another local authority in the lower three quartiles (‘control unit’) that is observationally equivalent in terms of baseline characteristics. Since the treated group is drawn from the upper quartile of the accession shock distribution, we do not expect results to be identical to those from the standard difference-in-differences exercise, unless treatment effects are constant across quartiles of treat-

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<sup>12</sup>The only difference is that the BSS exercise used the  $\text{AccessionShock}_c$  variable as a continuous outcome, while now we use a binary variable for the upper quartile of the  $\text{AccessionShock}_c$  distribution in the matching exercise.

ment intensity. But we consider this exercise to be complementary: while it zooms into only one part of the distribution of treatment intensities (a potential downside), it makes further headway in ensuring comparability between local authorities subject to large versus small accession shocks.

Online Appendix Table A1 highlights that the matching exercise does not exclusively compare districts in the third quartile to those in the fourth quartile of the Accession Shock empirical distribution. Rather, the control group includes districts from all of the three lower quartiles of the Accession Shock.

We check balancing of covariates before and after matching and confirm that matched pairs have similar baseline levels of predictor variables, giving support to the matching approach as a way to compare treated regions (upper quartile of “accession shock”) and control regions that are very similar ex ante.

## 4.1 Data and pre-trends

In this section, we present our data along with graphical evidence of the link between AC12 migration and economic outcomes.

**Labour market** The Annual Survey of Hours and Earnings provides data on hourly wages across different quantiles of the wage distribution from 2002 to 2015. This data is reported by place of residence, which is important, since especially in Southern England commuting is very common.<sup>13</sup>

Figure 7 uses the matched sample to illustrate pre-trends.<sup>14</sup> It shows coefficient estimates from the estimation of a version of specification (3) where instead of the post-2004 dummy, the treatment variable  $\text{AccessionShock}_c$  is interacted with a full set of year dummies, with 2004 serving as reference year. The data do not allow us to trace pre-trends further back in time because the wage data only starts in 2002. Yet,

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<sup>13</sup>Place of residence (which coincides with the location where votes are cast) is more appropriate when one keeps the Brexit referendum in mind as a backdrop for our paper. Our results are robust, albeit estimated less precisely, when using wage data provided at the place of work (see Appendix Table A2).

<sup>14</sup>Using the full sample and controlling for BSS subset variables at baseline, interacted with year dummies, yields very similar graphs.

all five figures, for mean and median as well as for the 75th, 25th and 10th percentile of the wage distribution show that there is no evidence of diverging pre-trends for the few years before 2004. However, wage effects set in as early as 2 years after EU enlargement in 2004 in around 2006, thus *prior* to the recession induced following the Lehman brothers collapse in summer 2008. We will return to estimated treatment effects later.

**Demand for Benefits** We measure different dimensions of the demand for benefits across types of benefits that have been relatively little affected by the substantive welfare reforms that took place over our sample period: we focus on the number of claimants of job seeker allowance and income support and incapacity benefit recipients. Especially the job seeker allowance and incapacity benefits are said to be particularly accessible for migrants from EU accession countries and the popular debate about migration suggested that there were significant concerns about the misuse of the generosity of the British welfare system. The data is available as a balanced panel covering the period from 2000 to 2015. Again, it is instructive to look at pre-trends, this time going back a couple of years more. Figure 8 shows no indication of pre-trends for both job seeker allowance claimants and incapacity and benefit and employment support allowance claimants, but an effect of AC12 migration on the same right after 2004. Again, we will return to this as we discuss all our regression results.

We next turn to our discussion of the data we use to analyze the distributional effects of migration.

## 4.2 Within and between group decomposition

The analysis of broad labour market data, such as wages and the demand for benefits, fails to take into account the *composition* of effects across different population groups. If migrant workers are not perfect substitutes for domestic workers, the impact of migration on wages of natives could be much weaker.<sup>15</sup> Similarly, the increased demand

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<sup>15</sup>Our focus is on labour market outcomes across different country-of-origin groups, whereas the literature often looks effects across workers in different parts of the wage distribution, or across different occupations without regard to nationality or region of origin (see e.g. [Goos and Manning \(2007\)](#) and [Goos et al. \(2014\)](#)). We deliberately look at country-of-origin groups because of the natural link

for benefits could be capturing migration into the welfare system, or could capture genuine displacement effects, whereby locals are pushed out of the labour market, into the welfare system.

In order to shed light on the underlying compositional effects, we obtained novel tabulations from the UK Office of National Statistics (ONS) from the 2001 and 2011 censuses. For a range of socio-economic outcomes, such as housing and labour market outcomes, we can tabulate the contribution of each country-of-birth group to the overall total, at the local authority level. Only the 2001 and 2011 census data allow for a breakdown by local authority and country of birth.<sup>16</sup> For instance, in each local authority district, we know how the number of long-term unemployed evolved by the country of birth of the resident population between 2001 and 2011. This data is sensitive and confidentiality protection constraints required the aggregation of the micro data into four main country groups: UK-born, born in another EU15 country, born in an EU accession country and born in the “rest of the world”.<sup>17</sup>

We perform two separate analyses that are complementary and best illustrated through an example, e.g. long-term unemployment.

**Between country-of-origin analysis** The *between country-of-origin* analysis uses, as dependent variables, (i) the level and, alternatively, (ii) the percentage share of the long-term unemployed in local authority area  $c$  that is from country of origin  $o$ . In the first variant, we use the (log) levels of the dependent variable for each country-of-origin group as the dependent variable, i.e. we ask to what extent migration from Eastern Europe increased the number of long-term unemployed among *British* nationals, among those from Eastern Europe, from the old EU15, and among those born in the rest of the world. Increases in the number the long-term unemployed among *British* nationals could be evidence of displacement effects. Increases in the number of

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with the Brexit Referendum which forms the backdrop of our analysis.

<sup>16</sup>Note that the data for overall effects described in the previous subsection are annual data from various sources.

<sup>17</sup>Clearly, country of birth is only an imperfect measure of nationality and to the extent that migrants have children in the UK, they would be counted as “UK-born”. Given that most migrants from Eastern Europe arrived only post 2004, their UK-born children could be a maximum of 7 years old at the time of the 2011 census, so should not affect any of the outcome variables we are looking at.

long-term unemployed of *Eastern European* origin could be capturing migration into the welfare system (or displacement of Eastern Europeans who came to the UK before 2004). Naturally, the point estimates for this analysis are difficult to interpret as the size of the base population varies significantly: a large proportional increase of long-term unemployed from Eastern Europe may still be a small number in absolute terms, while a proportionally small increase of British long-term unemployed may be a large absolute number. For this reason, the second variant uses the percentage share of the long-term unemployed in local authority area  $c$  that is from country of origin  $o$ . This implies a normalization since the percentage shares of the four country-of-origin groups naturally add up to 100%, making it easier to interpret the relative magnitudes.

The setup thus allows us to study whether immigration affects the composition of long-term unemployment *between* country-of-origin groups. Under what scenario would the relative contributions of each country-of-birth group stay flat despite an increase in overall levels of long-term unemployment? This would happen if the levels of long-term unemployed of each country of birth group grew by the same proportionate rate for each country-of-birth group. However, if the rates of growth were to differ across country-of-origin groups, it would cause a compositional shift. Even if long-term unemployment were to *fall* in response to immigration, there could still be compositional shifts whereby some country-of-origin group loses *relative to* other country-of-origin groups. In fact, we will show that most of the growth in long-term unemployment levels is driven by migrants from EU accession countries, consistent with the idea that some migration into the welfare system might have occurred.

**Within country-of-origin analysis** The second exercise is the *within-group* analysis. For instance, we compute *country-of-origin group*-specific long-term unemployment rates. That is: we compute the long-term unemployment rate of the UK-born working age population and similarly, the long-term unemployment rate of working-age individuals from EU accession countries, and so on. We study how these *country-of-origin group*-specific unemployment rates evolved in places that were affected by significant migration from the EU accession countries between 2001 and 2011. Did

the long-term unemployment rate of the UK-born working age population rise more strongly in areas with a larger Accession Shock? This question is interesting against the backdrop of the EU Referendum where British voters might have compared their own circumstances to those of fellow Brits in other local authorities and concluded that they are “left behind” compared to their cousins elsewhere.

**Outcome variables available by country-of-origin groups** Throughout, we focus on four different labour market outcomes and four different outcomes characterizing services and housing demand. As for labour market outcomes, we look at the self-reported long-term unemployment status as well as tabulations of the number of individuals who report to have never worked. Based on the census categorization of socio-economic class of occupations, we measure the share of individuals e.g. working in routine jobs; similarly, based on the sectoral employment figures we compute group specific sectoral employment shares. Lastly, we also explore access to the housing market by studying, in particular, the composition of the demand for social housing and private rental housing, and home ownership.<sup>18</sup>

## 5 Results

We present the main results and show that they are robust to many alternative ways of exploring the underlying data.

### 5.1 Labour Market

We first explore the effect of our Accession Shock measure on wages across different quantiles of the wage distribution. We use data from the Annual Survey of Hours and Earnings reported at the local authority of residence from 2002 to 2015. The results are presented in Table 2. Throughout, we see that our Accession Shock measure is correlated with weakly lower wages. The effect is strongest in the lower quantiles

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<sup>18</sup>In the appendix A, we also explore other margins, such as overall house prices (as in Sa (2015)) and crime (as in Bell et al. (2013)). We relegate this analysis to the appendix as here, we can not provide a decomposition by the respective country-of-birth group.

of the wage distribution, with the point estimate for the effect for the 10th percentile being similar to that of the 25th percentile. But even at the median and 75th percentile, there are mildly negative effects of AC12 migration.

While the effects are statistically significant, they are not as economically significant as one might expect. The coefficient estimates suggest that the median local authority district, with an AC12 accession shock measure of .012 (i.e. an AC12 flow of migrants equivalent to 1.2 percent of the 2001 population), sees a reduction in 25th percentile hourly wages by 0.7% ( $= -.545 * .012$ ). Even a local authority district receiving an AC12 accession shock at the upper decile (.035), sees a reduction in 25th percentile hourly wages by 'only' 1.9% ( $= -.545 * .035$ ). The relatively small size of the wage effects suggests that while the incidence of the shock is concentrated at the lower end of the wage distribution, it seems implausible to claim that (mild) pressure on wages is the sole explanation for growing anti-immigration sentiment. Appendix Table A2 displays results when using wages measured at place of work instead of at place of residence. Results are similar, albeit less precisely estimated, making us confident that commuting does not have a major influence on the estimates.

The wage effects are in line with [Dustmann et al. \(2013\)](#) who, using overall migration to the UK between 1997 and 2005, find a pattern of effects whereby immigration depresses wages below the 20th percentile of the wage distribution. Appendix Tables A5 shows that the results are robust to also controlling for migration from other country-of-origin groups (rest of the world and EU15). Similarly, Appendix Table A7 shows that we obtain very similar results focusing specifically on migration from Poland. Lastly, Appendix Figure A1 highlights the extent to which the effects are nonlinear in the quantiles of the migration shock, documenting that the effect is concentrated in the lower wage quantiles in local authority areas that saw a migration shock in the higher quintiles.

We next explore the effect of EU accession migration on proxies for the overall demand on the welfare state.

## 5.2 Demand for Benefits

A commonly held belief among British voters is that migration into the UK welfare system is particularly widespread. A study commissioned by the European Commission evaluated the impact of “non-active” EU migrants on the social security systems of host countries. The report estimates that there are 600,000 non-active adult EU migrants living in the UK in 2012, of which an estimated 112,000 were job-seekers. The UK is a striking outlier in these statistics in two extreme ways. On the one hand, the data suggests that across the EU, the unemployment rate of EU migrants in the UK is the *lowest* (standing at 7.5%). On the other hand, the UK has the largest percentage of EU migrant job-seekers who have never worked in their (host) country of residence, standing over one third 37% (compared to 16% in France and 18% in Germany) in 2012.<sup>19</sup> This suggests that migration brings clear benefits to the UK economy, due to the low unemployment rates among this group. However, it also suggests that there are potentially cases of misuse facilitated by the ease of access to benefits, which populists may use to create a negative image of immigration.

We explore the extent to which there are significant changes to the demand for types of benefits as measured by the number of benefits claimants per capita. The results are presented in Table 3. In particular, we look at the log number of claimants for job seekers allowance, and the the log number of claimants of incapacity benefits and employment support allowance per capita. This data is available as a balanced panel for the period from 2000 to 2015 across local authority districts in the whole of the United Kingdom. Access to the job seekers allowance is particularly easy and may thus be picking up in places that see significant migration, at least in the short run.

The results suggest that local authority districts that saw significant immigration from EU accession countries relative to the baseline stock of EU migrants, experience a marked uptick in the demand for job seeker allowance and incapacity benefits. The effects suggest that for a local authority district with a median migration shock measure of .012, the demand for job seekers allowance has increased by around 2.8%. The effect of AC12 migration on the demand for incapacity benefits is in a similar ball-

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<sup>19</sup>See <http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=1980>, accessed 01.02.2018.

park. Both results combined suggest that places that experienced a larger Accession Shock saw an increased demand for those benefits that are more easily accessible to migrants from EU countries.

The results are robust. Appendix Table A6 shows that the results are robust to also controlling for migration from other country of origin groups (rest of the world and EU 15). Similarly, Appendix Table A8 shows that we obtain very similar results focusing specifically on migration from Poland, which make up the largest group of AC12 migrants. Lastly, Appendix Figure A2 highlights that the effects are stronger in local authority areas that received a larger migration shock relative to areas that received a smaller shock.

### **5.3 Between and within group decomposition**

The preceding analysis suggests that there are significant effects of migration on the labour market and on the demand for benefits.<sup>20</sup> What the analysis so far does not address is the distribution of these effects across UK-born or foreign-born residents, i.e. the incidence of migration effects (if any). We tackle this in the next section, studying the impact of Eastern European migration on labour market outcomes of natives, both on the extensive and intensive margin. Before concluding, we also briefly discuss effects in the housing market.

Labour market pressures following from Eastern European migration may operate along the extensive and the intensive margin. Along the extensive margin, migration may cause some natives to lose their jobs, resulting in increases in unemployment. On the intensive margin, migration may result in worsened job quality and wages for those natives remaining in the same jobs that absorbed significant numbers of migrants; on the other hand, migration into low skill and low quality jobs may also open up the possibility for natives to move up into higher quality jobs.

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<sup>20</sup>Appendix A documents that there are no discernible effects when exploring house prices or crime.

### 5.3.1 Labour Market Effects at the Extensive Margin

We start our analysis of labour market outcomes by looking at labour market attachment. We present the results from this analysis in Table 4.

We look at four non-employment states (non-participation; being long-term unemployed; having never worked; being a full-time student) in Panels A-D.

Column (1) suggests that in local areas with a larger influx of Eastern Europeans, the number of individuals in all four non-employment categories (panels A-D) goes up significantly. For instance, the coefficient of 2.145 in Panel B suggests that a local authority receiving a median migration shock of 1.2 witnesses an increase in the total number of the long-term unemployed of around 2.5% ( $= 2.145 * 1.2$ ).<sup>21</sup> The equivalent effects in columns (2) and (3) are 1.88% ( $=1.574*1.2$ ) and 27.407% ( $=22.839*1.2$ ), which have to be viewed against the vastly different baseline levels.<sup>22</sup> Still, as columns (4) and (5) indicate, the ‘market share’ of Eastern Europeans in the pool of long-term unemployed increases.

The same is true across all four non-employment states, when looking at columns (4) and (5). The *between analysis* thus reveals movements in the ‘market share’ of different country-of-origin groups. Putting it simply, the *between analysis* shows that a smaller share of a larger pool (= number of people in a specific non-employment state) goes to the UK-born in areas with a larger inflow of Eastern Europeans.

From a political point of view, the *within group* analysis is of particular interest because it compares natives in high-migration areas to natives in low-migration areas etc. Columns (6) and (7) suggest that there is a significant increase in the long-term unemployment share of the UK-born: for an area with the median accession shock, this share increased by around 2.5% ( $=0.206*1.2/0.097$ ).

This suggests that for *a very small group* UK-born residents, migration from Eastern Europe is associated with a worsening of their own labor market situation with

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<sup>21</sup>This effect size in column (1) is very similar compared to what we documented in the previous section in terms of the demand for job-seeker allowance (which is typically claimed by long-term unemployed).

<sup>22</sup>An increase of 1.88% on 930 long-term unemployed who are UK-born is ca. 17 more UK-born unemployed, whereas the 27% more long-term unemployed of Eastern European origin on a basis of 10 constitutes ca. 3 more long-term unemployed Eastern Europeans.

a statistically significant (but economically small) increase in the level of long-term unemployment among UK born residents.

If we reconcile this with the previous evidence pertaining to the demand for job seeker allowance, the timing pattern there suggested a sharp jump around 2004, which is most consistent with the immediate level increase being mostly driven by Eastern European migrants who temporarily enter the welfare system claiming job-seeker allowance while searching for a job. The overall level of job seeker allowance claimants remains consistently high after 2004. This is simply capturing the fact that the overall increase in the population levels due to migration entails an increased demand for benefits; yet, as this analysis suggest it may also partly capture a small increase due to some UK-born residents becoming unemployed as a result of migration.

### 5.3.2 Labour Market Effects at the Intensive Margin

Turning to the intensive margin, we look at movements of workers across sectors, job types and occupations. In the previous section we discussed in detail how to read regression tables. One key finding of the analysis of effects at the extensive margin was that, in local authorities with high migration from Eastern Europe the ‘market share’ of the UK-born went down across all different outcomes. That is a general finding also when looking at the outcomes in this section: employment shares in different sectors; occupation profiles; and the socio-economic status of occupations. In terms of regression results, coefficient estimates for the UK-born in the *between group* analysis are generally negative and statistically significant and those for Eastern Europeans are positive and statistically significant. This implies that the UK-born lose ‘market share’ at the expense of Eastern Europeans across all sectors, occupation profiles and occupational status groups. This is probably not surprising because a large influx of migrants from Eastern Europe is bound to lead to shifts *between* country-of-origin groups. To save on space, we therefore relegate all tables reporting regression results to the Appendix, Tables [A9](#), [A10](#), and [A11](#).

In what follows, we instead focus on reporting coefficient estimates from the *within group* analysis, i.e. we ask how natives (and Eastern Europeans themselves) fare in

high-migration areas compares to natives (and Eastern Europeans) in low-migration areas. The discussion of the results for the Eastern Europeans is interesting in so far that it provides statistically robust evidence relative to the summary statistics presented in Section 3.4, indicating how Eastern Europeans who arrived after 2004 differ from Eastern Europeans who had already been in the UK in 2001.

**Industry employment shares** Figure 9 provides a visual summary of the estimated effects in columns (6) and (7) of Table A9. The most striking result is the significant decline in high-migration areas of the share of AC12 migrants working in the Health care sector. This suggests that, relative to past migration from AC12 countries, the subsequent flow since 2001 included a smaller percentage of health care professionals (as pre-EU-enlargement migration was bound to be of the high-skilled type). Giuntella et al. (2018) use a shift-share instrumentation using past AC12 migration patterns to study the effects of migration on the performance of the health care system. Their finding of an improvement in performance in places that experience significant migration (as predicted by past migration exposure) suggests that the instrumentation may well pick up only the part of the migration from Eastern Europe after 2004 that is of the high-skill type into places that hosted high skill immigrants before, yet, fails to account for the bulk of the migration. The overall pattern of effects across industry classifications suggests that the industry employment profile of past AC12 migration is only a poor proxy of the industry employment structure of subsequent migration.

The fact that there is no striking pattern in sectoral employment shifts as a result of AC12 migration, could be the result of the fact that sectors of the economy are relatively coarse groupings to capture the flow of migrants. Instead of the ‘horizontal distribution’ across sectors, migration may be more influential to understand movements across occupational profiles and/or status groups. While there is likely a partial overlap between sector and occupation choice, there is clearly also a lot of within-sector variation in occupational profiles and status, which is why those merit attention of their own.

**Occupational profiles** Occupation profiles tell us about the roles an employee takes in the economy. The census gives a rich set of descriptors, ranging from man-

agers/directors, science/research roles to processing roles and plant operators. As in earlier tables, by virtue of an increase in the number of AC12 residents, the share of the UK-born across all occupation profiles shrinks relative to AC12 residents, as can be seen in columns (4) and (5) of Table A10. Again, it is more interesting to take the within-group perspective in columns (6) and (7), and illustrate coefficient estimates in Figure 10. Some interesting patterns emerge: the UK-born in high-AC12-influx areas are more likely to move into manager/director roles, but also see an increase in personal care service jobs and in sales occupations, whereas there is a decrease in business services jobs, skilled trades jobs, elementary trades & administration, as well as in process & plant operator jobs.

Turning to outcomes for the AC12 migrants themselves, the second panel of Figure 10 suggests that high-AC12-influx areas see a strong increase in the share of Eastern Europeans working as process and plant operators and in elementary trades and administration, highlighting again that there are significant differences between those AC12 migrants that had been in the UK already in 2001 and those that arrived afterwards in terms of how they are integrated in the labor market in terms of the occupation groups.

**Socio-economic status** While the composition of employment is telling about the sectoral and occupation level recompositioning by country-of-origin groups, it does not reveal the nature and quality of jobs held. We can analyse this using the socio-economic classification of jobs held. The Office of National Statistics classifies jobs held according to the National Statistics Socio-economic classification (NS-SEC), which has been constructed to measure the employment relations and conditions of occupations according to the scheme proposed by Goldthorpe and Jackson (2007). The classification scheme distinguishes two main groups of employment. The first one is composed of managers and professionals, while the second group can broadly be classified as “the working class”. Occupations belonging to the first group are characterized by their high and secure incomes that rise progressively as careers develop, by the authority that they exercise in their work organization and by the discretion they enjoy. This contrasts with work relationships in the working class, which are

characterized by low trust with terms and conditions of work strictly contractual. Jobs in that category are inherently less secure and unemployment risks higher, with limited career prospects and most employees are not responsible for the work of any other staff. In total, the five class representation distinguishes between (i) Managerial and professional occupations, (ii) Intermediate occupations, (iii) Small employers and own account workers, (iv) Lower supervisory and technical occupations and (v) Semi-routine and routine occupations. The reference population throughout is the working age population.

We present the results pertaining to the effect of immigration on the distribution across socio-economic status categories of jobs in Table A11. The levels of UK-born participants in the labour market across the different socio-economic status groups has shrunk at the very top (Managerial occupations) and at the bottom (lower supervisory and routine occupations) as evidenced in column (2). Meanwhile, the levels of AC12-born residents working across all socio-economic status groups has grown strongly. This suggests that there have been significant compositional changes due to the distinct rates of growth of totals for UK born and AC12 born residents in places that saw significant migration from AC12 countries; this is evidenced in the coefficients in columns (4) and (5) of Table A11, which tell us that share of the UK-born of the total in any socio-economic status category goes down as a function of AC12 migration, whereas the opposite is true for AC12 residents themselves results in significant expansions.

Figure 11 provides a visual display of the coefficient estimates of this *within group* analysis that is also provided in columns (6) and (7) of Table A11. We find that in areas with more AC12 migration, the share of the UK-born in occupations at the top end of the status distribution (Managerial & Professional occupations and Intermediate) went up, while the share of the UK-born in lower supervisory occupations and routine & semi-routine jobs decreased. This suggests a certain degree of mobility of those UK born residents who remain active in the labor market to move up into jobs with higher socio-economic status.

We find somewhat of a mirror image for AC12 migrants themselves. In areas with more AC12 migration, the share of AC12 migrants in at the top end of the status

distribution decreases, while it increases in routine & semi-routine jobs. Again, this highlights that past AC12 migrants are structurally very different from the subsequent flow of migration to the UK that ensued following the EU accession.

## 5.4 Summary of the between and within analysis

Altogether, the results presented here document that migration from Eastern Europe has put (mild) pressures on the labour market in places that received significant migration from Eastern Europe, with mixed consequences. At the extensive margin, there is a mild increase in long-term unemployment. But most of the action is at the intensive margin, where UK-born workers in high-AC12-influx areas seem to move up in occupational status. In other words, increased competition at the lower end of the occupational status distribution does not necessarily have negative effects, but may be offset by pushing natives up the hierarchy.

What seems to be the case however, is that immigration was not supported by accommodating fiscal policies, such as support for housing construction and general improvements in the ability of the public services to cope with increased demand for services, as suggested by our earlier results. Remember that in the wake of the financial crisis, the British government set out on a period of fiscal austerity with dramatic effects on public spending. Increased demand for public services was met with austerity. While this did not erode the *relative* rates of access to the welfare system by UK-born residents living in areas more affected by migration from Eastern Europe, competition over increasingly difficult-to-access services might have been (rightly or wrongly) interpreted as being associated with immigration.

While we cannot pursue an analysis by country-of-origin for all of our outcomes, census data reveals different types of housing arrangements by country-of-birth allowing us to shed light on the housing market. In Appendix A, we show that – based on the *within group* analysis, in high-AC12-influx areas, the share of the UK-born home-owners decreases and the share of those in rented housing increases, compared to low-AC12-influx areas. The same is true for the AC12-born themselves. Additionally, the AC12-born in high-AC12-influx areas are *less* likely to live in social rented housing. This suggests that in areas with larger AC12 migrant flows, additional de-

mand is largely absorbed by additional private rented housing, but not by additional social rented housing. This potentially contributes to the impression that migration from Eastern Europe made it harder to move up the housing ladder and realize the proverbial British dream of home ownership.

## 6 Conclusion

Free movement of labour is an integral part of the EU's Single Market rules. However, this paper suggests that free movement of labour also has effects on various economic outcomes. It is possible that some of these effects might have contributed to a shift in the mood in the UK against the EU, which was seen as being the reason behind 'unrestricted migration' and led to calls to 'take back control' during the Brexit Referendum campaign. [Colantone and Stanig \(2018\)](#) and [Viskanic \(2017\)](#) documented a link between AC12 migration and the Brexit vote, but not the effect of migration on intermittent variables, as we do.

Our analysis shows that the migration flow from EU accession countries after 2004 was distinct from past migration from the same countries, both in terms of its geographical pattern and the composition of the group of migrants. The stock of migrants from Eastern Europe that resided in the UK before 2004 was largely composed of two groups: older migrants who came to the UK in the wake of WW2. After the fall of the Iron Curtain in 1990 and before EU enlargement, migration from Eastern Europe was regulated by work visas favouring the high-skilled. Most of them settled in the South-East of the UK and in urban areas. After 2004, newly arriving AC12 migrants came from across the whole skill distribution and settled also in more rural areas, which often had not been subject to large migration flows before.

Our results indicate that AC12 migrants are moving into occupations and sectors that tend to provide low quality jobs. Yet, while we document that there is a statistically significant (but small) effect on unemployment of natives, the bulk of natives (continue to) work in other sectors and occupations, many of which are of higher socio-economic status. This may help understand why the overall wage effects are relatively small. Our result suggests that the overall labour market effect of migra-

tion from Eastern Europe may have been beneficial to most of the UK-born as many moved into higher-status occupations.

Complementary evidence shows also an increased demand for benefits and for private rented housing, consistent with increased pressures on public services and housing arising from AC12 migration, which suggests that the government may have been too slow in accommodating the inflow of migrants. This in turn may have contributed to the impression, frequently heard in the run-up to the UK's EU Referendum, that migration affected the quality of public service provision.

Free movement of labour continues to be an important issue in the ongoing negotiations between the UK and the EU27. While our results suggest that the public perception of negative labour market consequences of EU migration on natives are exaggerated, there do seem to be pressures on housing and possibly on the welfare state. The government may have been too slow in accommodating increased population numbers due to migration. Importantly, while free mobility of labour is agreed at the EU level, policies to accommodate immigration are a national responsibility. A lesson from our analysis is thus that the freedom of movement of labour within the EU has to be accompanied by public policies that provide sufficient support to local housing and public services.

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# Figures and Tables for the Main Text

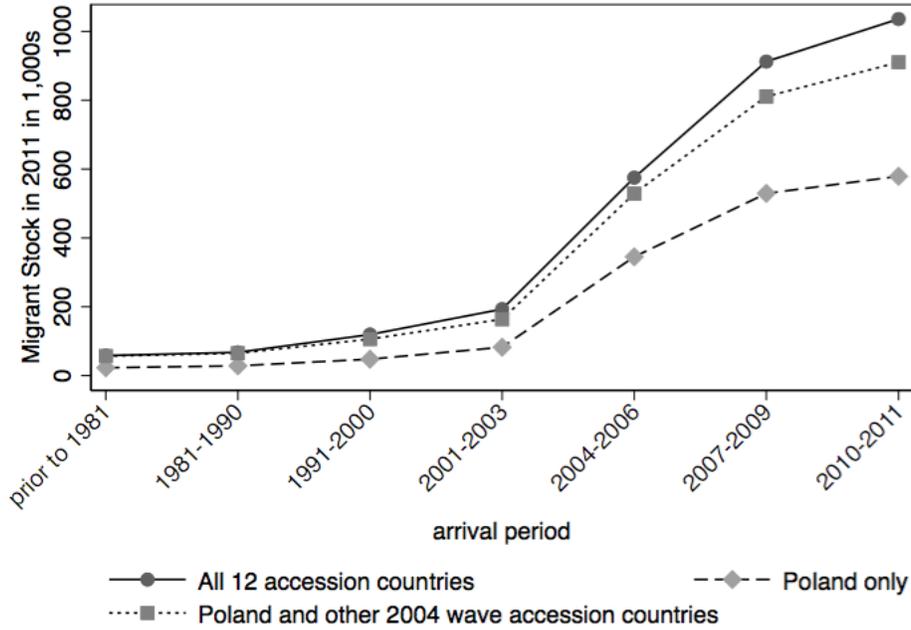


Figure 1: This figure presents the year of arrival for the stock of migrants as of the census date in 2011. It is quite clear that there was a significant influx of migrants from the 2004 accession countries, mostly driven by individuals from Poland.

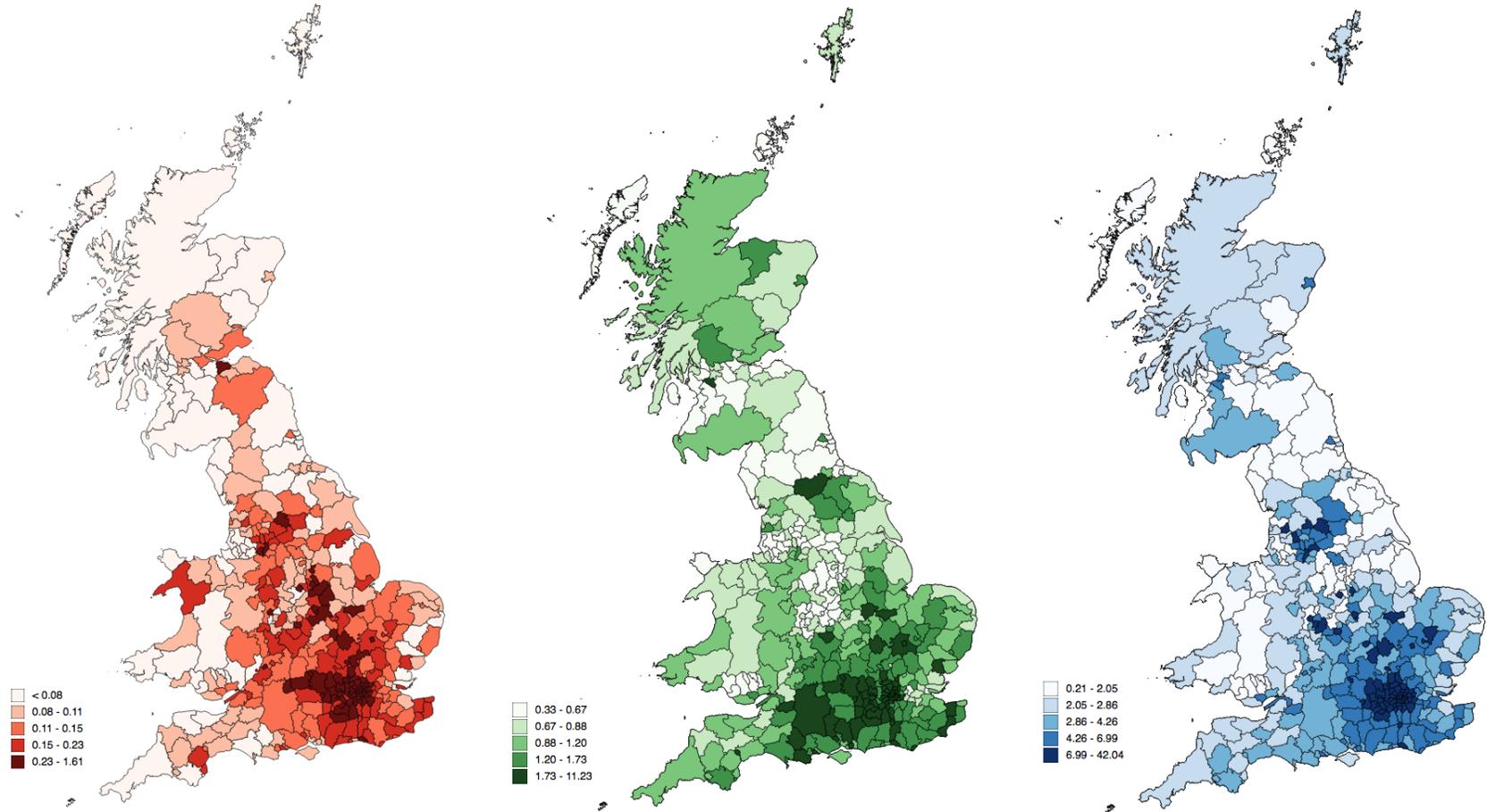
Figure 2: Distribution of the initial stocks of AC12, EU 15 and Rest of the World born UK residents in 2001 (in percent).

Panel A: AC12

Panel B: EU 15

Panel C: Rest of World

38



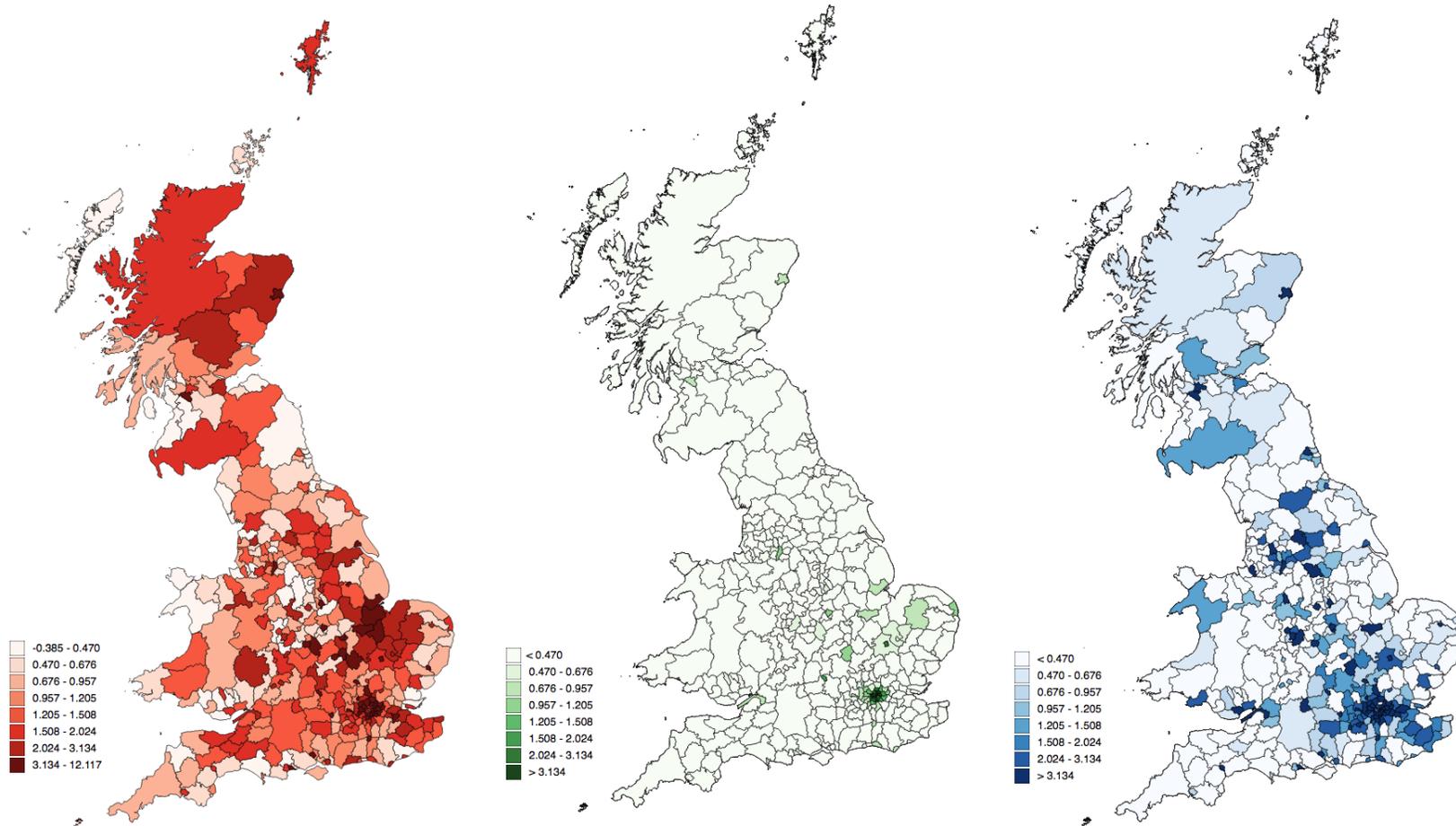
**Notes:** The geographic pattern of the stock of AC12 immigrants in 2001 is roughly similar to the one displayed by immigrants coming from the EU15 and the Rest of World, their share is overall lower. The underlying data is 2001 census data measuring the resident population in a local authority by the country of birth, in quintiles of the respective region of origin.

Figure 3: Distribution of inflow of immigrants from AC12, EU 15 and the Rest of the World between 2001 and 2011 relative to the 2001 population in percent

Panel A: AC12

Panel B: EU 15

Panel C: Rest of World

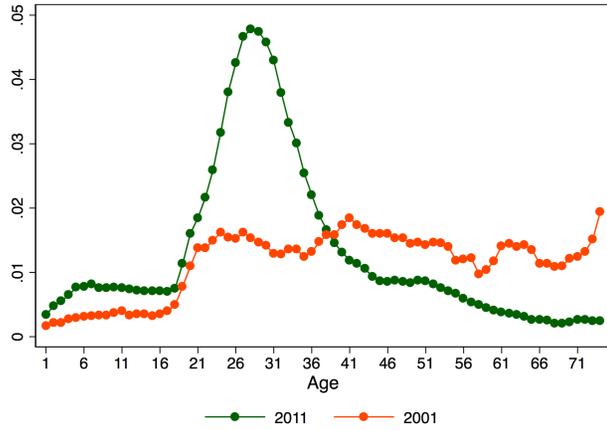


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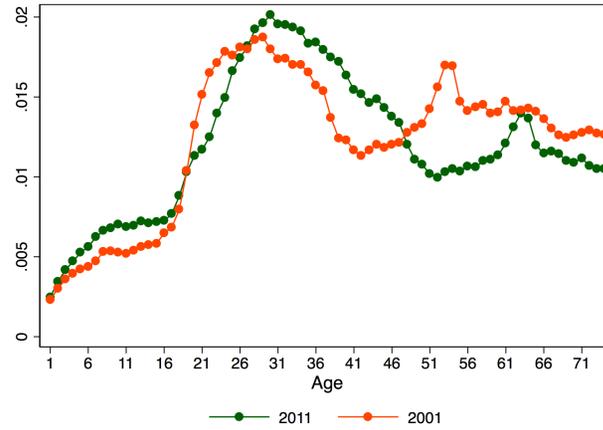
**Notes:** The distribution of new AC12 immigrants over the period 2001 to 2011 follows distinctly different patterns compared to the pattern displayed by immigrants coming from the EU15 and the Rest of the World. The underlying data is the change in the share of migrants residing in a local authority area between the 2001 and 2011 census, by region of origin. The shading intensity is identical across the three groups, showing that migration from AC12 countries (a) was the strongest in this period and (b) followed a distinct geographical pattern. Comparing this flow figure to the stock figure before shows what seems an Eastward shift in England in the location pattern of Eastern Europeans while the location pattern of new arrivals from EU15 and ROW countries remains very similar to the initial stock.

Figure 4: Who are the AC12 migrants? Age profile of resident population by country of birth in 2001 and 2011

Panel A: born in AC12

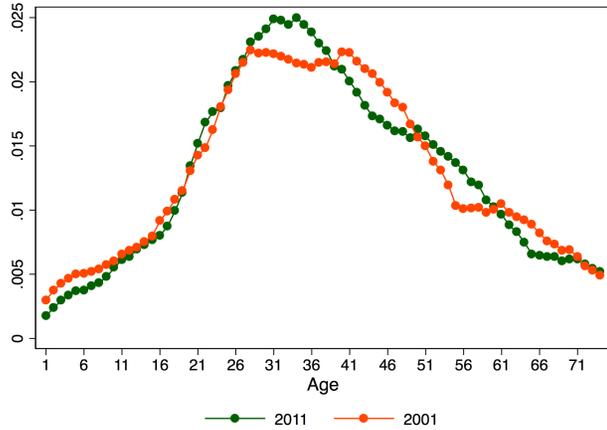


Panel B: born in EU15

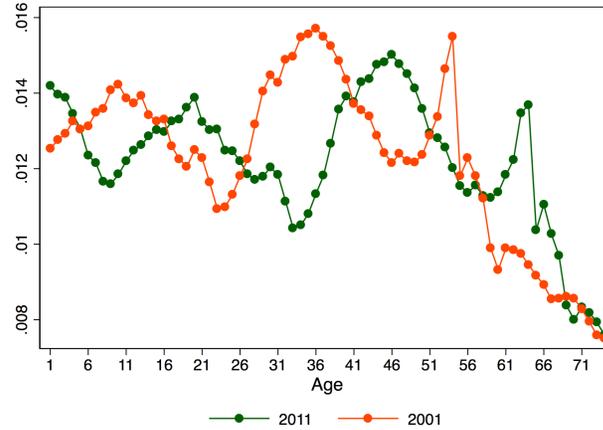


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Panel C: born in ROW



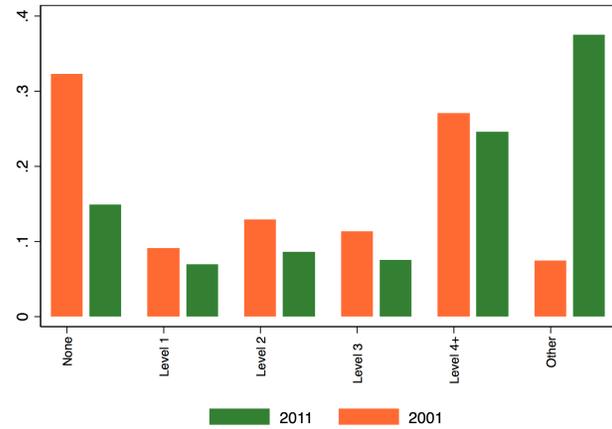
Panel D: born in UK



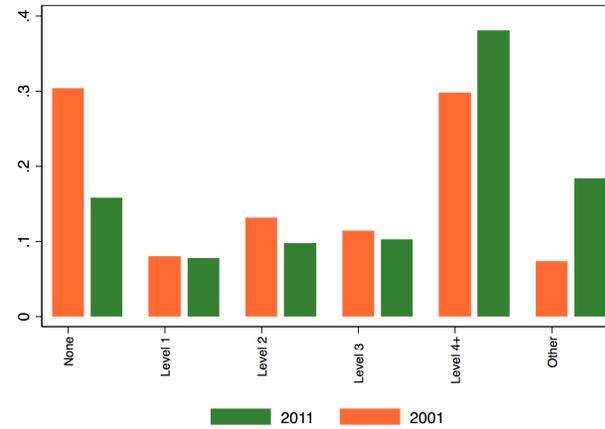
**Notes:** The bulk of the 2011 residents born in AC12 countries is aged between 20-40. The underlying data is 2001 and 2011 census measuring the resident population in a local authority by the country of birth. The underlying data is 2001 and 2011 census measuring the resident population in a local authority by the country of birth.

Figure 5: Who are the AC12 migrants? Qualification profile of resident population relative to the own country of birth group totals in 2001 and 2011

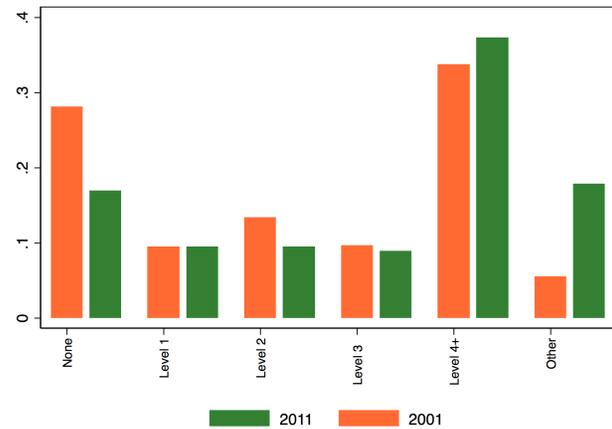
Panel A: born in AC12



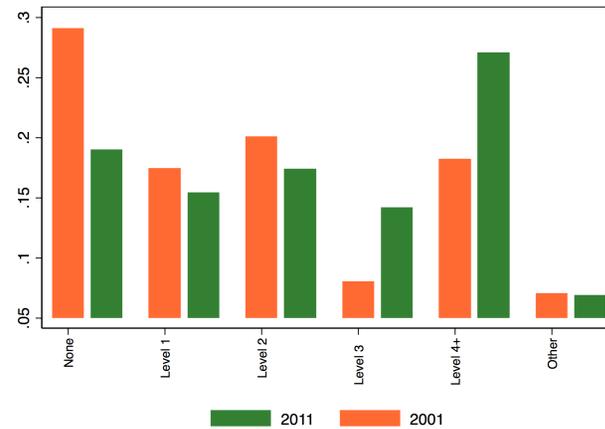
Panel B: born in EU15



Panel C: born in ROW



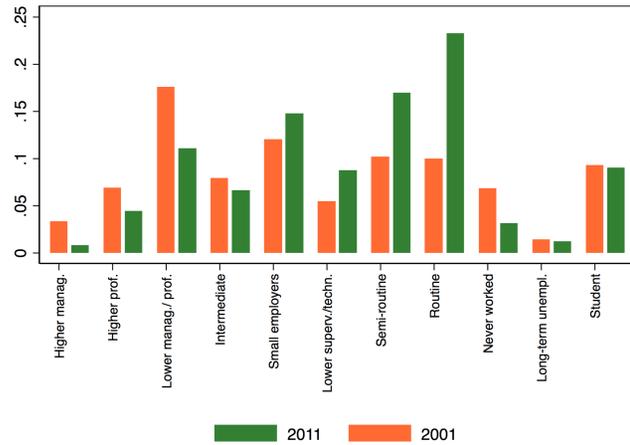
Panel D: born in UK



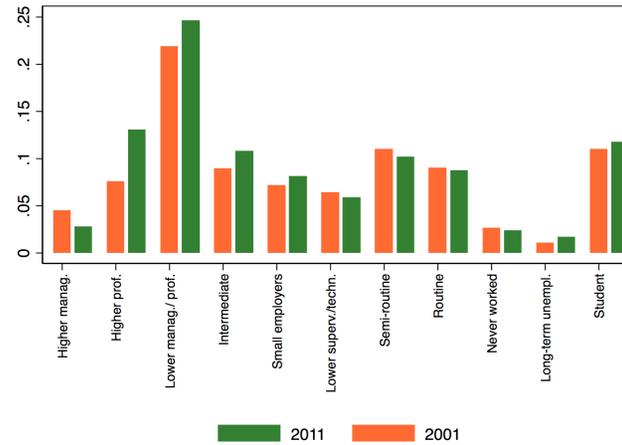
**Notes:** This figure presents the distribution of qualifications of the resident population born in AC12 and EU15 countries in 2001 and 2011 relative to the group total. The bulk of the 2011 residents born in AC12 countries has "Other" qualifications that do not directly map into the UK system of qualifications. The underlying data is 2001 and 2011 census measuring the resident population in a local authority by the country of birth.

Figure 6: Who are the AC12 migrants? Socio-economic status classification of resident population relative to the own country of birth group totals in 2001 and 2011

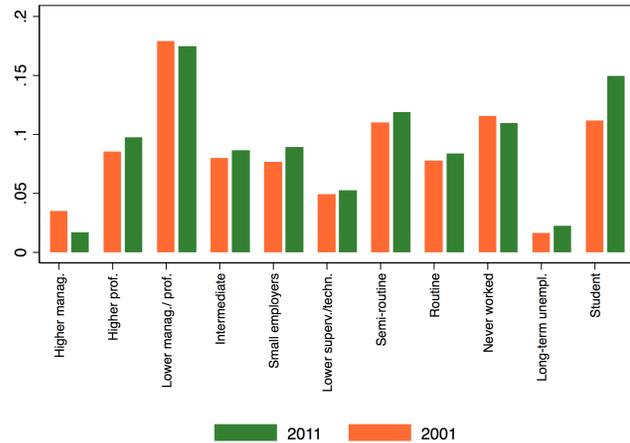
Panel A: born in AC12



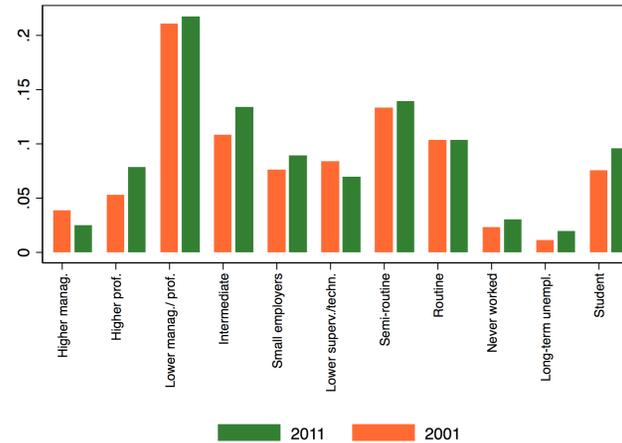
Panel B: born in EU15



Panel C: born in ROW



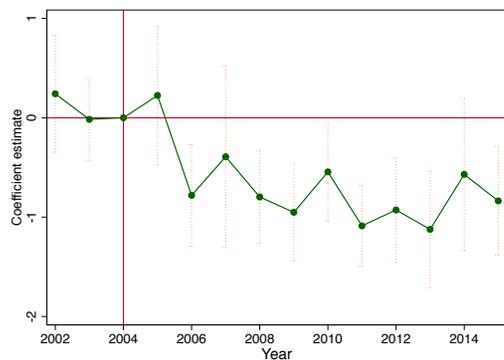
Panel D: born in UK



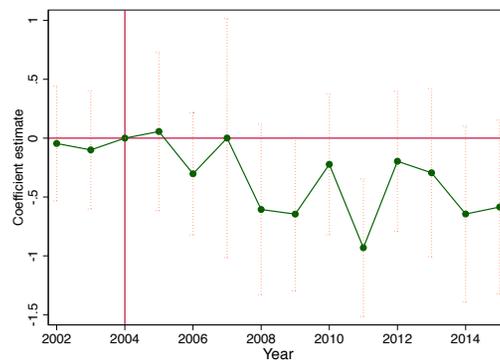
**Notes:** This figure presents the distribution of the resident population born in AC12 and EU15 across the UK's national statistics socio-economic classification of occupations in 2001 and 2011 relative to the group total. The bulk (40 %) of the 2011 residents born in AC12 countries is working in routine- or semi-routine occupations. The underlying data is 2001 and 2011 census measuring the resident population in a local authority by the country of birth.

Figure 7: Effect of AC12 migration on wages at different quantiles of the wage distribution.

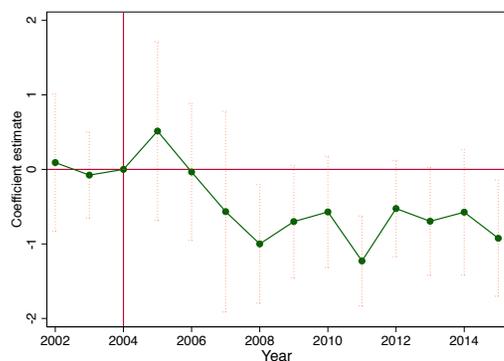
Mean



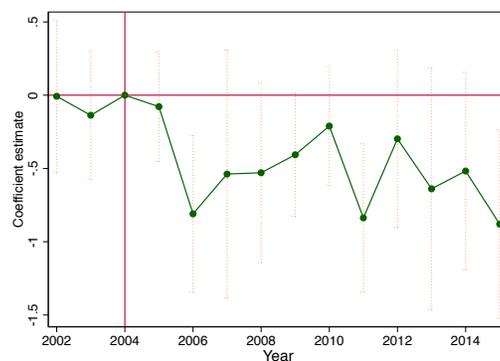
Median



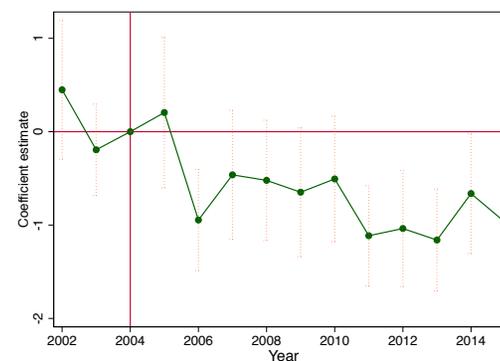
75th percentile



25th percentile



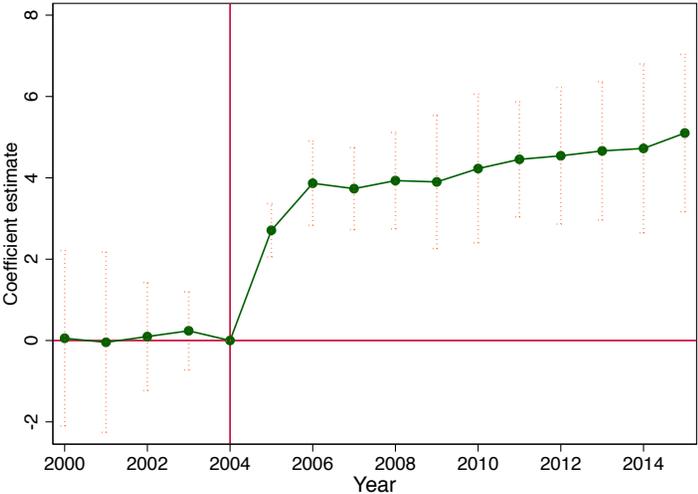
10th percentile



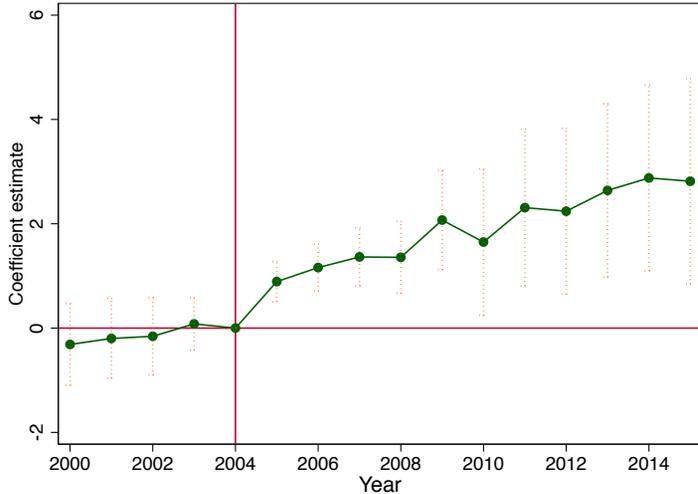
**Notes:** Figure presents evidence in support of common trends assumption for wage variable. The top panel presents the mean and median wages, while the bottom presents the results pertaining to the 75th, 25th and 10th percentile. The figures are estimated on the respective matched sample and present estimated coefficients from a specification interacting the Accession Shock variable with year dummies, controlling for local authority and region by year fixed effects. 10% confidence bands are indicated as dashed lines.

Figure 8: Effect of AC12 migration on the demand for benefits.

Job Seeker Allowance

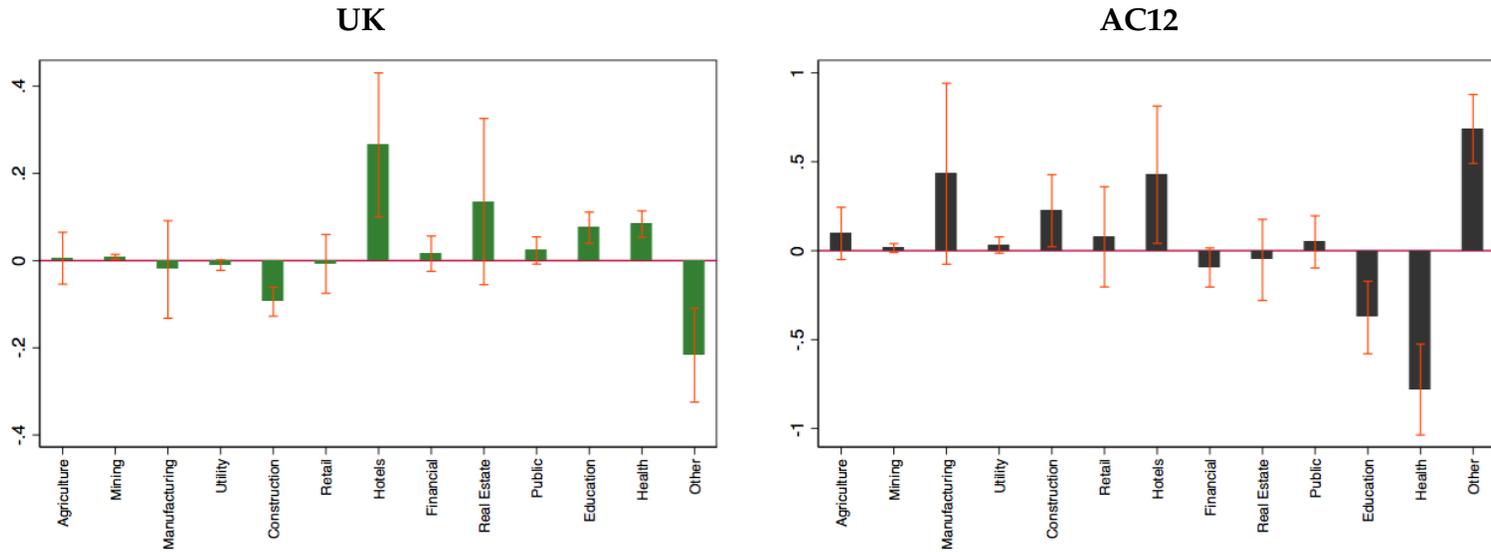


Incapacity Benefit & Employment Support Allowance



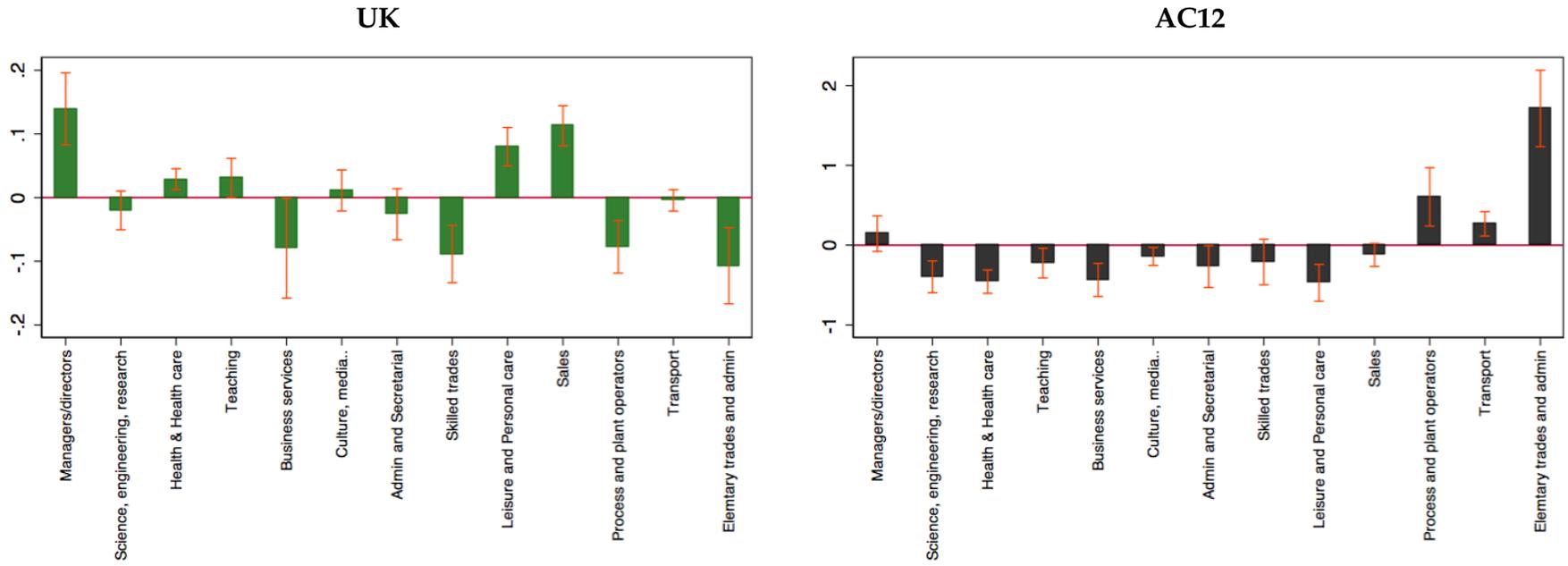
**Notes:** Figure presents evidence in support of common trends assumption for the demand for benefits measures. The left panel measures the demand for job seeker allowance, while the right panel measures demand for incapacity benefits. The figures are estimated on the respective matched sample and present estimated coefficients from a specification interacting the Accession Shock variable with year dummies, controlling for local authority and region by year fixed effects. 10% confidence bands are indicated as dashed lines.

Figure 9: *Within group* industry employment profile changes of UK-born and AC12 born residents due to migration between 2001 and 2011.



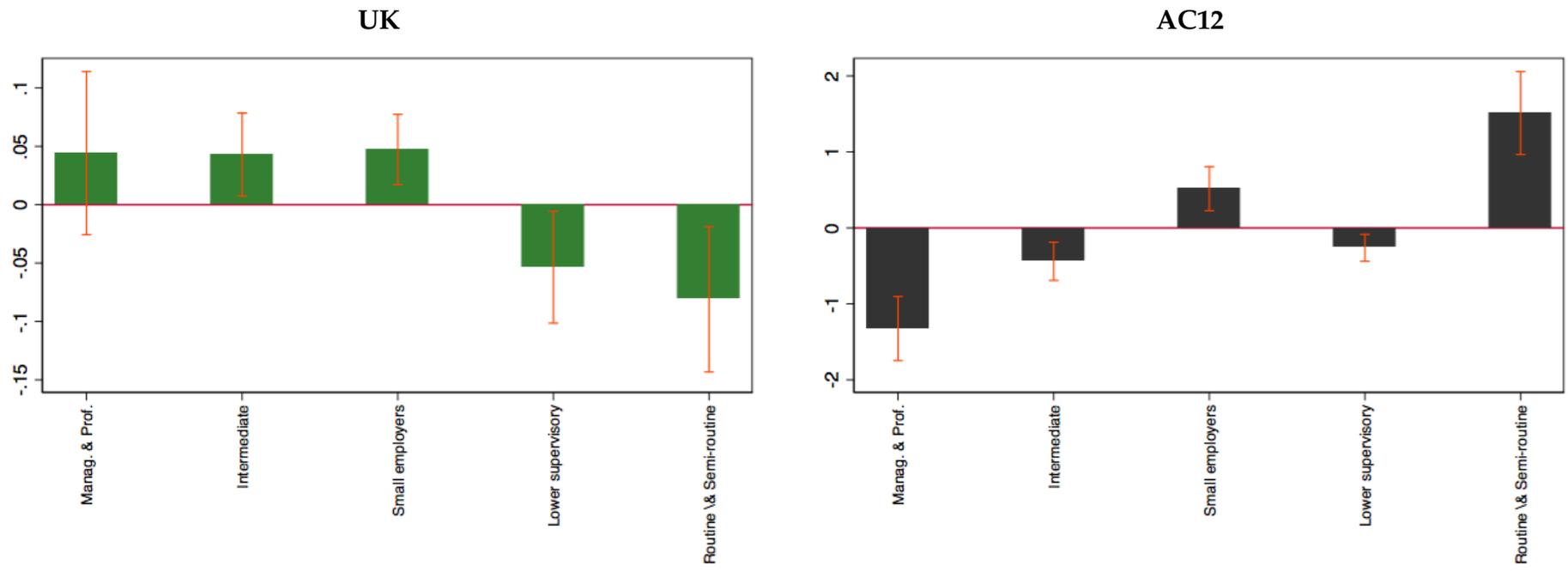
**Notes:** Figure visually displays the results summarized in columns (6) and (7) of Table A9. The figures present the changes in the respective country of birth group employment rate among all working age residents from this country of birth group in a local authority district that are due to an area experiencing a migration shock. 10% confidence bands obtained from clustering standard errors at the district level are indicated as dashed lines.

Figure 10: *Within group* occupational profile changes of UK-born and AC12 born residents due to migration between 2001 and 2011.



**Notes:** Figure visually displays the results summarized in columns (6) and (7) of Table A10. The figures present the changes in the respective country of birth group shares rate among all employed working age residents from this country of birth group in a local authority district that are due to an area experiencing a migration shock. 10% confidence bands obtained from clustering standard errors at the district level are indicated as dashed lines.

Figure 11: *Within group socio-economic employment status profile changes of UK-born and AC12 born working age residents economically active in employment due to migration between 2001 and 2011.*



**Notes:** Figure visually displays the results summarized in columns (6) and (7) of Table A11. The figures present the changes in the respective country of birth group shares rate among all economically active working age residents from this country of birth group in a local authority district that are due to an area experiencing a migration shock. 10% confidence bands obtained from clustering standard errors at the district level are indicated as dashed lines.

Table 1: What predicts where AC12 migrants settle across the UK?

	Accession Shock														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Urban District	-0.006*** (0.002)	-0.005*** (0.001)								-0.005*** (0.001)	-0.006*** (0.002)	-0.005*** (0.001)	-0.006*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)
Share of resident population born in continental EU 15 [2001]	-0.055 (0.196)														
Share of resident population born in EU Accession countries[2001]	0.914 (0.916)	0.867 (0.959)													0.867 (0.959)
Share of resident population born in rest of world [2001]	0.181*** (0.036)	0.208*** (0.028)	0.155*** (0.019)	0.191*** (0.019)	0.212*** (0.019)	0.237*** (0.023)	0.220*** (0.024)	0.225*** (0.025)	0.207*** (0.022)	0.225*** (0.023)	0.226*** (0.023)	0.221*** (0.023)	0.227*** (0.023)	0.222*** (0.023)	0.208*** (0.028)
Median Wage	-0.001 (0.001)														
Deprivation Index (2001)	0.001 (0.001)							-0.002*** (0.001)							
Agriculture employment share (2001)	0.149* (0.084)	0.143** (0.057)				0.131** (0.056)	0.129** (0.057)		0.220*** (0.058)	0.197*** (0.058)	0.190*** (0.053)	0.186*** (0.054)	0.142*** (0.055)	0.135** (0.055)	0.143** (0.057)
Mining employment share (2001)	0.073 (0.165)														
Manufacturing employment share (2001)	-0.040 (0.029)	-0.044** (0.018)											-0.042** (0.019)	-0.044** (0.018)	-0.044** (0.018)
Finance employment share (2001)	-0.075** (0.033)	-0.074** (0.034)											-0.068** (0.034)	-0.075** (0.034)	-0.074** (0.034)
Transport employment share (2001)	0.034 (0.032)														
Resident Population 16-64 share Qualification 4+ (2001)	-0.098** (0.049)	-0.124*** (0.034)			-0.112*** (0.028)	-0.085*** (0.016)	-0.098*** (0.016)	-0.123*** (0.021)	-0.128*** (0.030)	-0.123*** (0.030)	-0.128*** (0.031)	-0.130*** (0.031)	-0.111*** (0.032)	-0.113*** (0.032)	-0.124*** (0.034)
Share of population aged 64plus (2001)	0.004 (0.031)														
Share of Households living in Council rented housing (2001)	0.056*** (0.015)	0.057*** (0.011)						0.053*** (0.012)	0.058*** (0.011)	0.058*** (0.010)	0.057*** (0.010)	0.060*** (0.011)	0.052*** (0.011)	0.056*** (0.011)	0.057*** (0.011)
Share of Households living in private rental housing (2001)	0.118*** (0.039)	0.129*** (0.031)					0.093*** (0.027)	0.154*** (0.031)	0.149*** (0.029)	0.145*** (0.029)	0.140*** (0.030)	0.141*** (0.030)	0.132*** (0.030)	0.133*** (0.030)	0.129*** (0.031)
Share of Households living in mortgaged house (2001)	0.100*** (0.028)	0.098*** (0.016)				0.031** (0.012)	0.057*** (0.013)	0.042** (0.017)	0.104*** (0.016)	0.100*** (0.016)	0.094*** (0.016)	0.093*** (0.016)	0.099*** (0.016)	0.099*** (0.016)	0.098*** (0.016)
Share of resident population with low qualifications (2001)	-0.027 (0.048)	-0.022 (0.029)		0.052*** (0.012)	-0.029 (0.021)				-0.036 (0.026)	-0.030 (0.026)	-0.036 (0.025)	-0.038 (0.025)	-0.015 (0.029)	-0.017 (0.029)	-0.022 (0.029)
Constant	-0.002 (0.037)	-0.009 (0.023)	0.008*** (0.001)	-0.022*** (0.006)	0.042*** (0.016)	0.005 (0.005)	-0.009 (0.006)	-0.007 (0.010)	-0.016 (0.022)	-0.017 (0.022)	-0.011 (0.022)	-0.009 (0.022)	-0.016 (0.022)	-0.013 (0.023)	-0.009 (0.023)
R2	.559	.55	.377	.426	.45	.467	.484	.498	.517	.527	.532	.536	.542	.547	.55
N	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380

Notes: Table reports results from a the matching specification. The dependent variable is a dummy indicating whether a local authority district experienced an Accession shock in the upper quartile. Column (1) presents all cross sectional characteristics, while column (2) restricts the set of regressors to be those that are identified using best subset selection. Robust standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 2: Effect of Migration from EU Accession countries on the wage distribution.

	Whole sample				Matched sample
	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Mean Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.381*** (0.132)	-0.483*** (0.135)	-0.547*** (0.146)	-0.535*** (0.161)	-0.783*** (0.294)
LGA Districts	380	347	380	347	73
Observations	5245	4790	5245	4790	1022
<i>Panel C: 75th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.201 (0.128)	-0.277* (0.158)	-0.271* (0.152)	-0.229 (0.172)	-0.557* (0.304)
LGA Districts	375	342	375	342	73
Observations	4849	4403	4849	4403	982
<i>Panel C: Median Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.205 (0.146)	-0.129 (0.164)	-0.306* (0.175)	-0.134 (0.170)	-0.349 (0.276)
LGA Districts	379	346	379	346	73
Observations	5227	4777	5227	4777	1019
<i>Panel D: 25th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.545*** (0.156)	-0.452*** (0.170)	-0.573*** (0.184)	-0.418** (0.177)	-0.474* (0.276)
LGA Districts	379	346	379	346	73
Observations	5244	4791	5244	4791	1022
<i>Panel E: 10th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.520*** (0.128)	-0.453*** (0.150)	-0.556*** (0.154)	-0.496*** (0.176)	-0.796*** (0.247)
LGA Districts	378	345	378	345	73
Observations	5167	4717	5167	4717	1011
Sample	All	Not London	All	Not London	All
LGA District FE	Yes	Yes	Yes	Yes	Yes
Region x Year FE	Yes	Yes	Yes	Yes	Yes
Year x Matching Controls	No	No	Yes	Yes	No

Notes: Table reports results from a panel OLS regressions. The dependent variable is the log of hourly wages in the respective percentile of the earnings distribution in a local authority from the Annual Survey of Hours and Earnings. The data set is a balanced panel of hourly wages by location of residence from 2002 to 2014 across different quantiles. A few observations are missing as the Office of National Statistics deemed the statistics not precise enough. Columns (3) - (4) control for a full set of interactions between baseline predictor variables of the AC12 Accession Shock and year variables, as described in the main text. Column (5) restricts the analysis to matched pairs of observations whose propensity score difference predicting the upper quartile of the accession shock measure is less than 0.05. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 3: Effect of Migration from EU Accession on demand for benefits.

	Whole sample				Matched sample
	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Jobseeker Allowance</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	2.322*** (0.492)	2.704*** (0.549)	2.851*** (0.563)	3.192*** (0.676)	4.099*** (1.203)
LGA Districts	380	347	380	347	73
Observations	6080	5552	6080	5552	1168
<i>Panel B: Incapacity &amp; Employment Support Allowance</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	2.907*** (0.443)	3.938*** (0.667)	1.299*** (0.404)	2.004*** (0.387)	2.061** (0.855)
LGA Districts	380	347	380	347	73
Observations	6080	5552	6080	5552	1168
Sample	All	Not London	All	Not London	All
LGA District FE	Yes	Yes	Yes	Yes	Yes
Region $\times$ Year FE	Yes	Yes	Yes	Yes	Yes
Year $\times$ Matching Controls	No	No	Yes	Yes	No

Notes: Table reports results from a panel OLS regressions. The dependent variable in Panel A is the log of the annual average number of job seeker allowance claimant counts from the ONS from 1999 to 2015. The data in panel B is obtained from the Department for Work and Pensions Longitudinal Study (WPLS) covering 1999 to 2015. The dependent variable in panel B is the log total number of incapacity benefit claimants. Columns (3) - (4) control for a full set of interactions between baseline predictor variables of the AC12 Accession Shock and year variables, as described in the main text. Column (5) restricts the analysis to matched pairs of observations whose propensity score difference predicting the upper quartile of the accession shock measure is less than 0.05. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 4: Effects of migration from EU Accession countries on labour market participation and unemployment: Overall, Between and Within country-of-origin group effects.

	Whole sample						
	log value of respective level			Share between country group in %		Share within country group in %	
	Total (1)	UK (2)	Accession (3)	UK (4)	Accession (5)	UK (6)	Accession (7)
<i>Panel A: Non-participating</i>							
Post 2004 × Δ EU Accession/Initial Pop	2.185*** (0.430)	0.402 (0.341)	20.112*** (2.567)	-1.107*** (0.175)	0.584*** (0.039)	0.297*** (0.060)	-0.971*** (0.184)
Mean of DV in 2001	11.65	9.38	.07	87.01	.45	10.07	12.17
<i>Panel B: Long-term unemployed</i>							
Post 2004 × Δ EU Accession/Initial Pop	2.145** (0.858)	1.574* (0.846)	22.839*** (4.511)	-0.429*** (0.122)	0.393*** (0.046)	0.206** (0.093)	0.264 (0.372)
Mean of DV in 2001	1.09	.93	.01	89.52	.47	9.7	11.76
<i>Panel C: Never worked</i>							
Post 2004 × Δ EU Accession/Initial Pop	1.673*** (0.469)	0.469 (0.391)	26.654*** (3.264)	-0.717*** (0.129)	0.550*** (0.062)	-0.024 (0.077)	-0.062 (0.705)
Mean of DV in 2001	2.93	1.96	.03	80.05	.74	20.34	36.15
<i>Panel D: Full-time student</i>							
Post 2004 × Δ EU Accession/Initial Pop	2.222*** (0.499)	0.060 (0.355)	20.335*** (2.724)	-1.477*** (0.244)	0.658*** (0.043)	-0.182* (0.103)	-0.202 (0.680)
Mean of DV in 2001	7.63	6.48	.04	89.57	.35	69.96	52.08
LGA Districts	344	344	344	344	344	344	344
Observations	688	688	688	688	688	688	688
LGA District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table reports results from a panel OLS regressions. The dependent variable in columns (1) - (3) is the log value of the respective level in 1000s, the mean of the DV for these columns is reported as the level value in 1000s. The dependent variable in columns (4) and (5) is the group specific share of the total, thus normalizing the relative growth rates from columns (2) and (3): for example the coefficient in column (4) of Panel A provides the effect of migration on the share of the UK-born among the overall total of working age residents not participating in the labor market in a given local authority district. The respective mean of the DV is the average group share in 2001. The dependent variable in columns (6) and (7) is the respective group specific share among the group specific population: for example, the estimated coefficient in Panel A column (6) presents the effect of migration on the UK-born share of non-participating working age residents among all UK-born working age residents. The respective mean of the DV is the group specific shares in 2001. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

# Appendix to “Has Eastern European Migration Impacted UK-born Workers?”

For Online Publication

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## A Additional results

While in the main text we discussed in detail the effects of AC12 migration on labour markets and the demand for benefits, here – for completeness – we also present results for crime, house prices and house prices, homeownership and private vs social rental arrangements.

### A.1 Effects of AC12 Migration on Crime

Migration is often assumed to affect crime. In the context of the UK, [Bell et al. \(2013\)](#) document that the migration wave from EU accession countries is correlated with a small *reduction* in levels of crime. They rely on a shift-share identification strategy. We already discussed previously that, while a shift-share strategy may provide a relevant instrument for migration from EU accession countries, it is not clear whether it adequately captures the underlying skill composition of the inflowing migrants that arrive after EU accession. In particular, the initial stock of Polish residents in 2001 that arrived prior to EU accession mainly consisted of migrants who are in pension age (having lived in the UK since the second world war as remnants of the Polish Free Army that fought the Nazis alongside the British), or consists of migrants who have entered the UK since 1991 for graduate studies or under high skilled migration visas. This means that, while the instrument is relevant, when interpreted as a local average treatment effect (see [Angrist and Imbens \(1994\)](#)), it may be relevant only in predicting the part of the inflow of Polish migrants that can be thought of as being high skilled, whose inflows may well be associated with lower levels of crime.

When studying a range of crime outcomes for England and Wales across Local Authority districts (rather than Police Force Areas used in [Bell et al. \(2013\)](#)) in [Table A4](#), we find that migration from EU accession countries as captured by our measure is *not* correlated with crime across broad categories capturing property crime, violent crimes or crimes against public order in any systematic way.

## **A.2 Effects of AC12 Migration on House Prices**

Housing in the UK is an extremely contentious political topic, with housing conditions being often quite poor and access to housing due to restrictive zoning laws being quite limited. The UK housing market, inside and outside London has seen accelerating house prices and high rental prices, while at the same time being accompanied by a withdrawal of the state from social housing projects provided by the local councils. Migration is commonly associated with increased house prices and restrictive access, which results in larger shares of households finding themselves in rental housing as opposed to owner occupied housing.

While we discussed rental housing in more detail when looking at different country-of-origin groups in [section 5.3](#), here we complement this analysis by one of median house prices in a local authority district. While the rental market is an important entry point for migrants, rental housing in the UK is only a small share of the overall housing market. In 2001, on average only 8% of households lived in rental housing. This share has increased to 13% by 2011.

Here, we use median house prices sold within a local authority district between 1997 and 2013. The results are presented in [Table A3](#). We look at median house prices across all types of houses, and separately at terraced house prices and semi-detached house prices, two of the most popular house types in the UK. The evidence suggests that, in the more demanding specifications, in columns (3) and (4), the effects of AC12 migration on house prices is, if anything *negative*. This is well in line with [Sa \(2015\)](#) who finds negative effects of migration on house prices in the UK which she explains by within-UK mobility of UK-born house owners.

### A.3 Housing Market Pressures?

Census data in 2001 and 2011 allow us to look at the number of individuals, by country-of-origin, living in private rented housing, social rented housing, or owning a house. On the basis of this, we can again pursue a *between group analysis* and a *within group analysis*.

**Between group decomposition** Starting with those living in private rented housing in Panel A of Table A12, the coefficient in column (1) suggests that areas with a larger inflow of AC12 migrants see an increase in those living in private rented housing. In fact, in local authority district receiving a median-sized inflow of AC12 migrants of .012, the total number of those living in rented housing goes up by  $.012 * 4.933 = 0.059196$  % (note that coefficients are scaled by 100). Looking at the stock of the UK-born in private rented housing, it does not change at all in absolute number (coefficient estimate is 0.299 compared to the 4.933 for the total UK resident population). Yet, the total number of AC12-born people in rented housing goes up considerably, by  $.012 * 24.994 = 2.99928$  %, from a low base: only 100 AC12-born individuals (.1 in 1,000s of the dependent variable) in the average local authority in 2001 lived in private rented housing. Consequently, the share of the UK-born in rented housing goes down by 2.83 percentage points while that of AC12 migrants goes up by 2.78 percentage points, with residual movements in the EU15 and ROW shares not displayed.

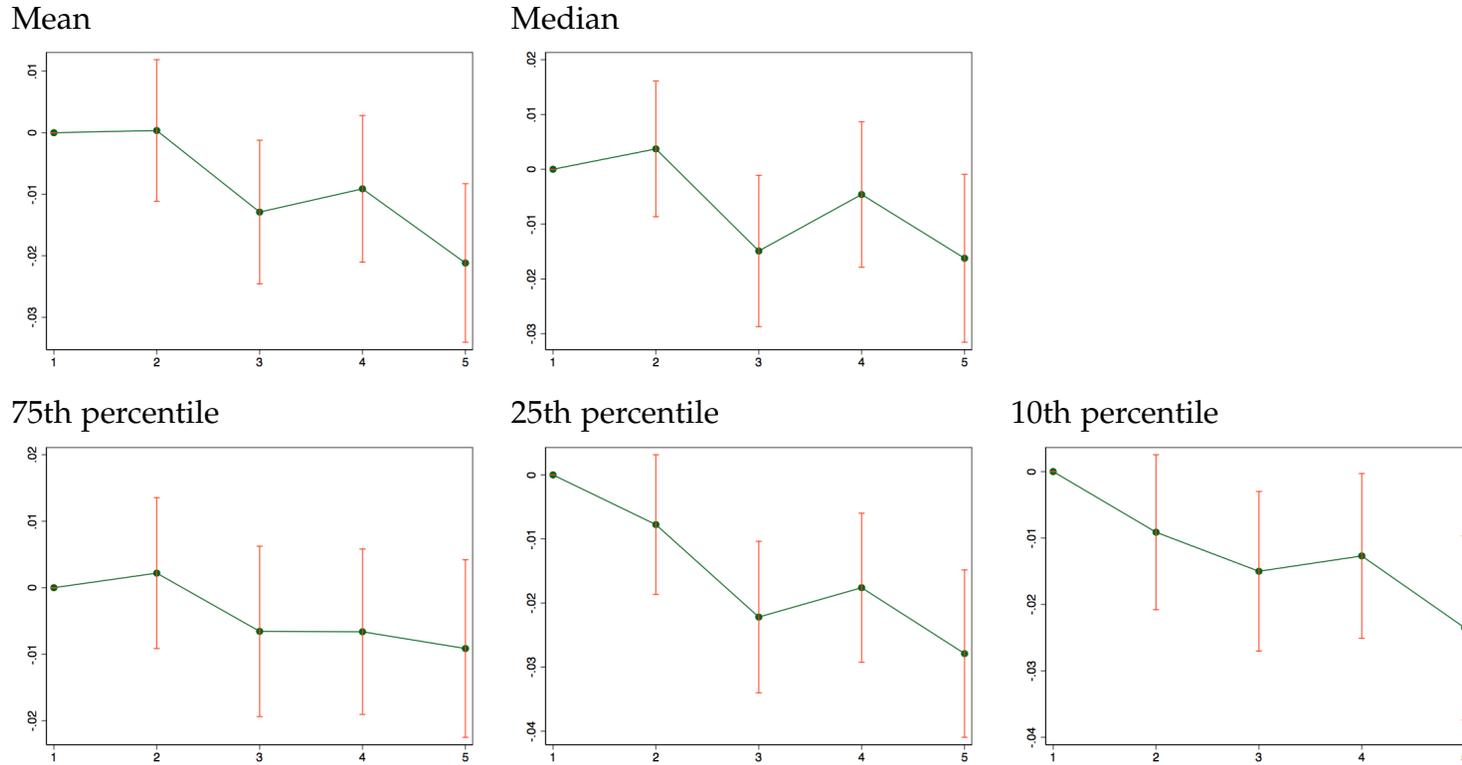
It is also interesting to study how migration affects the levels and distribution across of individuals living in social rented housing, in Panel B of Table A12. Here the total stock is barely affected (a coefficient of 0.273 in column (1) is an order of magnitude smaller than the one of 4.933 for 'living in private rented housing'). But that hides variation between country-of-origin groups. Column (2) suggests that the number of the UK-born in social housing has fallen in absolute terms while it has gone up for AC12 migrants. Not surprisingly, the same is reflected in a change of the shares of the two groups, in columns (4) and (5).

Similarly, there is no overall effect on home ownership in areas with more AC12 migrations, as Panel C shows in column (1). But this hides a decrease in UK-born home owners in column (2) and an increase among AC12 homeowners. This is well

in line with the findings of [Sa \(2015\)](#).

**Within group decomposition** Turning to columns (6) and (7), the thought experiment is which effect AC12 migration has on the within-group rate of those living in rented housing etc. For instance, 9.64% of the UK-born live in private rented housing in the baseline year 2001. That rate is larger for the AC12-born in 2001, which is 13.84%. This difference between country-of-origin groups is reversed in 2001 when looking at the rate of those living in social rented housing: 16.51% of the UK-born live in social rented housing and only 12.66% of the AC12-born do so. As a consequence, the third category of housing, homeownership, has an equal share among the UK-born and the AC12-born, of 73.85% and 73.5%, respectively. Turning to coefficient estimates, we see that a larger influx of AC12 migrants between 2001 and 2011 leads to larger rate living in private rented housing among the UK-born in the affected local authority district, compared to the UK-born elsewhere. But the effect of AC12 migration on the rate of private rented housing among the AC12-born is even stronger, well in line with the finding in the between-group analysis which saw a shift in the composition of those in private rented housing. This increase in the rate of those living in private rented housing for both UK-born and AC12-born residents is mirrored by a decrease in the home ownership rate for both groups and a minor decrease in social rented housing for AC12-born residents.

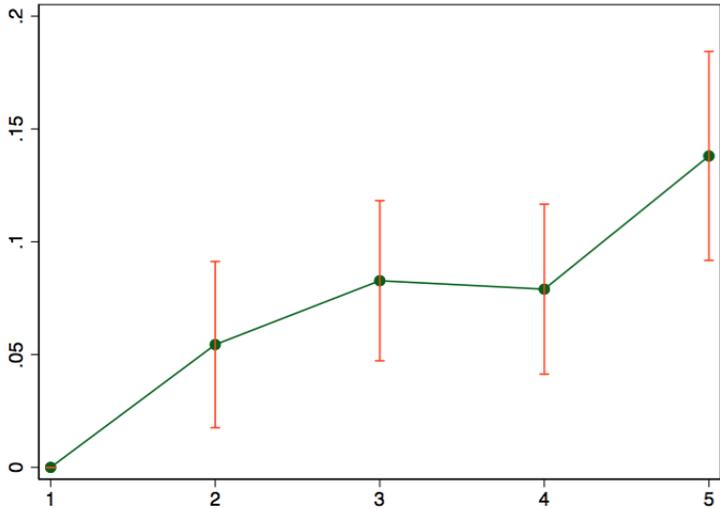
Figure A1: Non-linear effect of AC12 migration on wages at different quantiles of the wage distribution estimated on the whole sample.



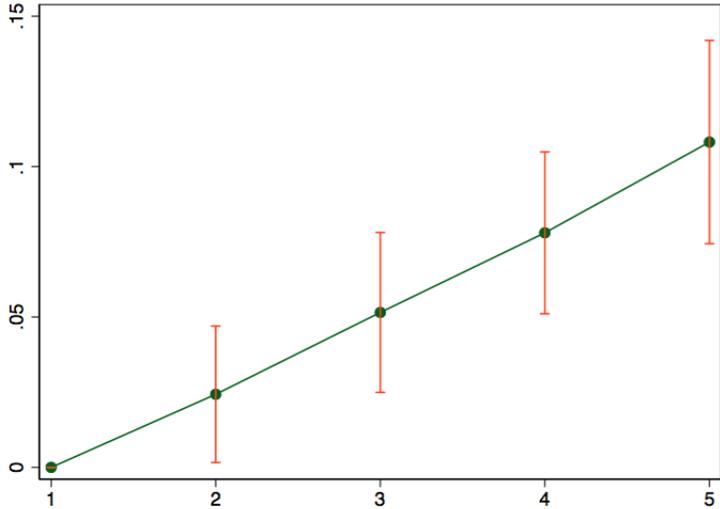
**Notes:** Figure presents effect of different quintiles of the accession shock on different quantiles of wages after 2004. The top panel presents the mean and median wages, while the bottom presents the results pertaining to the 75th, 25th and 10th percentile. The figures present estimated coefficients from a specification interacting the quintiles of the Accession Shock variable with a post 2004 dummy, controlling for local authority and region by year fixed effects. 10% confidence bands are indicated as dashed lines.

Figure A2: Non-linear effect of AC12 migration on the demand for benefits estimated on the whole sample.

Job Seeker Allowance



Incapacity Benefit & Employment Support Allowance



9

**Notes:** Figure presents effect of different quintiles of the accession shock on demand for benefits measures. The left panel measures the demand for job seeker allowance, while the right panel measures demand for incapacity benefits. The figures present estimated coefficients from a specification interacting the quintiles of the Accession Shock variable with a post 2004 dummy, controlling for local authority and region by year fixed effects. 10% confidence bands are indicated as dashed lines.

Table A1: **Treatment by Quartiles**

	<b>Quartiles</b>				
<b>Treatment</b>	1	2	3	4	<b>Total</b>
Untreated	5	15	17	0	37
Treated	0	0	0	37	37
<b>Total</b>	5	15	17	37	74

*Source:* EL.PAN.Jan2018.dta

Table A2: Effect of Migration from EU Accession affecting lower end of wage distribution *by place of work* .

	Whole sample				Matched sample
	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Mean Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.160 (0.179)	-0.097 (0.199)	-0.218 (0.189)	-0.381** (0.188)	-0.638*** (0.215)
LGA Districts	379	346	379	346	73
Observations	7083	6456	7083	6456	1381
<i>Panel B: Median Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.087 (0.186)	0.051 (0.169)	0.015 (0.189)	-0.127 (0.181)	-0.183 (0.228)
LGA Districts	379	346	379	346	73
Observations	7076	6449	7076	6449	1383
<i>Panel C: 25th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.376* (0.196)	-0.224 (0.155)	-0.273 (0.189)	-0.326* (0.174)	-0.367 (0.273)
LGA Districts	379	346	379	346	73
Observations	7102	6475	7102	6475	1385
<i>Panel D: 10th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.434** (0.169)	-0.510*** (0.161)	-0.429** (0.197)	-0.606*** (0.181)	-0.601** (0.246)
LGA Districts	379	346	379	346	73
Observations	6901	6274	6901	6274	1338
Sample	All	Not London	All	Not London	All
LGA District FE	Yes	Yes	Yes	Yes	Yes
Region $\times$ Year FE	Yes	Yes	Yes	Yes	Yes
Year $\times$ Matching Controls	No	No	Yes	Yes	No

Notes: Table reports results from a panel OLS regressions. The dependent variable is the log of hourly wages in the respective percentile of the earnings distribution reported at the place of work (as opposed to residence) from the Annual Survey of Hours and Earnings. The data set is a balanced panel of hourly wages by location of work from 2002 to 2014 across different quantiles. A few observations are missing as the Office of National Statistics deemed the statistics not precise enough. Columns (3) - (4) control for a full set of interactions between baseline predictor variables of the AC12 Accession Shock and year variables, as described in the main text. Column (5) restricts the analysis to matched pairs of observations whose propensity score difference predicting the upper quartile of the accession shock measure is less than 0.05. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A3: Migration from EU Accession and house prices.

	Whole sample				Matched sample
	(1)	(2)	(3)	(4)	(5)
<i>Panel A: log(Median House Price all types)</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	0.386*	0.441*	-0.054	-0.239	-0.240
	(0.198)	(0.245)	(0.239)	(0.299)	(0.315)
LGA Districts	342	309	342	309	64
Observations	5814	5253	5814	5253	1088
<i>Panel B: log(Median Terraced House Price)</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	0.232	0.454*	-0.365	-0.037	0.140
	(0.243)	(0.270)	(0.257)	(0.286)	(0.326)
LGA Districts	342	309	342	309	64
Observations	5790	5244	5790	5244	1088
<i>Panel C: log(Median Semi detached House Price)</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.160	0.066	-0.512*	-0.121	0.201
	(0.291)	(0.213)	(0.298)	(0.255)	(0.223)
LGA Districts	340	308	340	308	64
Observations	5780	5236	5780	5236	1088
Sample	All	Not London	All	Not London	All
LGA District FE	Yes	Yes	Yes	Yes	Yes
Region $\times$ Year FE	Yes	Yes	Yes	Yes	Yes
Year $\times$ Matching Controls	No	No	Yes	Yes	No

Notes: Table reports results from a panel OLS regressions. The measure in Panel A is from the 2001 and 2011 census for England, Scotland and Wales. In Panel B, house prices are a balanced panel from 1997 to 2013 for England and Wales. Columns (3) - (4) control for a full set of interactions between baseline predictor variables of the AC12 Accession Shock and year variables, as described in the main text. Column (5) restricts the analysis to matched pairs of observations whose propensity score difference predicting the upper quartile of the accession shock measure is less than 0.05. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A4: Migration from EU Accession countries and crime.

	Whole sample				Matched sample
	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Violent Crime per capita</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	0.402 (0.429)	0.292 (0.606)	0.405 (0.632)	0.356 (0.842)	0.974 (0.722)
LGA Districts	342	309	342	309	64
Observations	4469	4007	4469	4007	860
<i>Panel B: Public order crimes per capita</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	0.131 (0.821)	0.414 (1.035)	-0.459 (1.163)	-0.173 (1.426)	0.411 (1.215)
LGA Districts	342	309	342	309	64
Observations	4469	4007	4469	4007	860
<i>Panel C: Property crimes per capita</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	0.281 (0.498)	0.504 (0.649)	-0.093 (0.772)	0.218 (0.954)	0.838 (1.246)
LGA Districts	342	309	342	309	64
Observations	4469	4007	4469	4007	860
Sample	All	Not London	All	Not London	All
LGA District FE	Yes	Yes	Yes	Yes	Yes
Region $\times$ Year FE	Yes	Yes	Yes	Yes	Yes
Year $\times$ Matching Controls	No	No	Yes	Yes	No

Notes: Table reports results from a panel OLS regressions. The dependent variable is given in the respective panel headings and available for England and Wales as an unbalanced panel from 2002 to 2015. Columns (3) - (4) control for a full set of interactions between baseline predictor variables of the AC12 Accession Shock and year variables, as described in the main text. Column (5) restricts the analysis to matched pairs of observations whose propensity score difference predicting the upper quartile of the accession shock measure is less than 0.05. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A5: Robustness check - adding other migration interactions - Effect of Migration from EU Accession countries on the wage distribution.

	Whole sample				Matched sample
	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Mean Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.484*** (0.129)	-0.612*** (0.166)	-0.603*** (0.142)	-0.706*** (0.186)	-0.767** (0.304)
LGA Districts	380	347	380	347	73
Observations	5245	4790	5245	4790	1022
<i>Panel C: 75th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.361*** (0.125)	-0.569*** (0.195)	-0.308** (0.142)	-0.456** (0.192)	-0.900*** (0.331)
LGA Districts	375	342	375	342	73
Observations	4849	4403	4849	4403	982
<i>Panel C: Median Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.325** (0.135)	-0.302* (0.177)	-0.372** (0.155)	-0.361* (0.196)	-0.460 (0.320)
LGA Districts	379	346	379	346	73
Observations	5227	4777	5227	4777	1019
<i>Panel D: 25th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.603*** (0.151)	-0.449** (0.189)	-0.610*** (0.170)	-0.528*** (0.199)	-0.429 (0.313)
LGA Districts	379	346	379	346	73
Observations	5244	4791	5244	4791	1022
<i>Panel E: 10th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.505*** (0.129)	-0.347* (0.182)	-0.556*** (0.153)	-0.545*** (0.187)	-0.707*** (0.251)
LGA Districts	378	345	378	345	73
Observations	5167	4717	5167	4717	1011
Sample	All	Not London	All	Not London	All
LGA District FE	Yes	Yes	Yes	Yes	Yes
Region x Year FE	Yes	Yes	Yes	Yes	Yes
Year x Matching Controls	No	No	Yes	Yes	No

Notes: Table reports results from a panel OLS regressions. In addition to the post 2004 Accession migration effect, we also add post 2004 interaction effects for migration from other EU member countries between 2001 and 2011 and migration flows from the rest of the world between 2001 and 2011. The dependent variable is the log of hourly wages in the respective percentile of the earnings distribution in a local authority from the Annual Survey of Hours and Earnings. The data set is a balanced panel of hourly wages by location of residence from 2002 to 2014 across different quantiles. A few observations are missing as the Office of National Statistics deemed the statistics not precise enough. Columns (3) - (4) control for a full set of interactions between baseline predictor variables of the AC12 Accession Shock and year variables, as described in the main text. Column (5) restricts the analysis to matched pairs of observations whose propensity score difference predicting the upper quartile of the accession shock measure is less than 0.05. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A6: Robustness check - adding other migration interactions - Effect of Migration from EU Accession on demand for benefits.

	Whole sample				Matched sample
	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Jobseeker Allowance</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	2.068*** (0.528)	3.169*** (0.707)	2.691*** (0.553)	3.375*** (0.755)	4.812*** (1.388)
LGA Districts	380	347	380	347	73
Observations	6080	5552	6080	5552	1168
<i>Panel B: Incapacity &amp; Employment Support Allowance</i>					
Post 2004 $\times \Delta$ EU Accession/Initial Pop	1.927*** (0.371)	2.521*** (0.496)	1.145*** (0.361)	1.986*** (0.398)	1.850*** (0.684)
LGA Districts	380	347	380	347	73
Observations	6080	5552	6080	5552	1168
Sample	All	Not London	All	Not London	All
LGA District FE	Yes	Yes	Yes	Yes	Yes
Region $\times$ Year FE	Yes	Yes	Yes	Yes	Yes
Year $\times$ Matching Controls	No	No	Yes	Yes	No

Notes: Table reports results from a panel OLS regressions. In addition to the post 2004 Accession migration effect, we also add post 2004 interaction effects for migration from other EU member countries between 2001 and 2011 and migration flows from the rest of the world between 2001 and 2011. The dependent variable in Panel A is the log of the annual average number of job seeker allowance claimant counts from the ONS from 1999 to 2015. The data in panel B are an annual panel obtained from the Department for Work and Pensions Longitudinal Study (WPLS) covering 1999 to 2015. The dependent variable in Panel B is the log total number of incapacity and employment and support allowance benefit claimants. Columns (3) - (4) control for a full set of interactions between baseline predictor variables of the AC12 Accession Shock and year variables, as described in the main text. Column (5) restricts the analysis to matched pairs of observations whose propensity score difference predicting the upper quartile of the accession shock measure is less than 0.05. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A7: Robustness check - focusing on migration from Poland - Effect of Migration from EU Accession countries on the wage distribution.

	Whole sample				Matched sample
	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Mean Hourly Pay</i>					
Post 2004 $\times \Delta$ Poland/Initial Pop	-0.810*** (0.184)	-0.852*** (0.205)	-1.012*** (0.245)	-0.947*** (0.269)	-1.878*** (0.508)
LGA Districts	380	347	380	347	73
Observations	5245	4790	5245	4790	1022
<i>Panel C: 75th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ Poland/Initial Pop	-0.509** (0.216)	-0.502* (0.265)	-0.589** (0.285)	-0.433 (0.328)	-1.088* (0.557)
LGA Districts	375	342	375	342	73
Observations	4849	4403	4849	4403	982
<i>Panel C: Median Hourly Pay</i>					
Post 2004 $\times \Delta$ Poland/Initial Pop	-0.353 (0.273)	-0.185 (0.308)	-0.407 (0.330)	-0.117 (0.345)	-0.726 (0.554)
LGA Districts	379	346	379	346	73
Observations	5227	4777	5227	4777	1019
<i>Panel D: 25th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ Poland/Initial Pop	-0.941*** (0.282)	-0.809** (0.320)	-0.825** (0.324)	-0.704** (0.350)	-1.154** (0.521)
LGA Districts	379	346	379	346	73
Observations	5244	4791	5244	4791	1022
<i>Panel E: 10th Percentile Hourly Pay</i>					
Post 2004 $\times \Delta$ Poland/Initial Pop	-0.909*** (0.224)	-0.759*** (0.249)	-0.846*** (0.287)	-0.761** (0.331)	-1.876*** (0.505)
LGA Districts	378	345	378	345	73
Observations	5167	4717	5167	4717	1011
Sample	All	Not London	All	Not London	All
LGA District FE	Yes	Yes	Yes	Yes	Yes
Region x Year FE	Yes	Yes	Yes	Yes	Yes
Year x Matching Controls	No	No	Yes	Yes	No

Notes: Table reports results from a panel OLS regressions. The dependent variable is the log of hourly wages in the respective percentile of the earnings distribution in a local authority from the Annual Survey of Hours and Earnings. The data set is a balanced panel of hourly wages by location of residence from 2002 to 2014 across different quantiles. A few observations are missing as the Office of National Statistics deemed the statistics not precise enough. Columns (3) - (4) control for a full set of interactions between baseline predictor variables of the AC12 Accession Shock and year variables, as described in the main text. Column (5) restricts the analysis to matched pairs of observations whose propensity score difference predicting the upper quartile of the accession shock measure is less than 0.05. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A8: Robustness check - focusing on migration from Poland - Effect of Migration from EU Accession on demand for benefits.

	Whole sample				Matched sample
	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Jobseeker Allowance</i>					
Post 2004 $\times \Delta$ Poland/Initial Pop	4.016*** (0.982)	4.468*** (1.183)	4.541*** (1.197)	4.629*** (1.486)	9.304*** (2.078)
LGA Districts	380	347	380	347	73
Observations	6080	5552	6080	5552	1168
<i>Panel B: Incapacity &amp; Employment Support Allowance</i>					
Post 2004 $\times \Delta$ Poland/Initial Pop	4.767*** (0.778)	6.174*** (0.797)	1.386 (0.918)	2.207** (0.948)	3.359** (1.522)
LGA Districts	380	347	380	347	73
Observations	6080	5552	6080	5552	1168
Sample	All	Not London	All	Not London	All
LGA District FE	Yes	Yes	Yes	Yes	Yes
Region $\times$ Year FE	Yes	Yes	Yes	Yes	Yes
Year $\times$ Matching Controls	No	No	Yes	Yes	No

Notes: Table reports results from a panel OLS regressions. The dependent variable in Panel A is the log of the annual average number of job seeker allowance claimant counts from the ONS from 1999 to 2015. The data in panel B and panel C are an annual panel obtained from the Department for Work and Pensions Longitudinal Study (WPLS) covering 1999 to 2015. The dependent variable in Panel B is the log total number of incapacity and employment and support allowance benefit claimants. Columns (3) - (4) control for a full set of interactions between baseline predictor variables of the AC12 Accession Shock and year variables, as described in the main text. Column (5) restricts the analysis to matched pairs of observations whose propensity score difference predicting the upper quartile of the accession shock measure is less than 0.05. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A9: Effects of migration from EU Accession countries on industry employment shares: Overall, Between and Within country-of-origin group effects.

	Whole sample						
	log value of respective level			Share between country group in %		Share within country group in %	
	Total (1)	UK (2)	Accession (3)	UK (4)	Accession (5)	UK (6)	Accession (7)
<i>Panel A: Agriculture</i>							
Post 2004 × Δ EU Accession/Initial Pop	-0.671 (1.663)	-6.737*** (1.939)	28.304*** (4.605)	-3.935*** (0.495)	2.980*** (0.369)	0.005 (0.036)	0.097 (0.089)
Mean of DV in 2001	1.04	1.01	0	95.03	.29	1.95	1.22
<i>Panel B: Mining</i>							
Post 2004 × Δ EU Accession/Initial Pop	0.839 (1.488)	-1.315 (1.850)	0.283 (8.167)	-1.380*** (0.382)	0.622*** (0.119)	0.009** (0.003)	0.015 (0.015)
Mean of DV in 2001	.17	.16	0	91.58	.25	.27	.22
<i>Panel C: Manufacturing</i>							
Post 2004 × Δ EU Accession/Initial Pop	2.599*** (0.667)	-1.113* (0.633)	29.717*** (3.769)	-2.525*** (0.209)	2.249*** (0.177)	-0.020 (0.068)	0.433 (0.308)
Mean of DV in 2001	10.21	9.47	.03	92.55	.36	15.42	14.22
<i>Panel D: Construction</i>							
Post 2004 × Δ EU Accession/Initial Pop	1.186** (0.557)	-1.868*** (0.413)	28.510*** (3.489)	-1.656*** (0.281)	1.743*** (0.302)	-0.094*** (0.020)	0.225* (0.123)
Mean of DV in 2001	4.62	4.37	.01	94.7	.3	7.17	4.42
<i>Panel E: Retail</i>							
Post 2004 × Δ EU Accession/Initial Pop	1.571*** (0.451)	-0.741** (0.325)	29.328*** (3.281)	-1.550*** (0.180)	1.004*** (0.080)	-0.008 (0.041)	0.078 (0.171)
Mean of DV in 2001	11.49	10.54	.04	92.68	.32	17.02	14.43
<i>Panel F: Hospitality</i>							
Post 2004 × Δ EU Accession/Initial Pop	3.717*** (0.552)	1.584 (0.995)	32.497*** (4.429)	-5.497*** (1.639)	2.134*** (0.382)	0.265*** (0.100)	0.428* (0.234)
Mean of DV in 2001	3.25	2.7	.03	85.41	.7	4.44	9.4
<i>Panel G: Finance</i>							
Post 2004 × Δ EU Accession/Initial Pop	0.472 (0.531)	-0.559 (0.426)	18.964*** (3.231)	-0.832*** (0.162)	0.383*** (0.033)	0.016 (0.025)	-0.095 (0.066)
Mean of DV in 2001	3.23	2.89	.01	93.1	.27	4.45	3.38
<i>Panel H: Real Estate</i>							
Post 2004 × Δ EU Accession/Initial Pop	-1.000 (1.224)	-2.083* (1.238)	21.133*** (2.262)	-0.799*** (0.101)	0.613*** (0.052)	0.135 (0.116)	-0.052 (0.138)
Mean of DV in 2001	8.86	7.84	.04	92.13	.33	12.58	12.55
<i>Panel I: Public sector</i>							
Post 2004 × Δ EU Accession/Initial Pop	0.407 (0.407)	-0.144 (0.397)	21.957*** (2.241)	-0.438*** (0.082)	0.261*** (0.021)	0.023 (0.019)	0.049 (0.089)
Mean of DV in 2001	3.91	3.62	.01	93.25	.3	5.84	5.7
<i>Panel J: Education</i>							
Post 2004 × Δ EU Accession/Initial Pop	1.063*** (0.269)	0.143 (0.287)	20.216*** (2.389)	-0.684*** (0.105)	0.379*** (0.023)	0.076*** (0.022)	-0.376*** (0.123)
Mean of DV in 2001	5.3	4.81	.02	92.08	.35	7.68	8.29
<i>Panel K: Health</i>							
Post 2004 × Δ EU Accession/Initial Pop	1.755*** (0.393)	0.016 (0.256)	18.577*** (1.976)	-1.097*** (0.183)	0.431*** (0.031)	0.084*** (0.018)	-0.781*** (0.155)
Mean of DV in 2001	7.38	6.51	.03	89.37	.41	10.43	13.3
<i>Panel L: Utility</i>							
Post 2004 × Δ EU Accession/Initial Pop	1.933** (0.799)	-0.423 (0.801)	31.325*** (6.263)	-1.745*** (0.199)	1.562*** (0.125)	-0.010 (0.007)	0.032 (0.028)
Mean of DV in 2001	.5	.47	0	94.04	.23	.75	.49
LGA Districts	344	344	344	344	344	344	344
Observations	688	688	688	688	688	688	688
LGA District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table reports results from a panel OLS regressions. The dependent variable in columns (1) - (3) is the log value of the respective level in 1000s, the mean of the DV for these columns is reported as the level value in 1000s. The dependent variable in columns (4) and (5) is the group specific share of the total, thus normalizing the relative growth rates from columns (2) and (3); for example the coefficient in column (4) of Panel A provides the effect of migration on the share of the UK-born among the those living in rented housing in a given local authority district. The respective mean of the DV is the average group share in 2001. The dependent variable in columns (6) and (7) is the respective group specific share among the group specific population; for example, the estimated coefficient in Panel A column (6) presents the effect of migration on the share of British born residents working in Agriculture among all economically active British born residents in an area. The respective mean of the DV is the group specific shares in 2001. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A10: Effects of migration from EU Accession countries on composition of resident population according to occupational classification: Overall, Between and Within country-of-origin group effects.

	Whole sample						
	log value of respective level			Share between country group in %		Share within country group in %	
	Total (1)	UK (2)	Accession (3)	UK (4)	Accession (5)	UK (6)	Accession (7)
<i>Panel A: Managers &amp; Directors</i>							
Post 2004 × Δ EU Accession/Initial Pop	0.244 (0.332)	-1.137*** (0.428)	20.953*** (2.121)	-0.939*** (0.161)	0.427*** (0.036)	0.139*** (0.034)	0.144 (0.135)
Mean of DV in 2001	10.32	9.25	.05	91.61	.37	15.23	16.73
<i>Panel B: Science, engineering and research</i>							
Post 2004 × Δ EU Accession/Initial Pop	0.265 (0.415)	-1.346*** (0.344)	18.515*** (3.698)	-1.119*** (0.200)	0.422*** (0.037)	-0.020 (0.018)	-0.397*** (0.121)
Mean of DV in 2001	3.53	3.16	.01	91.5	.35	5.09	5.48
<i>Panel C: Health/ Care</i>							
Post 2004 × Δ EU Accession/Initial Pop	1.403*** (0.458)	0.130 (0.305)	13.517*** (1.996)	-0.829*** (0.164)	0.256*** (0.018)	0.029*** (0.010)	-0.457*** (0.089)
Mean of DV in 2001	2.83	2.33	.01	84.31	.41	3.7	5.57
<i>Panel D: Teaching</i>							
Post 2004 × Δ EU Accession/Initial Pop	0.764* (0.396)	0.284 (0.417)	14.516*** (1.879)	-0.347*** (0.089)	0.227*** (0.020)	0.031* (0.019)	-0.225** (0.113)
Mean of DV in 2001	3.07	2.72	.01	90.73	.38	4.37	5.44
<i>Panel E: Business services</i>							
Post 2004 × Δ EU Accession/Initial Pop	0.439 (0.362)	-0.630* (0.337)	21.336*** (2.277)	-0.813*** (0.134)	0.368*** (0.021)	-0.079* (0.047)	-0.436*** (0.126)
Mean of DV in 2001	7.06	6.38	.02	92.6	.29	10.14	9.22
<i>Panel F: Culture, media, arts</i>							
Post 2004 × Δ EU Accession/Initial Pop	-0.629 (0.530)	-1.686*** (0.539)	19.123*** (3.533)	-0.853*** (0.115)	0.498*** (0.047)	0.011 (0.020)	-0.142** (0.068)
Mean of DV in 2001	1.43	1.26	.01	92.44	.4	2.03	2.4
<i>Panel G: Admin and Secretarial</i>							
Post 2004 × Δ EU Accession/Initial Pop	0.079 (0.214)	-0.920*** (0.312)	23.961*** (2.573)	-0.769*** (0.109)	0.517*** (0.031)	-0.026 (0.024)	-0.268* (0.159)
Mean of DV in 2001	9.1	8.36	.03	93.36	.29	13.25	11.13
<i>Panel H: Skilled trades</i>							
Post 2004 × Δ EU Accession/Initial Pop	1.365*** (0.377)	-1.695*** (0.385)	25.777*** (2.825)	-1.704*** (0.220)	1.636*** (0.218)	-0.089*** (0.027)	-0.211 (0.173)
Mean of DV in 2001	7.95	7.41	.03	93.08	.38	12.3	10.09
<i>Panel I: Leisure and Personal care</i>							
Post 2004 × Δ EU Accession/Initial Pop	2.162*** (0.354)	0.066 (0.260)	23.667*** (2.644)	-1.329*** (0.213)	0.739*** (0.078)	0.080*** (0.018)	-0.471*** (0.140)
Mean of DV in 2001	4.72	4.31	.03	91.92	.57	7	10.07
<i>Panel J: Sales</i>							
Post 2004 × Δ EU Accession/Initial Pop	2.518*** (0.492)	0.532 (0.404)	25.455*** (3.079)	-1.226*** (0.194)	0.547*** (0.056)	0.113*** (0.019)	-0.122 (0.087)
Mean of DV in 2001	4.37	4.02	.01	92.91	.29	6.4	5.43
<i>Panel K: Process and plant operators</i>							
Post 2004 × Δ EU Accession/Initial Pop	3.479*** (0.715)	-2.174*** (0.463)	32.359*** (4.454)	-3.371*** (0.342)	3.617*** (0.236)	-0.077*** (0.025)	0.605*** (0.222)
Mean of DV in 2001	3.35	3.05	.01	91.02	.44	4.95	4.73
<i>Panel K: Transport</i>							
Post 2004 × Δ EU Accession/Initial Pop	2.757*** (0.414)	-1.100*** (0.312)	33.536*** (4.537)	-2.374*** (0.281)	1.547*** (0.112)	-0.004 (0.010)	0.267*** (0.093)
Mean of DV in 2001	2.46	2.27	.01	93.17	.29	3.65	2.65
<i>Panel K: Elementary trades and admin</i>							
Post 2004 × Δ EU Accession/Initial Pop	4.816*** (0.470)	-1.041*** (0.272)	30.278*** (3.133)	-3.328*** (0.249)	3.154*** (0.119)	-0.107*** (0.036)	1.713*** (0.290)
Mean of DV in 2001	8.11	7.35	.03	91.47	.36	11.88	11.06
LGA Districts	344	344	344	344	344	344	344
Observations	688	688	688	688	688	688	688
LGA District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table reports results from a panel OLS regressions. All coefficients are scaled by 100. The dependent variable in columns (1) - (3) is the log value of the respective level, the mean of the DV for these columns is reported as the level value in 1000s. The dependent variable in columns (4) and (5) is the group specific share of the total, thus normalizing the relative growth rates from columns (2) and (3); for example the coefficient in column (4) of Panel A provides the effect of AC12 migration on the share of British among all Manager/ Directors living in an area. The respective mean of the DV is the average group share in 2001. The dependent variable in columns (6) and (7) is the respective group specific share among the group specific population: for example, the estimated coefficient in Panel A column (6) presents the effect of AC12 migration on the share of Managers/ Directors among British born residents. The respective mean of the DV is the group specific shares in 2001. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A11: Effects of migration from EU Accession countries on composition of economically active resident population according to socio-economic status: Overall, Between and Within country-of-origin group effects.

	Whole sample						
	log value of respective level			Share between country group in %		Share within country group in %	
	Total (1)	UK (2)	Accession (3)	UK (4)	Accession (5)	UK (6)	Accession (7)
<b>Socio-economic status of occupation</b>							
<i>Panel A: Class 1 Managerial and professional occupations</i>							
Post 2004 $\times \Delta$ EU Accession/Initial Pop	0.489*	-0.602*	18.232***	-0.801***	0.360***	0.044	-1.325***
	(0.264)	(0.306)	(1.889)	(0.135)	(0.019)	(0.042)	(0.256)
Mean of DV in 2001	29.08	25.89	.12	91.29	.33	37.61	38.03
<i>Panel B: Class 2 Intermediate occupations</i>							
Post 2004 $\times \Delta$ EU Accession/Initial Pop	0.435*	-0.531	22.867***	-0.738***	0.433***	0.043**	-0.440***
	(0.236)	(0.323)	(2.309)	(0.108)	(0.024)	(0.022)	(0.153)
Mean of DV in 2001	10.12	9.27	.03	92.87	.3	13.14	11.34
<i>Panel C: Class 3 Small employers and own account worker</i>							
Post 2004 $\times \Delta$ EU Accession/Initial Pop	3.561***	0.332	28.026***	-1.586***	1.598***	0.047***	0.516***
	(0.722)	(0.336)	(2.675)	(0.224)	(0.252)	(0.018)	(0.176)
Mean of DV in 2001	7.31	6.51	.05	90.29	.57	9.99	13.61
<i>Panel D: Class 4 Lower supervisory and technical occupations</i>							
Post 2004 $\times \Delta$ EU Accession/Initial Pop	1.771***	-0.997***	24.559***	-1.812***	1.298***	-0.054*	-0.262**
	(0.259)	(0.372)	(2.832)	(0.145)	(0.059)	(0.029)	(0.107)
Mean of DV in 2001	7.71	7.16	.02	92.94	.3	10.35	8.64
<i>Panel E: Class 5 Routine &amp; Semi-routine</i>							
Post 2004 $\times \Delta$ EU Accession/Initial Pop	2.501***	-0.848***	30.058***	-2.184***	1.881***	-0.081**	1.512***
	(0.196)	(0.197)	(3.183)	(0.164)	(0.096)	(0.038)	(0.331)
Mean of DV in 2001	22.24	20.26	.08	91.61	.4	28.91	28.38
LGA Districts	344	344	344	344	344	344	344
Observations	688	688	688	688	688	688	688
LGA District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region $\times$ Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table reports results from a panel OLS regressions. All coefficients are scaled by 100. The dependent variable in columns (1) - (3) is the log value of the respective level in 1000s, the mean of the DV for these columns is reported as the level value in 1000s. The dependent variable in columns (4) and (5) is the group specific share of the total, thus normalizing the relative growth rates from columns (2) and (3); for example the coefficient in column (4) of Panel A provides the effect of migration on the share of the UK-born among the those living in rented housing in a given local authority district. The respective mean of the DV is the average group share in 2001. The dependent variable in columns (6) and (7) is the respective group specific share among the group specific population: for example, the estimated coefficient in Panel A column (6) presents the effect of migration on the share of British born economically active working age residents working in higher class jobs relative to all UK born economically active residents. The respective mean of the DV is the group specific shares in 2001. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A12: Effects of migration from EU Accession countries on housing market: Overall, Between and Within country-of-origin group effects.

	Whole sample						
	log value of respective level			Share between country group in %		Share within country group in %	
	Total (1)	UK (2)	Accession (3)	UK (4)	Accession (5)	UK (6)	Accession (7)
<b>Housing Market pressures</b>							
<i>Panel A: Living in private rented housing</i>							
Post 2004 $\times \Delta$ EU Accession/Initial Pop	4.933***	0.299	24.994***	-2.831***	2.786***	0.330***	2.763***
	(0.720)	(0.691)	(2.971)	(0.249)	(0.177)	(0.091)	(0.488)
Mean of DV in 2001	15.95	13.05	.1	86.66	.47	9.64	13.84
<i>Panel B: Living in social rented housing</i>							
Post 2004 $\times \Delta$ EU Accession/Initial Pop	0.273	-0.655**	21.820***	-0.768***	0.292***	-0.079	-0.303*
	(0.298)	(0.292)	(2.670)	(0.115)	(0.033)	(0.072)	(0.164)
Mean of DV in 2001	26.38	23.99	.09	94.27	.27	16.51	12.66
<i>Panel C: Home ownership</i>							
Post 2004 $\times \Delta$ EU Accession/Initial Pop	-0.256	-0.901***	15.289***	-0.489***	0.191***	-0.251***	-2.460***
	(0.188)	(0.266)	(1.944)	(0.093)	(0.017)	(0.095)	(0.503)
Mean of DV in 2001	105.4	97.72	.41	93.26	.37	73.85	73.5
LGA Districts	344	344	344	344	344	344	344
Observations	688	688	688	688	688	688	688
LGA District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region $\times$ Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table reports results from a panel OLS regressions. The dependent variable in columns (1) - (3) is the log value of the respective level in 1000s, the mean of the DV for these columns is reported as the level value in 1000s. The dependent variable in columns (4) and (5) is the group specific share of the total, thus normalizing the relative growth rates from columns (2) and (3); for example the coefficient in column (4) of Panel A provides the effect of migration on the share of the UK-born among the those living in rented housing in a given local authority district. The respective mean of the DV is the average group share in 2001. The dependent variable in columns (6) and (7) is the respective group specific share among the group specific population: for example, the estimated coefficient in Panel A column (6) presents the effect of migration on the share of the UK-born living in private rented housing. The respective mean of the DV is the group specific shares in 2001. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .