"The impact of migration on the provision of UK public services (SRG.10.039.4)"

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The robustness of the analysis is the responsibility of the authors, and the findings and views presented in this report do not necessarily reflect those of the MAC.

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Executive Summary

Preliminaries

The public sector in the UK comprises of three main sub-sectors or industries: health and social care, education, and public administration. The existing literature mainly discusses the role of immigrants in the health and social care sectors, but even for this sector, quantitative evidence is rare. Even less in known about the role of immigrants in areas such as public administration and education. This report provides evidence on the role of immigrants in the different public sub-sectors. Our investigation is based on the UK Labour Force Survey (LFS), a sample survey of households living at private addresses in Great Britain/UK. We focus on the years 1994-2010, and we compare three groups: natives, EEA immigrants, non-EEA immigrants. We define immigrants as individuals who are – according to the LFS – born outside the UK. We provide some of the basic headline statistics, which we discuss below, in Tables 3.2.1 and 3.4.1.

Overall Trends

Public sector employment has steadily increased in the UK since 1998, both in absolute terms and as a share of total employment. While 22.8 percent of all jobs were in the public sector in 1998, this figure has increased to 25.3 percent by 2010. Over the same period, immigrants increased their share in total employment from about 7 percent in 1995, to 13.3 percent in 2010 (see Table 3.2.1).

The overall working age population in the UK has increased by 3.93 million individuals between 1995 and 2010. Most of this increase is due to immigrants: while the native born

population has increased by 1.37 million (or by 4 percent), the immigrant population has increased by 2.55 million (or by 82 percent). The size of the EEA immigrant population more than doubled, from 820,000 in 1994 to 1.75 million in 2010. The non-EEA immigrant population increased by 71%, from 2.24 to 3.83 million. Over the same period, the total number of individuals in employment has increased by 3.26 million individuals (or 13%), of whom 1.35 million are natives, and 1.9 million immigrants (see Table 3.2.1).

The size of the public sector increased by 1.1 million workers by 2010, a 19% increase with respect to 1994 employment. The private sector grew by 2.1 million workers, a 12% increase on 1994. relative to its size in 1994, the public sector has expanded by more than the private sector. Immigration accounted for 65% of the growth in the working age population, and for 58% of the growth in total employment. However, it accounted for only 29% of employment growth in the public sector, but for 77% of employment growth in the private sector (see Table 3.2.1 for more details).

The average age of the native population has increased by more than one year between 1994 and 2010, from 39 to over 40 years, while the average age of immigrants has decreased from 40 to less than 38 over the same time period. This is primarily due to the change in the composition of EEA immigrants', whose average age decreased by more than 6 years, from 41 to 36. On the other hand, the age structure of non- EEA immigrants remained quite stable over the period (see Table 3.3.1).

The average years of education increased between 1994 and 2010 for both immigrants and natives; however, the increase was higher among immigrants, and due primarily to a pronounced increase (over two years) in the average years of schooling of EEA immigrants. Public sector workers have on average about one more year of education than private sector workers, both for natives and for immigrants. Workers in the public sector are also on average older than workers in the private sector (see Table 3.3.1).

With respect to the gender distribution, women are substantially more likely to work in the public sector than men: the share of women among public sector workers is more than 20 percentage points higher than among private sector workers for both immigrants and natives.

When we break down the public sector into the different sub-sectors, we find that over the period 2008-2010, the education sector employs about 32% of native public sector workers and 29% of immigrant public sector workers. This compares to 25.6 % of natives and 18% of immigrants in public administration, and 27.6 % of natives and 40% of immigrants in health and social work. Thus, of those who work in the public sector, immigrants are more likely to work in the health and social work sector than natives, but less likely to work in public administration, and in education. The concentration of non-EEA immigrants in the health sector has increased over time, from 36% in the period 1994/1996 to 41% in the period 2008/2010, while EEA immigrants have moved out of the health sector, from 40% in 1994/1996 to 29% in 2008/2010, and into education, from 27% in 1994/1996 to 37.5% in 2008/2010. Overall, both EEA and non-EEA immigrants are less represented in public employment, relative to their share of the working age population. When we break down the public sector by occupations, we find that immigrants have a higher relative share in the higher skilled and higher paid occupations in the public sector. See Table 3.4.1 for more details.

Regional analysis

In 2008/2010 non-EEA immigrants constitute 30% of the total working age population in London, while EEA immigrants make up another 10% of the working age population. The corresponding shares for the whole of the UK are 9.5% and 4%, respectively. The share of EEA immigrants among public sector workers is lower than their share in the total population

in all regions, while the share of non-EEA immigrants among public sector workers is higher than their share in the total population in three regions. The relative concentration of non-EEA immigrants in the public sector is particularly high in East Anglia. Across all regions, non-EEA immigrants are least likely to be employed in the public sector in London, where only 19.5% of them are public sector employees, versus 25% of natives and 13% of EEA immigrants.

Immigrants and natives are not equally distributed across occupations in the public sector: on a national level, 10.6 percent of immigrants would have to change jobs to equalize their occupational distribution to that of native public employees. The occupational dissimilarity of immigrants and natives differs considerably across regions: while for instance in London, only 4.6% of non-EEA immigrants will have to change their jobs to equalise their occupational distribution to that of natives, this number increases to more than 23% in the North-East.

Wages

Average wages are higher in the public than in the private sector. The raw public sector wage premium has declined between 1994 and 2001, from 24.6% to 16.3%, but increases again afterwards, reaching 21% in 2008. Some of this gap is due to differences in the education and age structure between public- and private sector workers, as mentioned above. When conditioning on education, gender, region, and age, the gap reduces to about 8-10 percent. Controlling for the occupational structure in private and public sector in addition reduces the public – private wage gap even further: it is lowest at 3% in 2001.

Both EEA and non-EEA immigrants have an raw average wage advantage relative to natives in both the private and the public sector until the mid-2000s. After that, the relative

however, wage position for EEA immigrants deteriorates, and becomes negative in the private sector. The gap for non-EEA immigrants is instead stable over time. However, the reason for this relatively favourable position of immigrants is that they are better educated and more experienced than natives, and are concentrated in London. If we compare natives with immigrants who have the same age, education, regional distribution, and gender composition, the wage gap turns negative for all years, indicating that immigrants have a wage disadvantage relative to natives with the same characteristics. The difference is largest for non-EEA immigrants, and in the private sector.

Both EEA and non-EEA immigrants are more likely to work in the public sector in regions where the public sector wage premium is higher. However, the fraction of immigrants among public sector employees is lower in areas with a higher public sector wage premium. This might indicate that, when public sector wages are higher, natives have more incentives to work in the public sector. It may also simply be a consequence of immigrants settling in regions where private sector wages are high, relative to wages in the public sector. Indeed, when plotting the regional public sector wage premium against a measure of the *relative* concentration of immigrants in the public sector, we can not detect evidence of an association between the relative proportion of immigrants in public employment, and the public sector wage premium.

Mobility over the life cycle

The fraction of both EEA and non-EEA immigrants employed in the public sector is higher for those who have been longer in the UK. The fraction of EEA immigrants in the public sector more than doubles when comparing newly arrived immigrants to those who arrived ten to twelve years earlier. The growth in the share of public sector employment is

lower, but still positive, for non-EEA immigrants: the share of non-EEA immigrants in public sector doubles after about 30 years of residence. This however does not necessarily mean that immigrants move into the public sector with time in the UK: It could also be due to immigrants in the private sector leaving the UK at a higher rate.

1.   Introduction

The Migration Advisory Committee (MAC) has commissioned an independent research report to address "**The impact of migration on the provision of UK public services**". The aim of the report is to improve the existing evidence base on the impact of migration on the provision of UK public services, to consider how the current limitations to existing data in this area can be overcome, for analysis of either the short- or longer-term impacts of migration. A key interest of the MAC is on public sector services that are provided by non-EEA immigrants. The report will – where possible – draw distinctions between EEA and non-EEA immigrants, where immigrant status is defined based on country of birth. A further aim of the MAC is to use this report to possibly monetise the impact of immigration (in particular of immigration from outside the EEA) on public services. Although such analysis is outside the scope of the report, we will discuss the possibilities and the problems and issues that arise when monetising the impact of immigration on public services in the "Discussion" section.

It is important to spell out what is meant with public services. In our primary empirical analysis, we will use indifferently "public services" or "public sector" as synonymous, and we will define an individual as being employed in the public sector if the individual is categorised as being employed in the public sector by the respective questions in the British Labour Force Survey (LFS). The LFS defines the "public sector" as that owned, funded or run by central or local government, and the "private" sector as everything else, The categorization is recorded as part of the variable "publicr" which identifies public sector workers as employees working in Nationalised industries or state corporations; Central Government or Civil Service; Local government or council (including police, fire services and local authority controlled schools or colleges); University or other grant funded

educational establishment; health authority or NHS trust; Armed forces; Other non-private organisations (except public companies plc and Charities).

It is important to note that two major differences exist in the classification of jobs in the LFS compared to that in the National Accounts: 1) all general practitioners are treated as part of the private sector in the National Accounts whereas the LFS records doctors in the NHS as public sector employees; 2) universities / polytechnics / higher education colleges, grant maintained schools and FE and 6th form colleges are classified as private in the National Accounts but as public in the LFS[1]. Within the public sector, we further distinguish between four main sub-sectors: "health and social care", "education", "public administration", and "other". Where appropriate, we break these down further. Please see Section 3 for more details.

Immigrants have been playing a vital part in the provision of public services in the UK, and in particular for some key services, like the NHS, and the education system. According to 2010 data from the General Medical Council, for instance, 37% of registered medical doctors in the UK received their education abroad (General Medical Council 2011). The UK's high standard of university research is also importantly determined by the UK's ability to attract top researchers from abroad. Over 10% of all UK academic staff are non-EU nationals, and this proportion is even higher in the research-intensive Russell Group universities.[2]

Little however is known about the precise distribution of immigrants from EEA and non-EEA countries in the public sector in the UK, and how this has changed over time, where they work in the public sector, and how they compare to native born workers in terms of their

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[1] Details can be found in the classification document of the LFS.
[2] Press release from Universities UK http://www.universitiesuk.ac.uk/Newsroom/Media-Releases/Pages/UniversitiesUKresponsetoHomeAffairsCommitteereportonimmigrationcap.aspx and written evidence submitted by Russell International Excellence Group to the House of Commons Home Affairs Committee: http://www.publications.parliament.uk/pa/cm201011/cmselect/cmhaff/773/773vw44.htm#n74

education, wages, and other characteristics. This report will – based on secondary data analysis, mainly drawing on the LFS – provide a comprehensive picture of the role immigrants play in the public sector in the UK. This analysis addresses – as best as possible - the key research questions the MAC has posed:

1)   How can the existing literature help us to understand the impacts of migration on the provision of UK public services? Is there any potential for analysing qualitative evidence, in combination with quantitative evidence, to consider the impact of migration on the provision of UK public services?

2)   What does analysis of relevant data tell us about the impacts of migration, in particular non-EEA immigration, on the provision of UK public services, with focus on the skill level of public sector jobs and occupations filled by migrants from outside the EEA? Do immigrants affect the quality and scope of public services in the UK? What would be the impact of having fewer non-EEA migrants employed in the sectors that provide these services? Is there scope to fill employer demand with suitably skilled workers from the UK and wider EEA labour force? Is it possible to differentiate between the contributions that non-EEA economic migrants make to the provision of specific public services? For example, do non-EEA migrants make a greater contribution to the provision of state education than to publicly-funded health services? Is it possible to differentiate between the impacts of non-EEA migration at a national, regional, and local level? If so, how do these impacts differ?

3)   What are the implications of the above? How do migrants' contributions to the provision of UK public services vary according to the duration of migrants' stay in the UK, and what are the potential issues that need to be considered in developing policy on temporary, circular and permanent migration? What are the implications of this impact of

migration for the design and operation of UK immigration policy, particularly for Points Based System (PBS) migration?

4) What are the limitations to analysis and how might we overcome them? What are the current limitations to evaluating the impact of migration on the provision of UK public services? What implications do these limitations have for considering this impact of migration for the purposes of immigration policy design? What potential is there to improve the measurement of this impact of migration? Are data currently being collected that will facilitate improved analysis in this area in future?

2.   Existing Literature and Conceptual Issues

The key question we address in this report is the impact of immigration on the provision of public sector services. Although there is quite a substantive body of research investigating the impact immigration has on the labour market, both internationally and for the UK, far less is known about the role of immigration in keeping up the provision of public services. More recently, effort has been made to highlight the role played by the foreign born in key sectors of the UK such as health and social care. A report by the House of Lords looking into the economic impact of immigration highlighted that there could be a 'possible positive effect of immigration on the supply of public services' owing to the number of immigrants that are employed in the sector (Authority of the House of Lords 2008).

Little is currently known about the overall extent to which immigrants contribute towards the provision of public services through their employment, in particular when distinguishing immigrants from within the EU, and from outside the EU. Public sector employment statistics are published every quarter by the Office for National Statistics (ONS) beginning in July 2005 (Matthews, 2010). Efforts are ongoing to improve these statistics. Currently the ONS bulletin publishes trends in public sector employment and looks at various demographics and characteristics of those employed in the public sector using data from QPSES (Quarterly Public Sector Employment Survey) and the LFS (Matthews, 2010). However, it does not look at the trend in the share of the foreign born employed in the public sector.

The public sector in the UK comprises of three main sub-sectors or industries: health and social care, education, and public administration. Of these three, the literature mainly discusses the role of immigrants in the health and social care sector which accounts for the

largest number of employed immigrants in the UK since the year 2002 (chapter 3, Ruhs and Anderson, 2010)[3]. Very little is known about their role in the areas such as public administration and education. We will summarise some of the existing literature in Section 2.2.

Further, to address the questions set out at the beginning involves a number of conceptual issues, like for instance "What determines individuals' choices about which sector to work in?", "How are wages set in the public and the private sector?", "Does the differences in average wages between the public and the private sector tell us anything meaningful about whether public sector workers are over- or under- paid?", and "Why would immigrants be helpful in addressing shortages in the public sector?". Section 2.1 will briefly talk about these issues, and provide a more conceptual discussion about how we should think about the impact of immigrants on the provision of public sector services. Section 2.2 will then briefly review some papers that address the impact of migration on the health sector, the social care sector, and the education sector.

2.1 Wages, Wage Setting, and Employment in the Public and the Private Sector

An important and relevant reference for this research is the literature on the choice of individuals whether to work in the public or private sectors. This literature started in the 1970's when economists became interested in why individuals choose e.g. being a union member or not, being a public or private sector worker, or being salaried or self employed. Economists understood early on, for example, that average wages of individuals who have *chosen* to work in different sectors are not indicative for the wage randomly assigned

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[3] See also the studies in Ruhs and Anderson (2010) for an overview of the role of migration in filling shortages in several sectors.

individuals would earn in these sectors, as individuals sort into sectors based on their own assessment of their strengths and weaknesses. A key question was how to address this problem empirically, and it was Jim Heckman in a number of papers in the early 1970's who suggested solutions, a contribution for which he ultimately received the Nobel prize (see e.g. Heckman (1978)).

For the public – private sector choice, there is a series of papers that aims at understanding (i) what drives the selection of individuals into these two sectors, and (ii) how can we compute the wages individual receive in the two sectors, taking account of selection. The papers by Dustmann and Van Soest (1997a, 1997b) are examples, and Dustmann and van Soest (1997a) give an account of this problem more formally. The paper by Disney and Gosling (1998) is an early reference that investigates public – private sector choice for the UK.

The sector choice has been commonly analysed within a framework that is known as the Roy model (Roy, 1951), which assumes that individuals possess skills along more than one dimension, and that the returns to this portfolio of skills differs between the private and the public sectors. Thus, individuals who have relatively more of the skill that is useful in the public sector will select into that sector while individuals who have more of the skills that is useful in the private sector will select into that sector. The model is one where individuals select into the sector where they have a *comparative advantage*. Two issues are addressed by this literature. First, the literature aims at understanding the type of selection into the two sectors. Secondly, it aims at comparing wages in the two sectors. Here the insight is that – as individuals self select into the two sectors – average wages in the two sectors can not be used to learn about what *average* individuals earn in the two sectors. For instance, assume that individuals in public sector jobs are more "able", in the sense that – even conditional on their labour market experience and their education – they are more productive than individuals in

private sector jobs. In that case comparing wages in the public sector with wages in the private sector would *overestimate* the wage differential between the two sectors (assuming that the wage of an individual is equal to her marginal product), as it is larger than it was if individuals were randomised into the two sectors.

The models that are estimated in this literature aim at assigning individuals to the two sectors as if they were randomly assigned, and to re-cover the wage differential that would be observed without self selection. The reliability and quality of these estimates depend on the particular study and – in particular – how well the researcher is able to *identify* the sector selection, in the sense that he finds variables that determine sector choice, but are not determining wages, conditional on sector choice.

What can be learned from this literature, and what is important for the work to be conducted here, is that individuals who work in the public and private sectors have *chosen* these sectors and are not randomly assigned, so that comparisons of wages in the two sectors are not reflecting wage differences that an *average* worker may experience in the average private vs. public sector job.

Another important area of research relates to the wage setting in the public sector. Ehrenberg and Goldstein (1975) are among the first to discuss this issue. Suppose there are public and private sector jobs, and that wages are set as the intersection of the demand- and supply curve of labour. Suppose that the private sector is competitive, so that – for a given labour supply – the wage equals its marginal product. How will wages be set in the public sector? Suppose first that the demand for labour in the public sector is determined by a given demand for public services, that public sector jobs are identical to private sector jobs, and there are no market frictions. Then there will be an equilibrium where the wage rate in the public sector equals the wage rate in the private sector, and the labour market will clear. In this simple economy, changes in the demand for the privately produced good, or the publicly

produced good will not change the wage in both sectors, as workers will switch sectors to eliminate any wage differentials. Now assume that public and private sector jobs are slightly different, and workers differ in their innate skills, which are multidimensional. Then wages in the two sectors do not need to be equal, and workers will select into the two sectors so as to realise their comparative advantage – as implied by the Roy model which we have discussed above.

Now assume again that public and private sector jobs are identical, but that there are labour market imperfections. These can take various forms. For instance, powerful public sector unions may negotiate wages above the market clearing rate. In that case, there will be an excess demand for public sector jobs, and this can then lead to queues for public sector jobs. This is the situation in many developing countries – with more people wishing to work in public sector jobs than there are positions. On the other hand, it may also be that the wages in the public sector are *below* the market clearing rate. This situation may occur when the government is required to provide a certain amount of services, but is not willing (or able) to pay sufficiently high wages for public sector positions so that private sector jobs become more attractive. Some argue that this situation characterised the UK in the early-mid 1990's, in particular in the health- and education sectors.

What can be done in this situation? One possibility is to adjust wages so that demand and supply will equalise. This requires the willingness of the government (and ultimately the electorate) to pay enough for public services so that the labour market in the public sector clears. Another possibility is to reduce the production of public services, and thus shift the demand curve downwards – something that we may experience currently. A final possibility – which is relevant for the work in this report – is to employ workers who are willing to work for wages that are lower than wages in the private sector.

Who are these workers? Immigrants are one category of workers who is often thought to be filling position in the labour market which are not desirable to native workers. But why should they take up positions that seem not attractive to native workers? There are (at least) two reasons why immigrants could be willing to work in the public sector although natives would prefer a higher paid private sector job.

First, there may be entry barriers for private sector jobs, or immigrants may be forced to remain in the public sector. Note that in this situation, immigrants are still likely to be better off working in the public sector than their alternative option (working in their home country), as the public sector job may still be better paid than the alternative job in their home country. If this was not the case, the individual would not have decided to emigrate, and to take the job in the first place. This is different from natives, whose alternative is the private sector. This is even more so if immigrants intend to remain only temporarily, so that they spend much of their earnings back home enjoying almost certainly a higher purchasing power. Thus, immigrants will *deliberately* choose to work in public sector jobs in the immigration country than remain in their origin country. This is not the case for natives, who will be made worse off when they are forced into the public sector. Of course, when removing the entry barrier to private sector jobs, immigrants will almost certainly move to the private sector. This suggests that the importance of immigrants for provision of public sector services is much related to the wage setting in the public sector, and the willingness to pay for public sector services.

Secondly, private and public sector jobs may differ, and immigrants may be *selected* (through e.g. immigration legislation, or point based systems) so that they have a comparative advantage in the public sector. For instance, when hiring trained nurses, these individuals will most likely be better off in a nursing job than in another job outside the care services in the

private sector, as their skills are likely to give them a comparative advantage in the nursing sector.

There are some dynamic aspects to these considerations. If public and private sector jobs are different, with different skill requirements, then non-competitive wages in the public sector may lead natives not to seek education in these jobs – for instance, in nursing or the teaching profession. In this case, the government will have to rely on immigrants for these jobs at least in the short run, as the production of these skills (through the national education system) will take some time even if wages are adjusted. However, whether young natives will react to improved wages by choosing that particular profession and study for it depends on whether they believe that an improvement in wages will be more permanent or not. For instance, assume there is a persistent shortage of native workers in say the nursing profession, the reason being that wages (set by the government) in this sector are lower than attainable wages in private sector occupations that require the same length of education. Now assume the government increase wages for nursing professions. Whether or not individuals will react to these increases by choosing education in nursing depends on how credibly the government can convey that these improvements are permanent. This discussion is useful for our analysis below, and we will come back to it when we present and discuss our results.

2.2   Immigration and the health, care and education sectors

The health sector

According to an article published by the ONS (Matthews, 2010), the service that witnessed the largest increase in the public sector during this period was the NHS. During the period 1999-2005 a major international recruitment drive was carried out as a response to the need for additional staffing for the UK's health sector (Buchan et al., 2006). In 2005, about

62% of the medical staff at that time in the NHS was UK trained, while 6% were from within the EEA and the remaining 32% from outside the EEA (Buchan, et al., 2006).

Since the NHS is publicly funded there is considerable scope for government intervention. The expansion in the NHS workforce came to a halt when funding shortages surfaced after which the focus was shifted to increasing productivity of the existing workforce.

This international recruitment drive of health professionals did not only happen in the UK but also in countries such as the US and Canada. In the early 1980's, 86% of all migrant physicians were found in just five countries: Australia, Canada, Germany, UK and the US (Bach, 2006). As a result, brain drain and a decline in the quality of health care in countries from where health professionals were recruited from abroad became an important issue, and started to affect recruitment policies. In response to these concerns, countries such as the UK developed policies that refrained from recruiting from source countries facing a shortage of health professionals (Buchan, et al. 2006).

The immigration of nurses has been documented in great detail, and has been the subject of several research papers (see e.g. Kalist et al., 2010 and Ross et al., 2005). There is plenty of research on the impact on host countries such as US and Canada as well as the common source countries like the Philippines and India. In response to the increased demand in the developed world for nurses for its health sector, the government of the Philippines established training schools for the nurses especially targeted at those who intend to emigrate (Bach, 2007). Unlike the recruitment of doctors, the emigration of nurses is widely believed to have been a source of foreign exchange through remittances and gain in expertise by returning immigrants for countries like India (Liese et al., 2003).

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The social care sector

Apart from the health sector, there are a number of studies on the effect on host countries due to the in-migration of skilled labour for the social care sector. For instance, for the UK, the literature has looked at the difficulties faced by employers of social care to recruit migrant labour after the changes that were made to the work permit system in 2004-2005 (Cangiano et al., 2009).

Unlike health professionals who were recruited as part of a programme, as explained above, the social care sector in the UK has not seen any systematic recruitment of migrant labour, according to Spencer et al. (2010). They point out that this is surprising, given that countries like Canada, the UK, Australia and Ireland have ageing populations which are projected to rapidly increase in the next twenty years. In the UK, the biggest influx of immigrants into this sector took place following the expansion of the EU to include the A8 countries, with the main source country being Poland (Hussein et al., 2011).

Education

Another area within the public sector that has seen an influx of immigrant labour in the developed world is education. The emphasis in the literature has mostly been on student migration (see e.g. Dustmann and Glitz, 2011) and less on the supply of teachers or educationists from within the pool of migrants. Where literature does address migration of education workers it does so from the perspective of the source country. Discussion on the brain drain effect is often found, as a result of the flight of highly skilled individuals who look to benefit from the provision of highly skilled migrant visas for countries such as the United Kingdom (Tremblay, 2005). More recent point-based systems implemented by countries such as Australia and Canada are cited as reasons for the worsening of the situation

for countries like Poland, Ukraine, Hungary, etc. Professionals such as scientists and professors leave their countries for better remuneration and seldom ever return (Vizi, 1993). Some countries like China and India have implemented policies to encourage overseas residents to return or to invest in their home countries. Tremblay (2005) argues that this has led to growth in the technological industries in these countries where migrants return with improved skill and knowledge of the developed world, or through the increase in remittances that provide valuable foreign exchange and contribute to development.

3.   Analysis

3.1   Data Sources: the UK LFS

We will address the questions set out by the MAC in its research specification primarily through analysis of secondary data sources. The main dataset that we will use in our analysis will be the UK Labour Force Survey (LFS).

The LFS is a sample survey of households living at private addresses in the UK. Its purpose is to provide information on the UK labour market that can then be used to develop, manage, evaluate and report on labour market policies. It is conducted by the Office for National Statistics. Other than the Census, the LFS is the only comprehensive source of information about all aspects of the labour market. As from 1992 (December 1994 in Northern Ireland) the LFS data are collected and published quarterly. Between 1984 and 1991 the survey was carried out yearly. Between 1973 and 1983 it was carried out biannually. The 1973 data are not publicly available. Since 1992 the sample size is about 60,000 households in the UK in every quarter, representing about 0.2% of the population. The LFS collects information on respondents' personal circumstances (including ethnicity, nationality, country of birth, and year of arrival in the UK if applicable) and their labour market status during a reference period of one to four weeks immediately prior to the interview. The LFS is a rotating panel dataset: individuals are interviewed for five consecutive quarters and then leave the sample. In every quarter, one fifth of the sample is interviewed for the first time, one fifth for the second time, and so on. Individuals are asked about their wage in their first and fifth interview only.

The LFS is the largest and longest-standing nationally representative continuous survey available in the UK. It is therefore particularly useful not only because of the rich amount of available variables, but also because it allows intertemporal comparison. However, the LFS

has not been especially designed for the study of immigration. Therefore, the number of sampled immigrants is relatively small, as it reflects the proportion of immigrants in total population. This might limit the extent to which some occupational or sectoral breakdowns are possible. The LFS also contains population weights, which account for differential nonresponse across the sample population, and allow producing tables giving population estimates. However, the construction of population weights does not take into account the nationality or country of birth of individuals. This therefore may limit the extent to which the LFS can be used to provide estimates of the size of the immigrant population.

In our analysis we will use the LFS for years 1994-2010, pooling together all quarters within each year to increase the sample size, and focusing in particular on most recent years. We define immigrants as "foreign born" throughout the analysis, and we will always compare three groups, based on individuals' country of birth: natives, EEA immigrants, non-EEA immigrants. We focus on the working age (16-65) population only.

3.2   Employment of Natives and Immigrants in the Public and Private Sectors

Figure 3.2.1 reports the evolution of total employment in the UK (scattered line) between 1994 and 2010, and it also shows the evolution of native employment (red solid line), and on a different scale on the right axis the evolution of immigrant employment (blue solid line). The total number of jobs in the UK has increased between 1994 and 2006, but it has then slightly declined between 2006 and 2010. At the same time, however, immigrants' employment has constantly increased, and remained constant in the most recent years.

[Figure 3.2.1]

Public sector employment has steadily increased since 1998, both in absolute terms and as a share of total employment, as we show in Figure 3.2.2. While for instance 22.8 percent of all jobs were in the public sector in 1998, this figure has increased to 25.3 percent by 2010.

[Figure 3.2.2]

Over the same period the immigrant population has also sharply increased, and immigrants increased their share of total employment from about 7 percent in 1995, to 13.3 percent in 2010 (see Figure 3.2.3).

[Figure 3.2.3]

In Table 3.2.1 we report in more detail the changes in the size and structure of employment between 1994 and 2010. The entries in the Table refer to the working age population, which we define to be all individuals in the UK between 16 and 65.

[Table 3.2.1]

The first interesting observation in that Table is that the working age population in the UK has increased by 3.91 million individuals. This increase has been mainly driven by immigration: while the native born population has increased by 1.38 million (or 4 percent), the immigrant population has increased by 2.56 million individuals (or by 82 percent). Further, the total number of individuals in employment has increased by 3.26 million individuals (or 13 percent), of which 1.35 million are natives, and 1.9 million are immigrants. Thus, more of the additional employment relationships go to immigrants than natives - about 58%. However, that is not at all surprising, as immigrants are mainly responsible for population growth in the working age population: 65% of working-age population growth has been due to immigration. Thus, the statement that "the majority of new jobs has gone to immigrants" is correct – but not surprising, as immigrants constituted the main part of population growth.

Employment growth over the period was relatively higher in the public sector than in the private sector. The size of the public sector increased by 1.1 million workers by 2010, a 19% increase with respect to 1994 employment. In contrast, employment in the private sector grew by 2.1 million workers, which is a 12% increase on 1994. Thus, relative to its size in 1994, the public sector has expanded by more than the private sector – which is exactly what Figure 3.2.2 illustrates.

What role did immigration have in these changes? The population of working age immigrants increased by 2.56 million over this period, and the increase was considerably faster among immigrants from EEA countries. The size of the EEA immigrant population more than doubled, from 820,000 in 1994 to 1.75 million in 2010, while non-EEA immigrants increased by 71%, from 2.24 to 3.83 million. Thus, although EEA immigration increased faster, non-EEA immigrants constitute still the vast majority of immigrants in the UK.

The bottom panel of the table decomposes growth in working age population and in employment in each sector between natives and immigrants. Immigration accounted for 65% of the growth in working age population, and for 58% of the growth in total employment. However, immigrants account for only 29% of employment growth in the public sector, but for 77% of employment growth in the private sector. Therefore immigrants' employment has played a larger role in the growth of private sector rather in public sector employment.

3.3   **Immigrants' characteristics**

We report summary characteristics of the native and immigrant population in 1994 and 2010 in Table 3.3.1.

[Table 3.3.1]

The top Panel of the Table refers to the whole working age population, the second panel reports characteristics of private sector workers, and the third panel of public sector workers. The average age of the native population has increased by over one year between 1994 and 2010, from 39 to over 40 years, while the average age of immigrants has decreased from 40 to less than 38 years over the same time period. The decrease in average immigrants' age is primarily due to the large drop in EEA immigrants' average age, which has decreased by over 6 years, from 42 to 36. In contrast, average non-EEA immigrants' age has remained quite stable. The share of women is higher among the immigrant working population than among natives in both years, although it has decreased for both EEA and non-EEA immigrants over time, while remaining stable for natives. The last column of the table reports the average age at which individuals left full time education. While changes in this variable between immigrants and natives may be affected by differences in school starting ages across countries and in the duration of school curricula, this is the best available source of information on immigrants' education in the UK LFS. The UK LFS, in fact, records all foreign educational qualifications as "other qualifications" and the comparison of qualification levels between immigrants and natives is therefore problematic.[4] The average years of education increased over time for both immigrants and natives, but the increase is higher among immigrants, and due primarily to a pronounced increase (over two years) in the average years of schooling of EEA immigrants.

The two bottom panels of Table 3.3.1 show that there are substantial differences between private and public sector workers, both among immigrants and natives. Workers in the public sector are on average older than workers in the private sector: in 2010 the average native public sector employee is more than two and a half years older than the average native private sector employee, and the gap is even higher, at over three and a half years, among

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[4] See the Appendix of Manacorda et al. (2011) for a discussion of this issue.

immigrants, and particularly large (almost six years) for EEA immigrants. Women are substantially more likely to work in the public sector than men: the share of women among public sector workers is over 20 percentage points higher than among private sector workers for both immigrants and natives.

Finally, public sector workers have on average about one more year of education than private sector workers, and this is true both for natives and for immigrants. We illustrate this in Figure 3.3.1, where we report the evolution over time of the mean age at which individuals left full time education for natives, EEA and non-EEA immigrants, separately in the private and public sector.

[Figure 3.3.1]

The figure shows clearly that workers in the public sector have a higher average education than workers from the same origin country in the private sector, and that there is a strong upward sloping trend over time in both sectors for the average years of education of both immigrants and natives. While in most years the average education of non-EEA immigrants is higher than for EEA immigrants, the latter have a faster growth over time, and by the end of the 2000s they have reached, and overcome, the average education of non-EEA workers in both sectors.

3.4   **Occupational and sectoral distribution**

Where within the public sector are immigrants more concentrated, and does their sectoral distribution differ from that of natives? Figure 3.4.1 and the left panel of Table 3.4.1 show the distribution of immigrants and natives across sectors within public employment. We distinguish between the three major subsectors where public employment is concentrated in

the UK (public administration, education, health and social work[5]), and pool all other sectors in the residual category "Other", for the years 1994/1996 and for the years 2008/2010.

[Figure 3.4.1]

In 2008/2010 education – which includes all educational institutions from pre-primary to higher education - is the most common sector for native public employees, as it employs about one third (32%) of native public workers. Conversely, 29% of immigrants in the public sector work in education while 38% are employed in the health sector. However, there is a large heterogeneity across immigrant groups: education is the most frequent sector of employment for EEA but not for non-EEA immigrants (over 37% versus 26%), while health is the most frequent sector for non-EEA immigrants (41% of total non-EEA public employees and 29% of EEA public employees). The concentration of non-EEA immigrants in the health sector has increased over time, from 36% in 1994/1996 to 41% in 2008/2009. Conversely, EEA immigrants have moved out of the health sector over time: 40% of EEA public employees were working in the health sector in 1994/1996, but this share has decreased to 29% in 2008/09. This is interesting, and could be explained by the change in the composition of EEA immigrants.

The right panel of Table 3.4.1 shows the share of EEA and non-EEA immigrants out of total public employees in each sector in the two periods.

[Table 3.4.1]

While in 2008/2010 non-EEA immigrants represent 11.2% of public employees in the health sector, they make up only 9.6% of the total working age population. Conversely, EEA

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[5] We define these sectors based on the Standard Industrial Classification (SIC) adopted in the LFS. Until 2008 sectors in the LFS were classified using the SIC 92 classification, while since 2009 the LFS has adopted SIC2007. Specifically, we define categories as follows. Public administration: SIC92 Section L, SIC2007 Section O "Public administration and defence; compulsory social security. Education: SIC92 Section M, SIC2007 Section P "Education". Health and social work: SIC92 Section N, SIC2007 Section Q "Health and social work".

immigrants account for only 3% of health sector employees, but constitute more than 4% of the total working age population. Both immigrant groups are under-represented in all other sectors of public employment, relative to their share on the working age population.

In Table 3.4.2 we report the distribution of native born individuals and of EEA and non-EEA immigrants in the public sector across major occupations groups (1 digit SOC 2000 classification). The three leftmost columns report the distribution, pooling years 2001-2003[6], while the three rightmost columns refer to years 2008-2010 pooled. The last column reports the average public sector hourly pay by occupation, expressed in 2005 GBP, computed over the years 2001/2010 pooled.

[Table 3.4.2 here]

Immigrants tend to be more concentrated than natives in the highest skilled and most highly paid occupations, but the difference is reducing over time. Over the period 2008-2010 56% of natives in the public sector are employed in the three highest ranked occupations, up from 51.5% in years 2001-2003. Conversely the share of EEA (non-EEA) immigrants in the same occupation groups is 62% (64%) in 2008-1010 pooled, while it was 64% (63%) over the period 2001-2003.

To what extent are differences in the occupational distribution of immigrants and natives due to immigrants and natives working in different sub-sectors? We explore this in Table 3.4.3 where we report the occupational distribution of native and immigrant public employees within the public administration, education and health and social work sector, where we pool again the years 2008/2010.

[Table 3.4.3]

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[6] We cannot go further back in time because before 2001 occupations were classified using the SOC90 classification, and there is no exact correspondence between SOC90 and SOC2000 at any level.

The occupational distribution of immigrants and natives within the public administration (first panel of the Table) is very similar, although immigrants tend to be less concentrated in the top occupations and more concentrated in the bottom occupation categories. In the education sector, instead, immigrants are more concentrated than natives in professional occupations: 60% of EEA immigrants and 54% of non-EEA immigrants in the education sector are employed in professional occupations, versus 50% of natives. It is in the health sector, however, that the occupational distribution of immigrants and natives is dramatically different: the share of immigrants in professional occupations is, for both EEA and non-EEA immigrants, about twice as high as the share of natives. Conversely, natives are twice as concentrated as non-EEA immigrants, and 50% more concentrated as EEA immigrants, among managers and senior officials.

3.5   **Regional analysis**

We investigate regional differences in the role of immigrants in public employment in Table 3.5.1, where we focus on the pooled years 2008/2010 (we report the corresponding table for years 1994/96 in Table A1 in the Tables Appendix). We define regions based on the LFS variable *uremsc*, which reports individuals' country of usual residence. We have grouped some regions together to increase the sample size[7]. Our final regional variable comprises of 12 regions: North East, Yorkshire and the Humber, East Midlands, East Anglia, Greater London, South East, South West, West Midlands, North West, Wales, Scotland and Northern Ireland.

[Table 3.5.1]

The first two columns of the table report the share of non-EEA and EEA immigrants in the total regional working age population. London is the region with the highest concentration of immigrants from all origins: non-EEA immigrants constitute 30% of the total population in London, while EEA immigrants make up another 10% of the population. The corresponding shares for the whole of the UK are 9.5% and 4%, respectively. In all other regions except for London, the share of immigrants is below the national average, with the West Midlands, the South East and the East Midlands having higher shares of non-EEA immigrants (9.5%, 8.6% and 6% respectively) than other regions, and East Anglia, the South East and Northern Ireland having shares of EEA immigrants that are higher than in remaining regions at 4.7%, 4.2% and 4.2% respectively. Columns 3 and 4 report for each region the share of immigrants among all public employees. It is instructive to look at these columns in comparison to columns 1 and 2. In regions where the share reported in column 3(4) is higher

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[7] We pool together Tyne & Wear and the Rest of Northern Region; South Yorkshire, West Yorkshire and Rest of Yorkshire and the Humber; Inner and Outer London; West Midlands (Metropolitan) and the Rest of West Midlands; Greater Manchester, Merseyside, and the Rest of North West; Strathclyde and the Rest of Scotland.

than those reported in column 1(2), non-EEA (EEA) immigrants are over-represented in the public sector relative to their number in the total population. For instance, although in London, the share of immigrants among public employees is highest, it is substantially lower than the corresponding share in the working age population (e.g. 24.3% in the public sector, vs. 30.2% in the working age population). The share of EEA immigrants among public sector workers is lower than their share of the total population in all regions. Conversely the share of non-EEA immigrants among public sector workers is higher than their share in the total population of East Anglia (8.6% versus 6%), the South East (9.1% versus 8.6%), and in the South West (5% versus 4.5%). The relative concentration of non-EEA immigrants in the public sector is particularly high in East Anglia, where their share among public sector employees is over 40% higher than their share in the total population.

Finally, in columns 5 to 7 we report the share of natives, non-EEA and EEA immigrants in public employment, out of total employment for each group. The region where non-EEA immigrants are least likely to be employed in the public sector is London, where only 19.5% of them are public employees, versus 25% of natives and 13% of EEA immigrants. Conversely, as indicated by the comparison of columns 1 and 3, East Anglia is the region with the highest concentration of non-EEA immigrants in public employment, with 37% of all employed non-EEA immigrants working in the public sector.

We analyse the differences in the occupational distribution of immigrants and natives in the public sector in different regions in Table 3.5.2, where we compare years 2001/2003 pooled to years 2008/1010 pooled.

[Table 3.5.2]

The table reports, for every region and for the whole UK, the Duncan dissimilarity index for the distribution of non-EEA and EEA immigrants relative to natives across the nine

SOC 2000 major occupation groups, corrected to account for sampling error (see Carrington and Troske, 1997 and Hellerstein and Neumark, 2008). The index can be interpreted as the percentage of immigrants that should change occupation for immigrants and natives to have the same occupational distribution. Therefore, the higher the index, the more dissimilar is the occupational distribution of immigrants and natives.

The table shows that, at the national level, the index is the same for both EEA and non-EEA immigrants, and stable over time. The entries indicate that - on average over the period 2008/2010 - in the UK 10.6 percent of immigrants in the public sector would have to change jobs to equalize their occupational distribution to that of native public employees. However, the picture is more scattered across regions. The region with the highest difference between natives' and non-EEA immigrants' occupations in the North East, followed by East Anglia: over 23% of non-EEA immigrants within the public sector in the North East and almost 19% in East Anglia should change job for their occupational distribution to be the same as that of natives. In both regions, instead, the value of the Duncan index for EEA immigrants is lower and similar to the value for the UK as a whole. In most regions the index for non-EEA immigrants has decreased over time. The exception to this is London, where the index has increased from 4.6 in 2001/03 to 10.4 in 2008/2010. Given that London is home to a very large share of immigrants, the behaviour of the index in London contributes to offset the changes in less immigrant-intensive regions and to maintain the value of the national index stable over time.

3.6   **Wage Structure**

The wage structures in public and private sector are different, and the wage differential has changed over time.

We study the evolution of the public-private wage gap over time by running log-wage regressions of the form:

$$lnw_{it} = X_i'\alpha + \sum_{t=1994}^{2010} \beta_t P_{it} * Y_t + \sum_{t=1994}^{2010} \gamma_t Y_{it} + \sum_{r=1}^{12} \delta_r R_{ir} + e_{it} \qquad (1)$$

where lnw_{it} is the logarithm of the average hourly real wage of individual i observed in year t, P_{it} is a dummy variable for public employment, Y_{it} (t=1994, ...,2010) are dummy variables for each year, R_{ir} (r=1, ..., 12) are dummy variables indicating the region of residence of individuals, and X_i is a vector of characteristics of individual i, which includes age, age squared, the age at which individuals left full time education, dummies for major occupation groups, and a gender dummy, all interacted with year dummies. We run the regression in (1) alternatively with and without background characteristics X_i and region dummies. The coefficients β_t can be interpreted as the percentage difference in average hourly wages between the private and private sector in every year t, with and without controlling for workers' characteristics.

We report regression results in Table A2 in the Tables Appendix, and plot the estimated percentage wage differential between average wages in the public and the private sector (β_t) between 1994 and 2010 in Figure 3.6.1.

[Figure 3.6.1]

The solid line represents raw wage gaps (i.e. results from the regressions without additional control variables and regional dummies), and shows that there are considerable differences in average wages between the two sectors. The gap has declined between 1994 and 2001, from 24.6% to 16.3%, but it has then started to increase again until reaching 21% in 2008. However, as we show in Table 3.3.1, public sector employees differ from private sector employees in the educational attainment, with public sector workers having on average

more years of education than those in the private sector. We therefore also report the wage differential when we keep education, gender, region, and age constant.

The dashed line in the figure represents the wage gap after controlling for workers' age, education, gender and region of residence. It shows that a sizable fraction of the gap is due to differences in the observable characteristics between workers in private and public sector: observable characteristics reduce the gap by about 10 percentage points in earlier years, and by about 8 percentage points in the years after 2004. However, even conditional on these observable characteristics, mean wages in the public sector are still higher than in the private sector. The dotted line represents wage gaps when we also include as control variables the occupational dummies. Controlling for the occupational structure in private and public sector reduces further the public–private wage gap, which reaches a minimum of 3% in 2001, but does not eliminate it. As we explain in section 2, the remaining differences could be due to unobservable differences, like ability.

How does the immigrant-native wage gap differ between the private and the public sector?

We use again regression analysis to answer this question, and we run, separately for private and public sector workers, regressions of the form in (2):

$$lnw_{it} = X_i{'}\alpha + \sum_{t=1994}^{2010}\beta_t^E E_{it} * Y_t + \sum_{t=1994}^{2010}\beta_t^{NE}NE_{it} * Y_t + \sum_{t=1994}^{2010}\gamma_t Y_{it} + \sum_{r=1}^{12}\delta_r R_{ir} + e_{it} \qquad (2)$$

where notation is the same as in (1), and E_{it} and NE_{it} are respectively dummy variables for EEA and non-EEA immigrants. The coefficient β_t^E (β_t^{NE}) measure the percentage wage difference between EEA (non-EEA) immigrants and natives in, alternatively, the private and the public sector.

Figure 3.6.2 reports the evolution of the conditional (solid line) and unconditional (dotted line) percentage wage gap between immigrants and natives in the public and private sector, where we distinguish between EEA and non-EEA immigrants. We report full regression results in Table A3 in the Tables Appendix.

[Figure 3.6.2]

Both EEA and non-EEA immigrants have an unconditional average wage advantage relative to natives in both the private and the public sector until the mid-2000s. After that, however, the wage gap for EEA immigrants becomes decidedly negative, possibly due to the inflow of immigrants from the new EU member countries. The gap for non-EEA immigrants is instead quite stable over time. Conditioning on observable characteristics of immigrants and natives, however, shows that immigrants' wage advantage is entirely due to their more favourable characteristics: as we have illustrated in Table 3.3.1 immigrants have higher education than natives in all years, moreover we have shown in Table 3.5.1 that they are much more concentrated than natives in London, where wages are on average higher than in other regions. The conditional gap is negative in all years, although not always statistically significant for EEA immigrants, and the difference with the unconditional gap is largest for non-EEA immigrants. Interestingly the conditional wage gap in the public sector, at slightly more than 10% for non-EEA immigrants, is considerably lower than the gap in the private sector.

We now examine the relationship between the share of immigrants in the public sector, and several measures of relative wages, where we compare different regions in the UK. We consider the years between 2005 and 2010, and pool observations top have a sufficiently large data base. We use graphical representations to illustrate these relationships. We remove differences log wages across regions that are due to composition, i.e. differences in the e.g. age- or education structure, using regression analysis. Our wage measures are residuals we

obtain from regressions as (1). We report regression results in Table A4 in the Tables Appendix.

We first introduce some notation. We denote by $\overline{\omega}_r^{Pu}$ and $\overline{\omega}_r^{Pr}$ the mean residual wages in the public (*Pu*) and private (*Pr*) sectors in region *r*, which we obtain from wage regressions as in (1), conditioning on education, age, gender, and occupation. Likewise, $\overline{\omega}_r^{Pu,N}$ and $\overline{\omega}_r^{Pu,I}$ are the mean residual log wages of natives and immigrants in the public sector, and $\overline{\omega}_r^{Pr,N}$ and $\overline{\omega}_r^{Pr,I}$ are the mean residual log wages of natives and immigrants in the private sector. Further, I_r^{Pu}/I_r is proportion of immigrants that are employed in the public sector, where I_r^{Pu} is the number of immigrants working in the public sector in region r, and I_r is the total number of employed immigrants in that region. Likewise, $I_r^{Pu}/(I_r^{Pu}+N_r^{Pu})$ is the proportion of public sector workers in region r who are immigrants (where N_r^{Pu} is the number of natives who work in the public sector in region *r*). Finally, N_r is the total number of natives who work in region *r*.

[Figure 3.6.3]

In Figure 3.6.3 we examine the relationship between the regional conditional public-private sector log wage gap, $\overline{\omega}_r^{Pu}-\overline{\omega}_r^{Pr}$, and the proportion of immigrants that are employed in the public sector I_r^{Pu}/I_r. The figure shows that for both EEA and non-EEA immigrants there is a positive association between a higher residual wage premium in the public sector and the proportion of immigrants that are public employees. The regression lines between the regional public sector wage premium and the share of EEA (non-EEA) workers are upward sloping.

In Figure 3.6.4 we plot the ratio between the regional conditional wage gap between immigrants and natives in the public and in the private sector, $(\overline{\omega}_r^{Pu,I} - \overline{\omega}_r^{Pu,N})/(\overline{\omega}_r^{Pr,I} - \overline{\omega}_r^{Pr,N})$, against the share of immigrants in each region that are public sector employees, I_r^{Pu}/I_r.

[Figure 3.6.4]

The figure can be interpreted as an indication of whether the share of immigrants in the public sector is higher in regions where the conditional wage disadvantage between immigrants and natives is lower in the public sector. The figure shows that, indeed, there is a negative association between these two statistics for non-EEA immigrants, with a downward sloping regression line. However, there is no such association for EEA immigrants.

In Figure 3.6.5 we plot the regional conditional public sector wage premium $\overline{\omega}_r^{Pu}$ - $\overline{\omega}_r^{Pr}$ against the share of public sector employees who are EEA and non-EEA immigrants, $I_r^{Pu}/(I_r^{Pu} + N_r^{Pu})$.

[Figure 3.6.5]

The figures show that regions with a higher fraction of immigrants among public sector workers are also the regions where the public sector wage premium is lower, as indicated by the downward sloping regression lines. The negative correlation is robust to the exclusion of London. One interpretation of this is that in regions where the public-private sector wage gap is smaller, immigrants are filling public sector jobs. However, notice that this association may also simply be a consequence of more immigrants living in areas where private sector wages are higher relative to public sector wages.

To address this, we normalise the share of immigrants in the public sector by the share of immigrants in the workforce in that region, to obtain $[I_r^{Pu}/(I_r^{Pu} + N_r^{Pu})]/[I_r^{T}/(I_r^{T} + N_r^{T})]$., the relative concentration of immigrants in the public sector. In Figure 3.6.6, we plot the

regional public sector wage premium $\overline{\omega}_r^{Pu}$ - $\overline{\omega}_r^{Pr}$, against this measure of relative concentration of immigrants in the public sector.

[Figure 3.6.6]

The graphs show that most of the negative association between public sector wage premium and the share of immigrants among public employees shown in Figure 3.6.5 is simply due to the fact that the public sector wage premium is lower in regions with a higher concentration of immigrants. Once we normalize by the share of immigrants in the regional population, the association between public sector wage premium and share of non-EEA immigrants among public employees becomes only mildly negative (and not statistically significant), while it completely disappears for EEA immigrants. Therefore, based on these simple figures, there seems to be no evidence of an association between the relative proportion of immigrants in public employment and the public sector wage premium.

3.7   Mobility over time

Finally, in the last part of our analysis we study patterns of mobility of immigrants into and out of the public sector over time. As we do not have longitudinal information on immigrants in the UK, we will use the repeated cross section structure of the LFS and follow the same cohort of immigrants over time.

We report in Figure 3.7.1 the evolution of the share of EEA (solid line) and non-EEA (dotted line) in public employment over years of residence in the UK. We have normalised the value of both series to be 1 in the first year, and we have top coded years of residence at 40.

[Figure 3.7.1]

The fraction of EEA immigrants in the public sector more than doubles when comparing newly arrived immigrants to those who arrived ten to twelve years earlier. The growth in the share of public sector employment is lower, but still positive, for non-EEA immigrants: the share of non-EEA immigrants in public sector doubles after about 30 years of residence.

Notice that due to the lack of longitudinal data we cannot distinguish between life cycle changes and compositional changes due to return migration.

For the first 10 years, we have illustrated the degree of outmigration (by EEA and Non-EEA migrant status) in Figure 3.7.2, for individuals who arrived in or after 1994 (the first year we use for analysis).

[Figure 3.7.2]

We follow the methodology as in Dustmann and Weiss (2007). In the lower panel, we replicate the graph on public employment for the same arrival cohorts. The upper graph indicates that out-migration – in particular of EEA immigrants – is large: after 8 years, only about 65 percent of those immigrants who stayed in the UK for at least one year, and who came from an EEA country, are still in the UK. Outmigration for non-EEA immigrants is smaller: about 90 percent of those who arrived 8 years earlier, and stayed for at least one year in the UK, are still in the UK 8 years later. This illustrates that the large increase in the proportion of – particularly EEA – immigrants in the public sector could well largely be explained by selective out-migration, with those who work in the private sector leaving the UK.

4.   Discussion and Conclusions

How does all that help addressing the questions posed by the MAC? This is what we discuss in this section.

The first set of questions are: w*hat is the impact of (non-EEA) migration on the provision of UK public services? Do immigrants affect the quality and scope of public services in the UK? What would be the impact of having fewer non-EEA migrants employed in the sectors that provide these services?*

Our analysis shows that public sector employment in the UK has increased from 22.8 percent of overall employment in 1998, to 25.3 percent by 2010. The size of the public sector has increased by 1.1 million workers by 2010, a 19% increase with respect to 1994. The private sector grew by 2.1 million workers, a 12% increase on 1994. Relative to its size in 1994, the public sector has expanded by more than the private sector.

Immigrants increased their share of employment from about 7 percent in 1995, to 13.3 percent in 2010. In 2010, about 26 percent of all native employment was in the public sector, but only 21 percent of all immigrant employment. Thus, overall, the share of immigrants who works in the public sector is lower than the share of natives. This is true for both EEA and non-EEA immigrants, with shares of public sector employees 15.5 and 23 percent.

However, immigrants greatly contributed to the growth of the public sector since 1994: while the overall employment in the public sector increased by about 1.1 million, the number of employed individuals of immigrant status in the public sector increased by 318 thousand, of whom 238 thousand are non-EEA immigrants. Thus, nearly 1 in three new jobs in the public sector since 1994 has been filled by immigrants. However, these numbers need to be seen in conjunction with the overall increase in immigrants in overall employment: Of the 3.2

Million new jobs created between 1994 and 2010, 1.9 Million jobs (or 60%) went to immigrants.[8] Thus, although immigrants importantly contributed to the expansion of the public sector between 1994 and 2010, their share in the private sector increased far more than in the public sector.

Averaging over the years 2008- 2010, the sector "education" employs 32% of native public sector workers, and 29% of immigrant public sector workers. Of those who work in the public sector, 37% of immigrants from EEA countries, but only 26% of immigrants from non-EEA countries work in education. On the other hand, non-EEA immigrants are more strongly concentrated in the health sector: while 41% of non-EEA immigrants who work in the public sector, work in the health sector, only 29% of EEA immigrants do. The concentration of non-EEA immigrants in the health sector has increased over time, from 36% over the period 1994-1996 to 41% over the period 2008-2010. Thus, immigrants played an important role in the expansion of the public sector in the UK, in particular in health and education.

Do immigrants affect the quality and scope of public services in the UK? To address that question indirectly, we investigate the skills immigrants have in comparison to natives in the public sector. Immigrants in the public sector are on average younger, and better educated. While natives in the public sector are on average 42.5 years old, immigrants are 41.2 years old (and non-EEA immigrants 41.4) – a difference of more than one year. Immigrants in the public sector are also better educated (where education is measured as the age at which full time education has been completed): while native public sector employees left full time education on average at an age of 18.5 years, immigrants stayed on until age 20.8 years, and non-EEA immigrants until 20.7 years. The educational advantage of

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[8] Of course, this does not mean that "immigrants took all the new jobs: Over the same period, the working age population grew by 3.9 Million, of whom 2.52 Million (or 64 percent) were immigrants. Thus, of the new jobs created, immigrants received slightly *less* than their contribution to the growth of the working age population.

immigrants may affect the quality and scope of public services they provide. In line with that, we find that immigrants tend to work in higher-skilled occupation groups (63% and 64% of EEA and non-EEA immigrants work in the 3 highest occupation groups, compared to 52% of natives). Thus, these figures suggest that immigrants contribute importantly, and over-proportionally, to the *quality* of public sector services.

The next set of questions asks *Is it possible to differentiate between the contributions that non-EEA economic migrants make to the provision of specific public services? Is it possible to differentiate between the impacts of non-EEA migration at a national, regional, and local level? If so, how do these impacts differ?*

The first question has been addressed above, and much detail is given in the Tables in this report: immigrants in the public sector tend to tend to work in higher level occupations and tend to be better educated (21 and 20.7 years for EEA and non-EEA immigrants in 2010, as compared to 18.5 years for natives) than natives.

The regional distribution of immigrants differs widely across the UK. Non-EEA immigrants constitute 30% of the total working age population in London, while EEA immigrants make up another 10% of the working age population. The corresponding shares for the whole of the UK are 9.5% and 4%, respectively. Overall, and for the years 2008-2010, the share of EEA and non-EEA immigrants who are employed in the public sector is lower than the share of natives, overall and in most regions (with few exceptions). Likewise, the share of EEA and non-EEA immigrants among public sector workers is lower than their share in the working age population in all regions, again with few exceptions for non-EEA immigrants (like East Anglia, the South East and the South West). Non-EEA and EEA immigrants are least likely to be employed in the public sector in London, where only 19.5% of non-EEA and 13 percent of EEA immigrants are public employees, versus 25% of natives. This might be due to the higher job opportunities and wages offered by the private sector in

London than in the rest of the country, which is also witnessed in the extraordinary proportion of immigrants in the working age population of London. These figures and the analysis we provide above show that there is a large variation in the employment share in the public sector of EEA and non-EEA immigrants across regions, which, is much related to the large variation o immigrants in the working age population share.

There is segregation of immigrants within the public sector across occupational groups, in the sense that the proportion of immigrants and natives across occupational groups is not the same. This is not too surprising: as we have shown above, immigrants are better educated, and they tend to be in higher level occupations, relative to natives. There is regional variation in the degree of segregation: for instance, in the North East, more than 23 percent of non-EEA immigrants in the public sector would have to be re-allocated to obtain an occupational distribution which is the same than that of natives, which is above the national level, where only 10.6 percent of immigrants would have to be re-allocated to equalize their occupational distribution to that of native public employees

The next set of questions is: *How do migrants' contributions to the provision of UK public services vary according to the duration of migrants' stay in the UK, and what are the potential implications of this impact of migration for the design and operation of UK immigration policy, particularly for Points Based System (PBS) migration?*

The fraction of immigrants in the public sector increases with immigrants' time in the UK, with the biggest increase after about 5 years of residence. This could mean that immigrants need time to acquire the human capital needed for employment in the public sector. However, it could also mean that immigrants working in the private sector leave the UK over-proportionally. It is impossible to tell what channel dominates, based on the data available. We show in Section 3.7 that out-migration is indeed substantial, in particular among EEA immigrants. Thus, compositional effects may contribute significantly to the

finding that the fraction of EEA and non-EEA immigrants in the public sector increases over time. Unfortunately, in the absence of data that provide repeated information on the same individual over time, the question as to whether composition, or movement of individuals into the public sector after some years of residence in the UK, drives the results is not possible. Thus, although the evidence we provide is compatible with immigrants increasing their share in the public sector with the time they are resident in the UK, it is also compatible with the within-arrival cohort composition of immigrants with respect to public sector employment changing over time (through over-proportional outmigration of individuals who work in the private sector).

The next set of questions is: *What are the limitations to analysis and how might we overcome them? What are the current limitations to evaluating the impact of migration on the provision of UK public services? What potential is there to improve the measurement of this impact of migration?*

Additional question raised:

How can the impact of migration on public service provision be considered within an economic cost-benefit framework?

The LFS gives us a pretty good picture of the status quo of immigrants in the public and the private sector. It is however a repeated cross section, and does not allow us to fully address life-cycle developments of immigrant engagement in the different sectors (as is demonstrated above). This is a major shortcoming. It calls for a longitudinal survey of immigrants, or at least access to longitudinal administrative social security data.

Now, what is the "impact" of migration on public services? To address this question requires some conceptual clarification. First, an "impact" must be some measurable outcome, and it needs to be clearly defined. This is quite straightforward when assessing, for instance, the impact of migration on "wages" of natives, as "wages" is a clearly defined concept. It is less straightforward when assessing the impact of migration on "public services". Immigrants could for instance contribute through improving the "quality" of public services. However, quality is multi-faceted concept, and not all its components can be measured. Immigrants could also contribute through affecting the "cost" of public services, by e.g. providing their services for a wage for which native workers of the same qualification would prefer to work in the private sector.

Suppose one has agreed on a measurable outcome. For illustration, let us assume that this outcome is the "waiting times" for treatment in the health sector. Then, secondly, to measure an "impact" of immigration on that outcome requires the comparison of two situations: the status quo (e.g. waiting times in the UK in 2010), and the outcome that would be observed in a counterfactual situation. This counterfactual situation could be – at the one extreme – a situation where no immigrants are employed in the public sector, or a situation where immigration has been restricted to a particular quota from a particular year onwards. In particular, the counterfactual situation one would like to consider depends on the particular policy question that one would like to pose. However, the counterfactual situation is a "hypothetical" situation – it is never observed! It therefore needs to be constructed, and this requires almost always assumptions which in many cases are implausible.

To stick to our example, one could ask the question how average "waiting times" (the outcome of interest) would be if access of non-EEA immigrants to the UK had been completely restricted since 2000, so that no new arrivals from non-EEA countries could have been employed in the health sector. One way to go about this would be to simply reduce

public sector employment of non-EEA immigrants to only those who arrived before 2000, and to compute (using some appropriate model) the waiting times for that situation. The comparison between the two outcomes would refer to a clear policy scenario: an immigration stop of non-EEA immigrants in 2000. But is a counterfactual situation, computed in the way that we simply eliminate all non-EEA immigrants who arrived after 2000, plausible for that specific policy scenario? Surely, in the absence of non-EEA immigration, some of the health sector jobs would have been filled by EEA-immigrants, and some by natives. The complication for the researcher is that we do not know which and how many jobs would have been filled. And how would a complete restriction of immigration of non-EEA immigrants have affected wages in the health sector (and- as a consequence - the willingness of natives to work in that sector)? How would it have affected immigration from EEA countries? How would this have affected the demand for health services? Would it have impacted on other sectors of the economy which – in turn – affect the health sector? All these questions have to be addressed to construct a "plausible" counterfactual situation for the assumed policy scenario. It is obvious that this is difficult. The MAC, in a recent report, recognises these problems, stating "*These considerations are complicated by the fact that it is impossible to know now how employers' decisions will change once limits* [on Tiers 1 and 2 of the Points Based System] *are in place. For example, some might simply seek to employ EEA workers in place of non-EEA workers.*" (Migration Advisory Committee (2010), chapter 9, "Limits and Policy Options") Further, in the above example, we have only considered one outcome. But of course, there are many more outcomes, across the entire spectrum of public sector engagement and services. Thus, to determine the "impact" of immigration on public services is a challenging task.

The same considerations hold for a cost-benefit analysis. Again, costs and benefits need first to be defined. What are the costs, which costs should be considered, and how can they be measured? What are the benefits? Further, as before, assessment requires the definition of a meaningful counterfactual situation, possibly one which is related to a policy scenario. Again, a challenging task.

Based on the findings in this report, can we say something about whether some regions are more reliant on migrants, and whether this is a result of inflexible wages in the public sector? In Figure 3.6.6, we plot the public sector conditional log wage premium against that relative share of immigrants in the public sector. From the figure, it seems that there is no correlation between the two: Immigrants are not relatively more or less concentrated in the public sector in regions where the public sector wage premium is higher. However, these associations do not have a causal interpretation. They do not speak to the question whether immigrants fill those jobs in the public sector where wages deteriorate relative to alternative jobs with similar requirements in the private sector. To address that question requires addressing the selection of immigrants and natives across regions, and distinguishing between supply- and demand effects. For instance, an increase in the public-private sector wage gap in a particular region may on the one hand change the relative allocation of immigrants and natives to public- and private sector jobs; it may also however be *induced* by supply shifts to that region, which lead to changes in the public-private sector wage gap. Addressing this requires a careful conceptual and empirical framework, and thorough empirical analysis.

Are there subsectors of the public sector that are more reliant on immigrants, and why? Our findings have for instance shown that the share of immigrants in the health and social work sub-sector has increased most among the public sub-sectors, from 10 to 14 percent between 1994/1996 and 2008/2010. However, this increase is largely in line (and even slightly lower) with the overall increase of immigrants in the working age population (from

8.4 to 14 percent). Whether – in the absence of immigration – the expansion in the health and social work sector would have been possible at the same wages can not be answered based on these figures. As we discuss above, what is needed to address this question is a construction of the missing counterfactual situation. Again, this requires far more involved analysis, and it is not clear whether – based on the available data – it can be conclusively answered.

What would be the consequence of restrictions – in the short run – if employment of non-EEA immigrants were suddenly constrained? Our analysis shows that non-EEA immigrants in the public sector work in higher ranked occupations, and are better educated than natives. Further, non-EEA immigrants are differently distributed across occupations than natives, as suggested by occupational dissimilarity indices. Also, if non-EEA immigrants are compared to natives with the same education and age structure, their wages are lower (which may partly be explained by a lower value of education acquired outside the UK, in the UK labour market). All this is compatible with the hypothesis that it may be difficult to fill some jobs in the public sector with equally skilled natives, and at the same wages, if employment of non-EEA immigrants was suddenly constrained.

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Figures

Figure 3.2.1 - Employment in the UK, 1994-2010
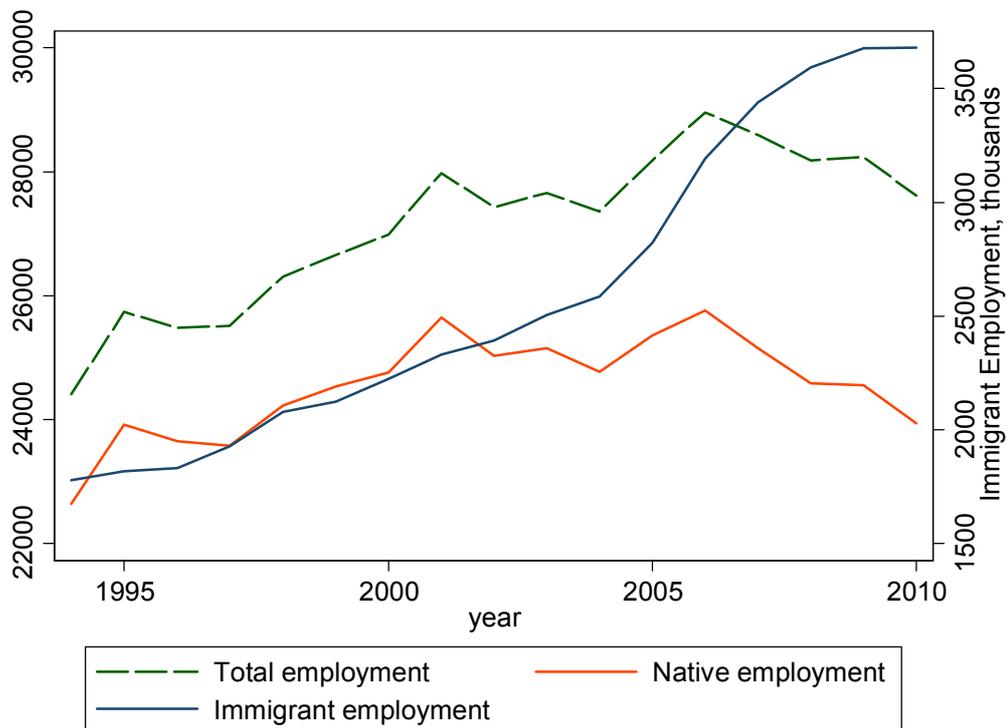
The figure reports the evolution of total and native employment (on the left axis) and of immigrant employment (on the right axis), expressed in thousands, in the UK over yeasr 1994-2010.
Source: UK LFS

Figure 3.2.2 - Public employment, 1994 -2010
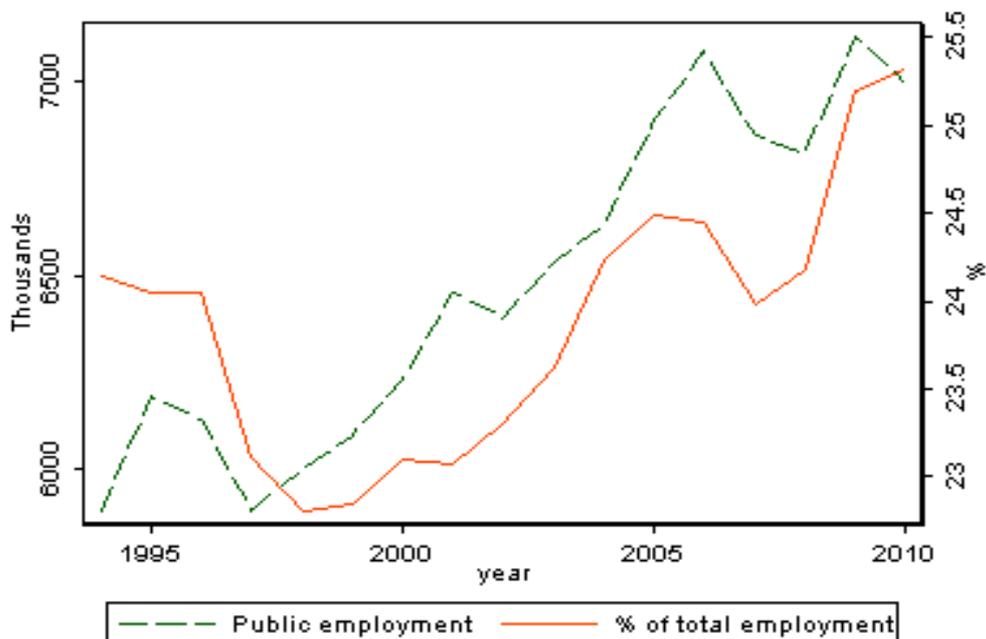
The figure reports the evolution of public employment, expressed in thousands (on the left axis) and as a share of total employment (on the right axis) in the UK over years 1994-2010.
Source: UK LFS

Figure 3.2.3 - Immigrant employment, 1994-2010
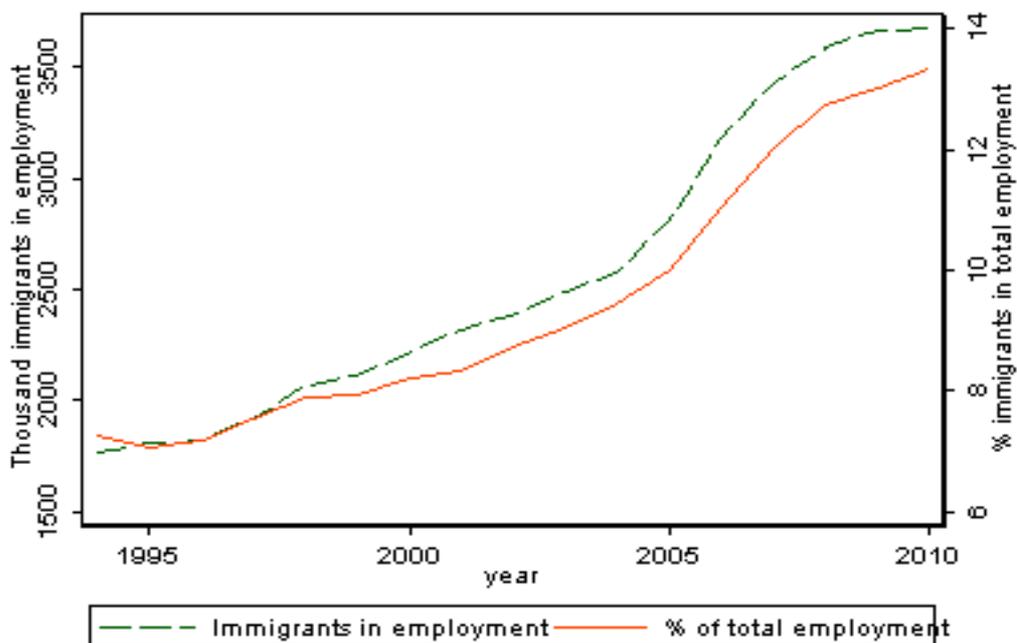
The figure reports the evolution of immigrant employment, expressed in thousands (on the left axis) and as a share of total employment (on the right axis) in the UK over years 1994-2010.
Source: UK LFS

Figure 3.3.1 – Average education by sector, 1994 -2010
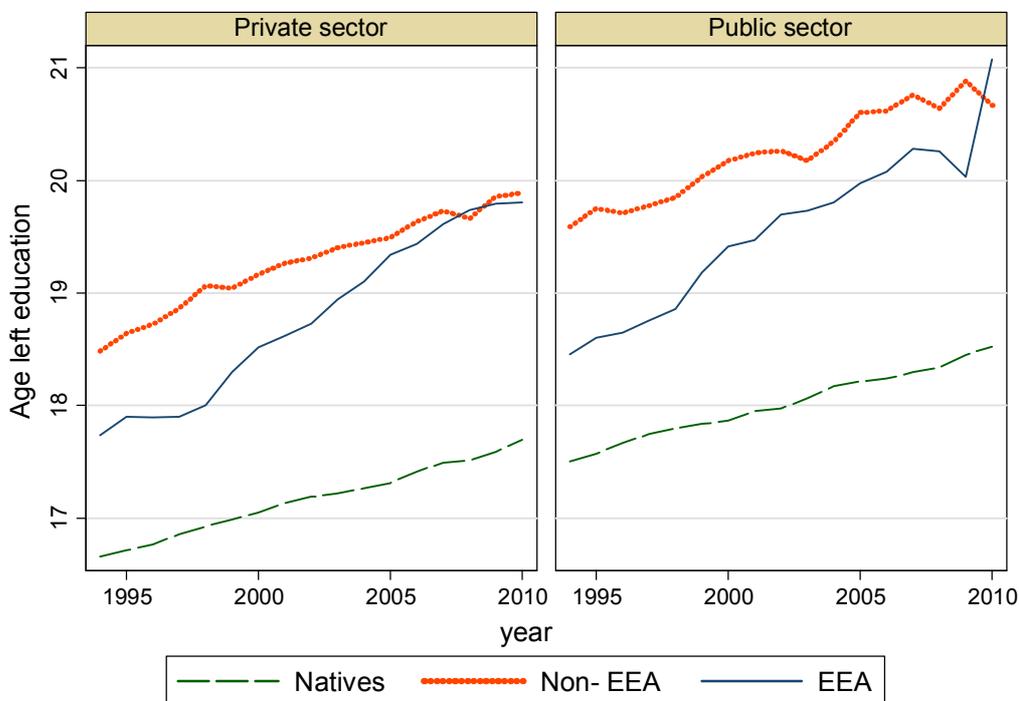
The figure reports the evolution of average age at which individuals left full time education between 1994 and 2010 in the private and public sector, where we distinguish between natives, EEA and non-EEA immigrants.
 Source: UK LFS

Figure 3.4.1 – Sector distribution within public employment, 1994/96 -2008/10
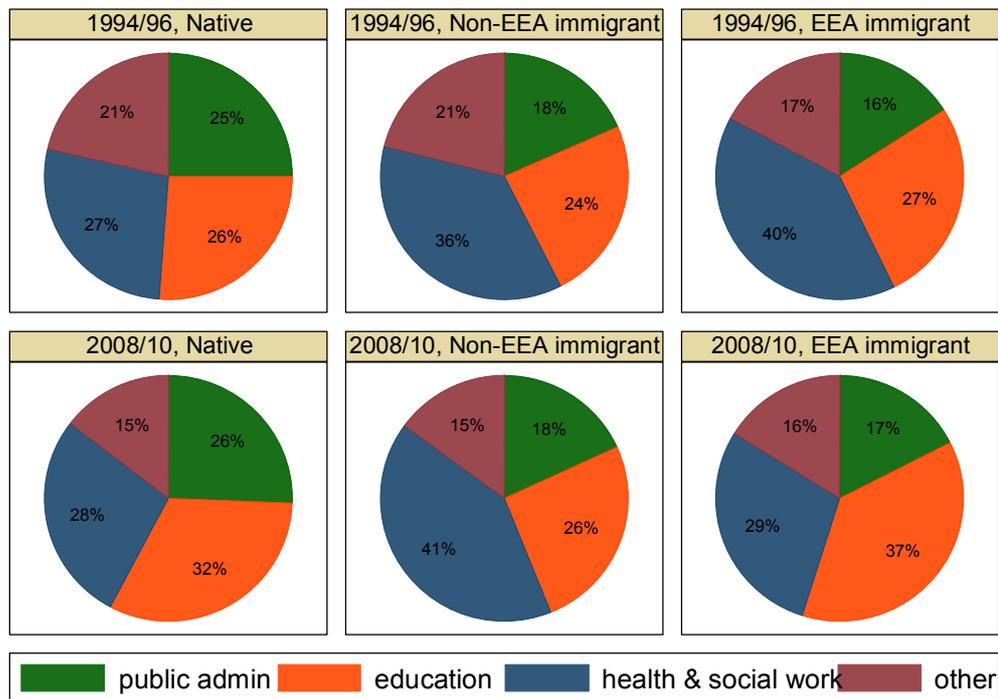
The figure reports the distribution of native, non-EEA and EEA immigrant public employees across sectors in public employment in years 1994/96 (top row) and 2008/10 (bottom row).
 Source: UK LFS

Figure 3.6.1 – Wage gap between private and public sector, 1994-2010
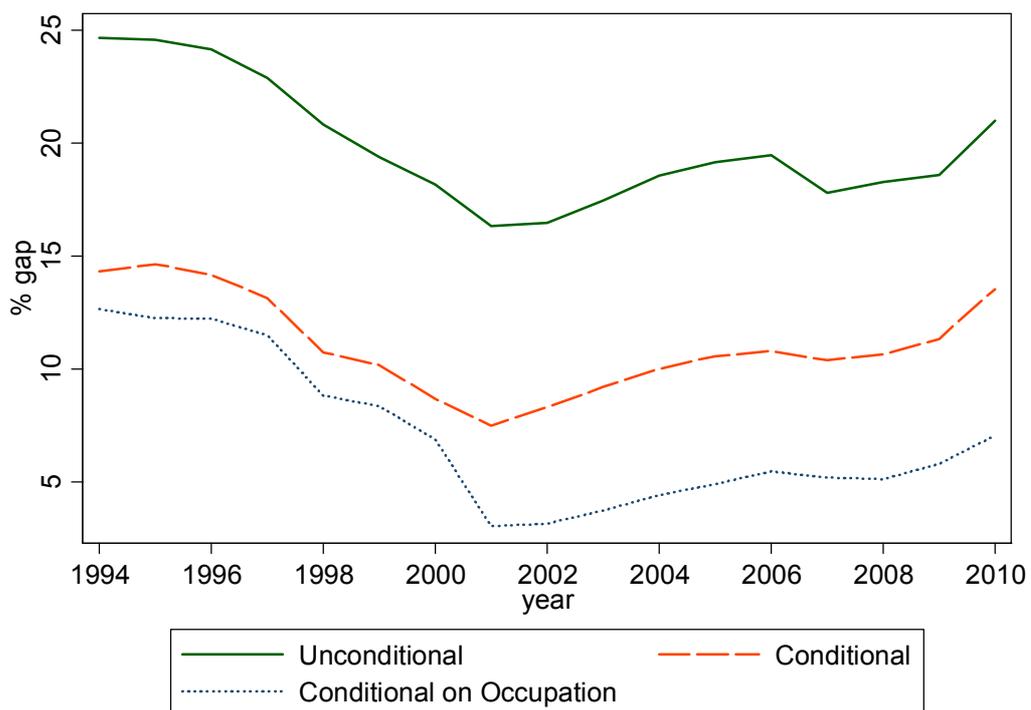
The figure reports the evolution of the average percentage wage gap between public and private sector between years 1994 and 2010. The solid line represents unconditional gaps, the dashed line reports gaps conditional on age, education, gender and region of residence, while the dotted line reports gaps conditional an all the previous characteristics and on occupational distribution. Gaps are computed from log-wage regressions. Source: UK LFS.

Figure 3.6.2 – Immigrant-Natives wage gap, 1994-2010
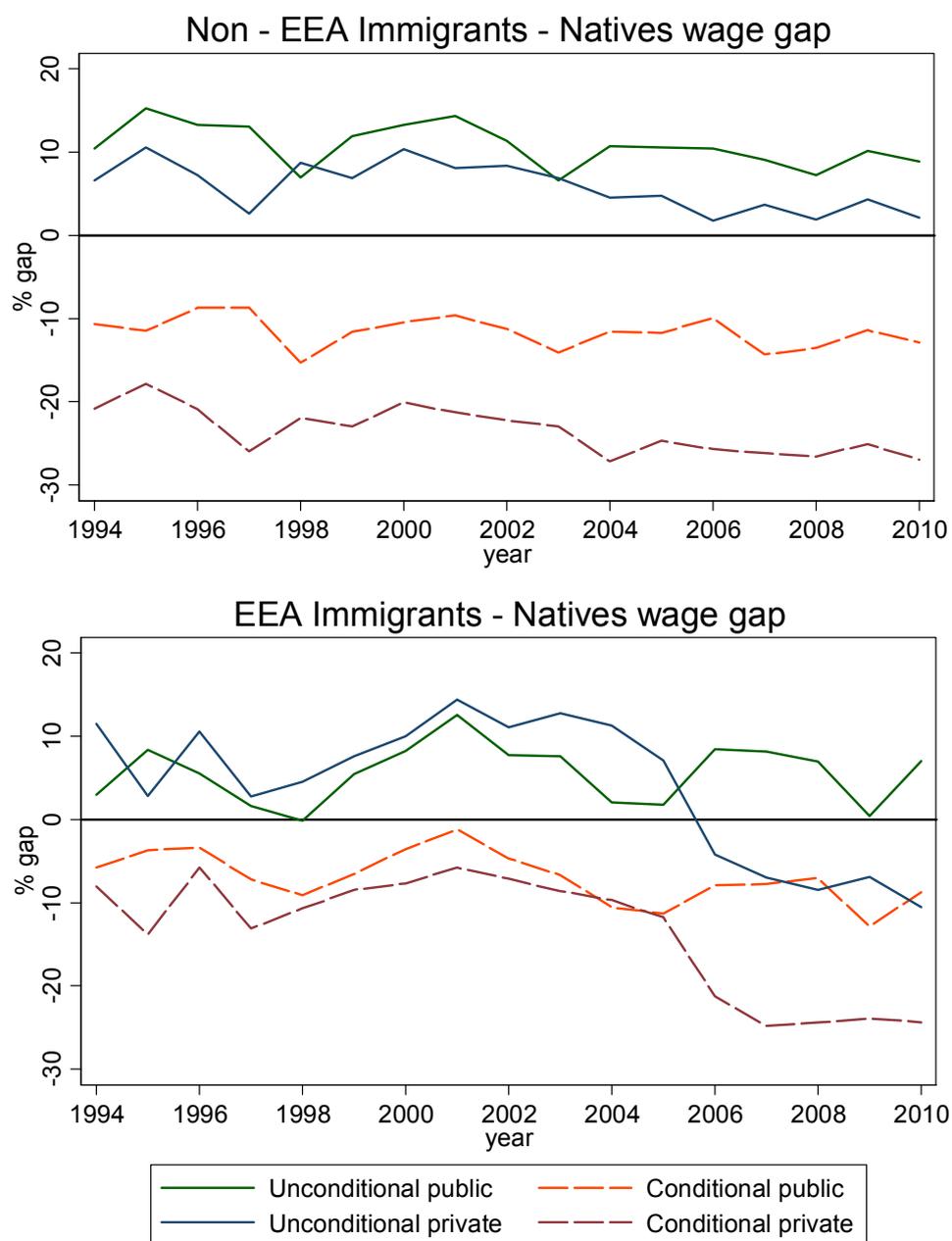
The figure reports the evolution of the average percentage wage gap between non-EEA (top panel) and EEA (bottom panel) immigrants and natives in the public (green line) and private (blue line) sector between years 1994 and 2010. The solid lines represent unconditional gaps, the dashed line report gaps conditional on age, education, gender and region of residence. Gaps are computed from log-wage regressions.
Source: UK LFS.

Figure 3.6.3 – Public-private sector wage gap and fraction of immigrants in public employment
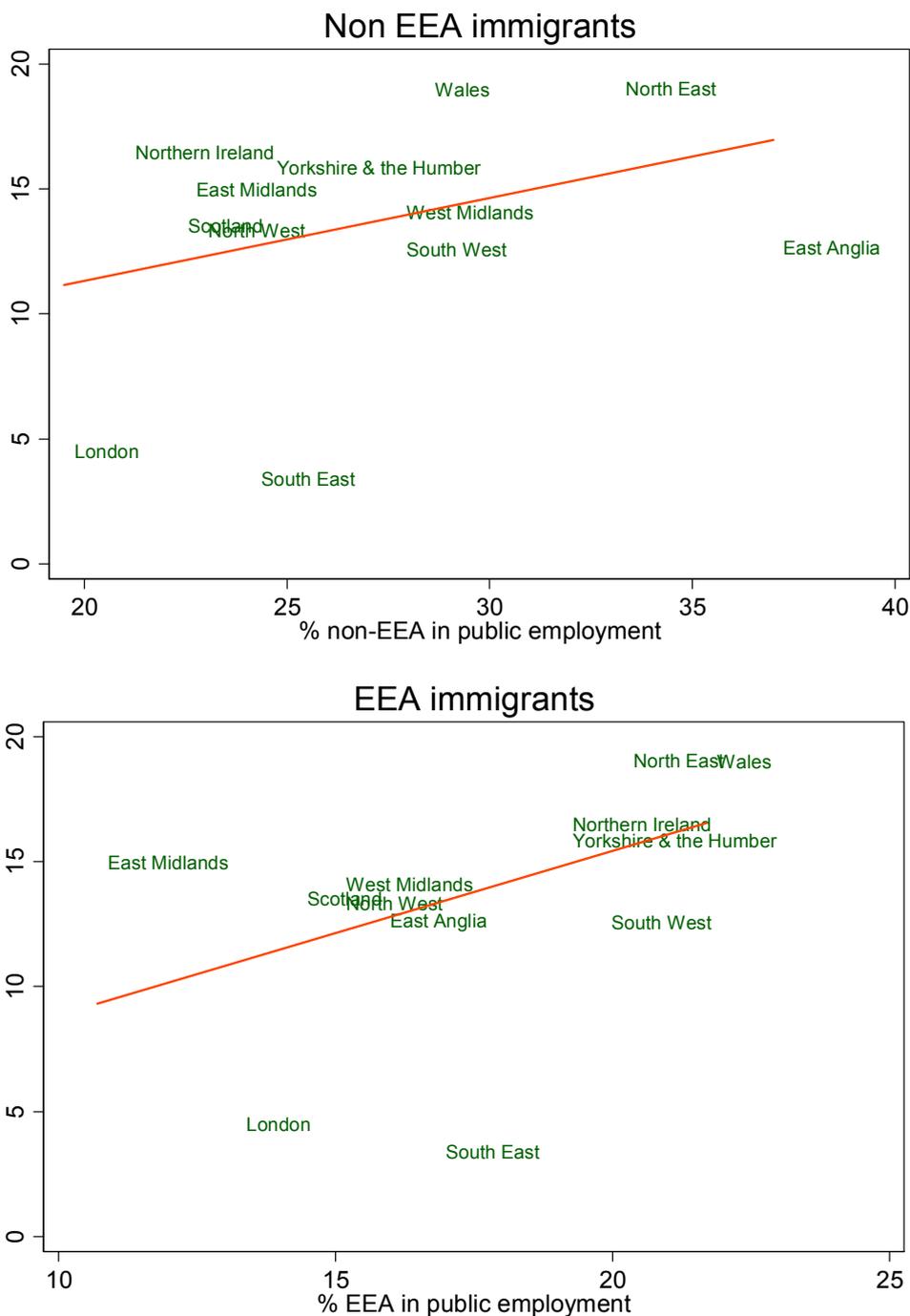
The figure plots the average wage gap between public and private sector job, conditional on workers' characteristics, in each region versus the fraction of non-EEA (top panel) and EEA (bottom panel) immigrants working in the public sector out of total employed non-EEA or EEA immigrants , respectively, for years 2005-2010 pooled.
Source: UK LFS.

Figure 3.6.4 – Relative native-immigrant wage gap in public and private sector and fraction of immigrants in public employment
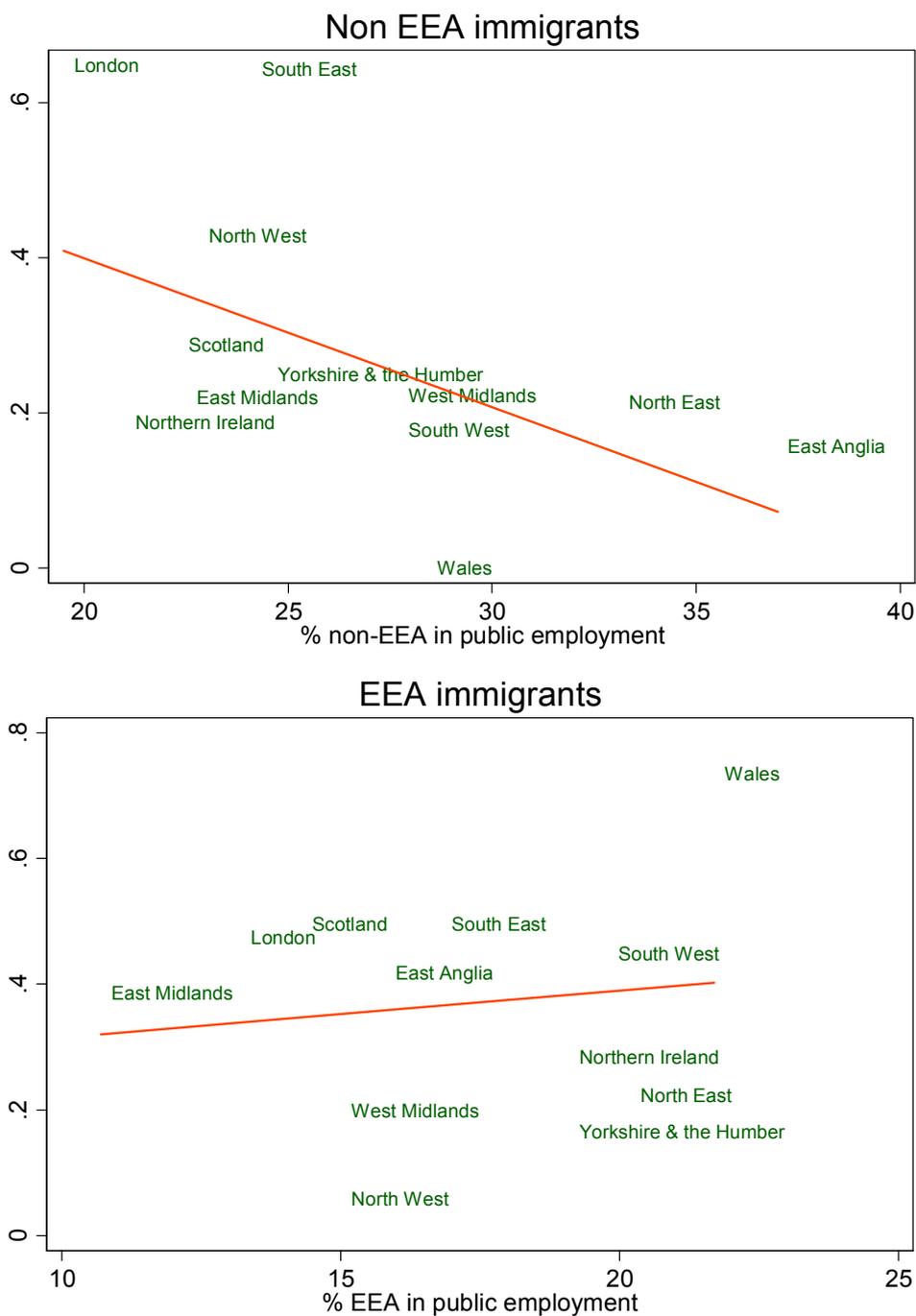
The figure plots the ratio between the average regional conditional wage gap between immigrants and natives in the public and in the public sector in each region versus the fraction of non-EEA (top panel) and EEA (bottom panel) immigrants working in the private sector out of total employed non-EEA or EEA immigrants , respectively, for years 2005-2010 pooled.
Source: UK LFS.

Figure 3.6.5 – Conditional public sector wage premium and fraction of immigrants among public employees
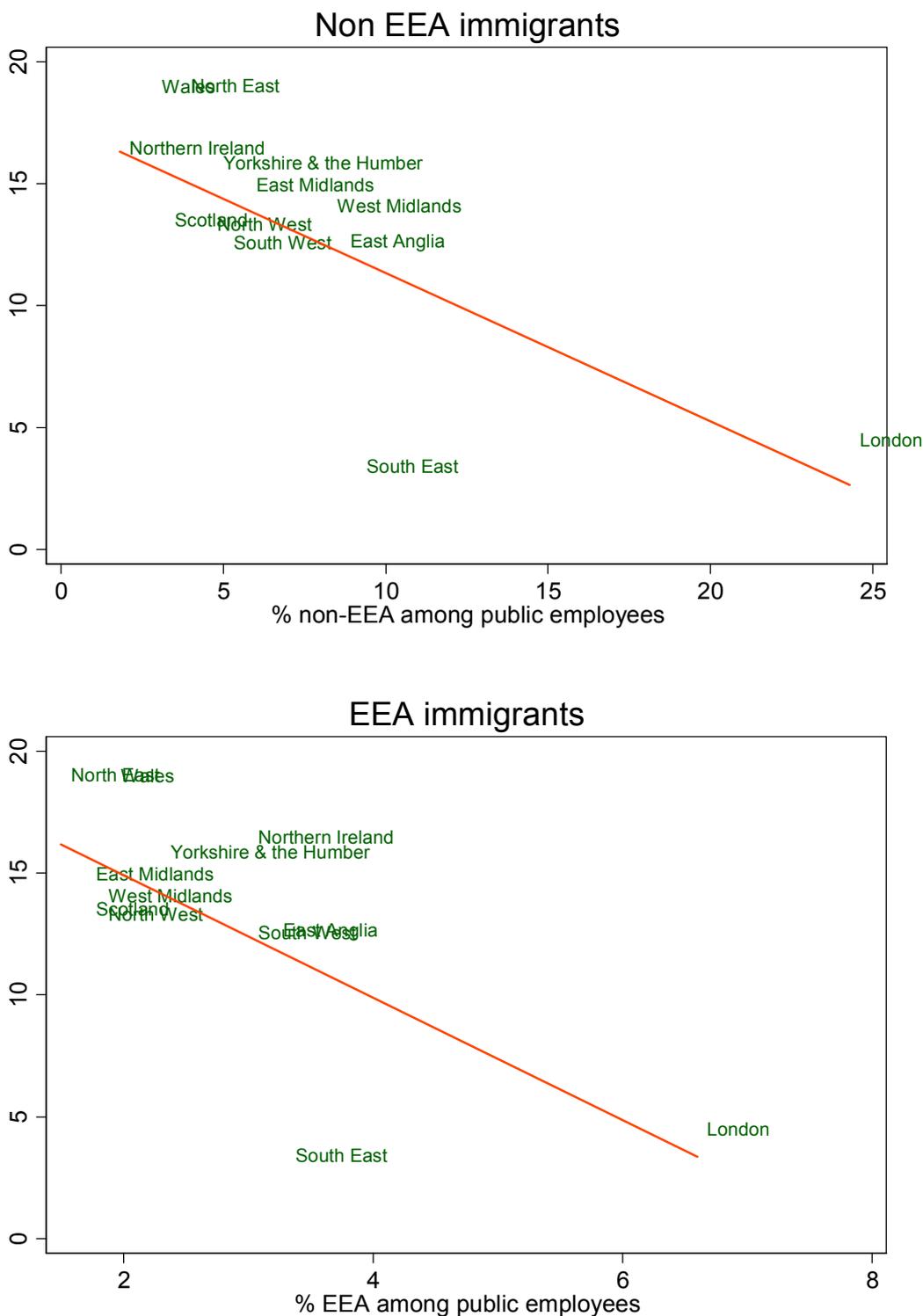
Non EEA immigrants

EEA immigrants

The figure plots the conditional public sector wage premium in each region versus the fraction of non-EEA (top panel) and EEA (bottom panel) immigrants out of total public sector employees, for years 2005-2010 pooled. Source: UK LFS.

Figure 3.6.6 – Conditional public sector wage premium and relative concentration of immigrants among public employees
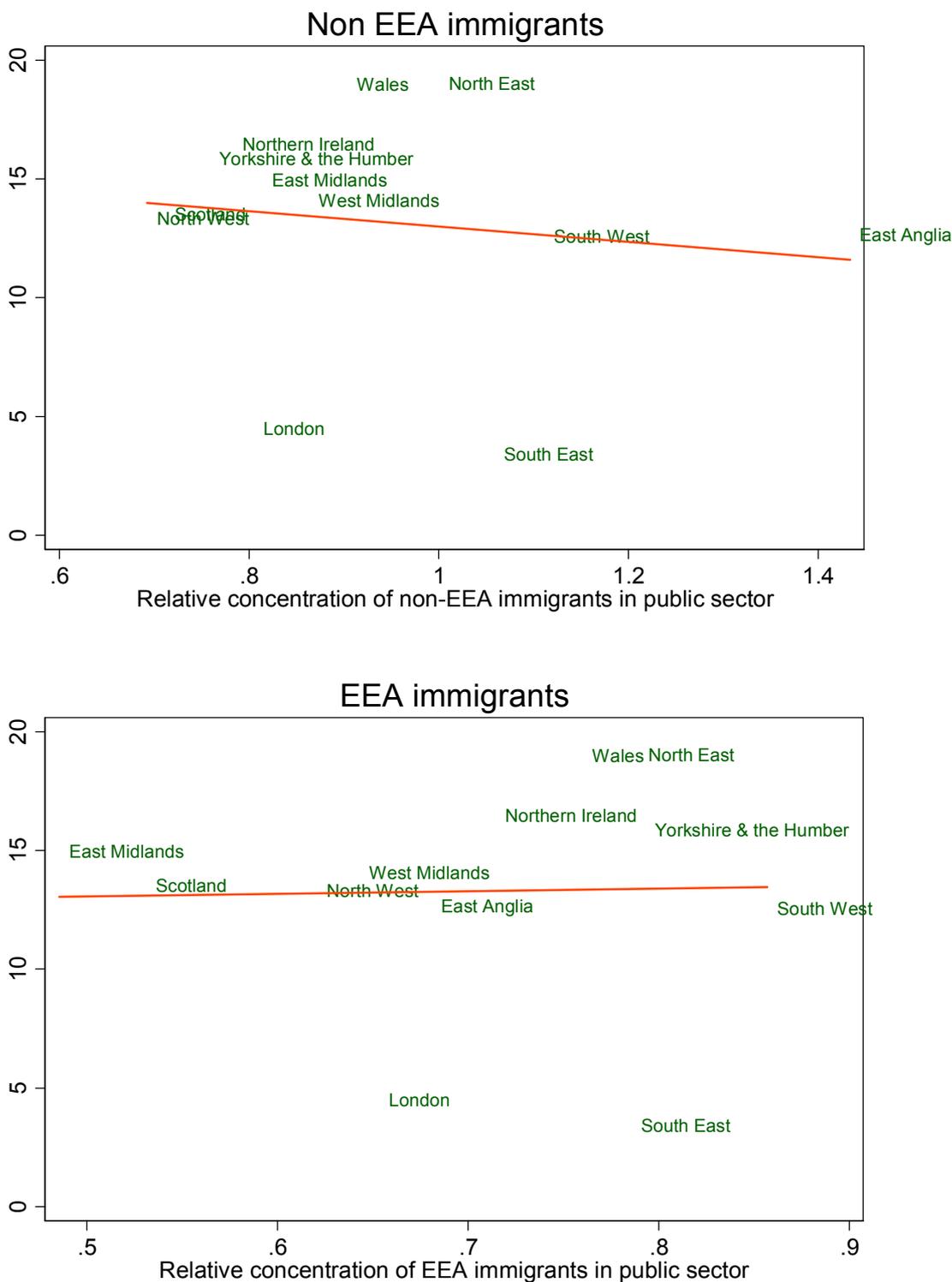
The figure plots the conditional public sector wage premium in each region versus the relative concentration of non-EEA (top panel) and EEA (bottom panel) immigrants in the public sector, for years 2005-2010 pooled. Relative concentration in public sector: share of immigrants among public employees/share of immigrants in working age population.
Source: UK LFS.

Figure 3.7.1 – Immigrants in public employment by years of residence in the UK
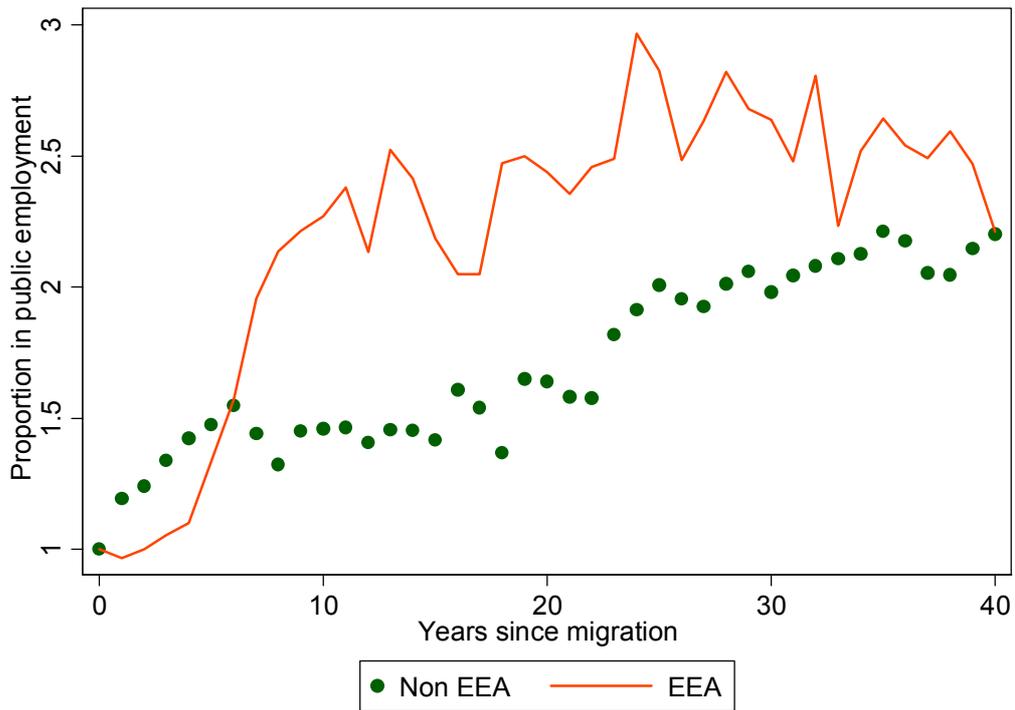
The figure reports the share of non-EEA (dotted line) and EEA (solid line) immigrants working in the public sector out of total employed immigrants in the UK by years of residence in the UK.
Source: UK LFS

Figure 3.7.2
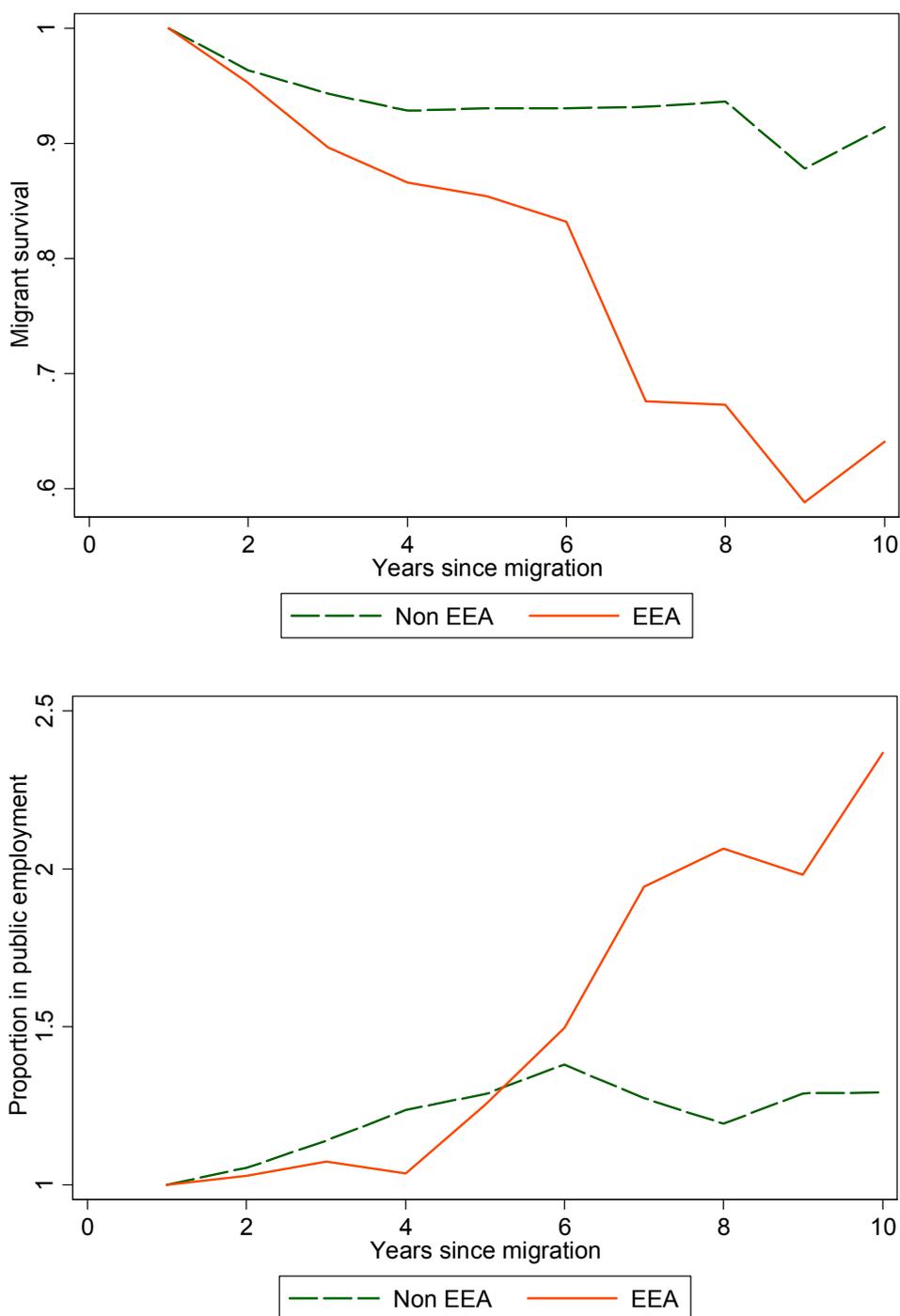
The figure reports in the top panel the evolution of the stock of immigrants arrived in 1994 or later with years of residence in the UK, where we distinguish between non-EEA (dashed line) and EEA (solid line) immigrants. IN the bottom panel we report for the same immigrant cohort the share of non-EEA (dotted line) and EEA (solid line) immigrants working in the public sector out of total employed immigrants in the UK by years of residence in the UK.
Source: UK LFS

Tables

Table 3.2.1 - Employment growth and composition, 1994-2010

	Working age population	*private*	*Employed* *public*	*total*
1994				
Natives	32,871,316	17,080,426	5,444,907	22,525,333
Immigrants	3,056,122	1,318,061	450,399	1,768,460
Non-EEA	*2,236,667*	*942,377*	*324,216*	*1,266,593*
EEA	*819,455*	*375,684*	*126,183*	*501,867*
Total	35,927,438	18,398,486	5,895,305	24,293,791
2010				
Natives	34,254,635	17,652,649	6,225,209	23,877,858
Immigrants	5,580,127	2,902,619	768,898	3,671,517
Non-EEA	*3,828,014*	*1,811,123*	*562,377*	*2,373,500*
EEA	*1,752,113*	*1,091,496*	*206,521*	*1,298,017*
Total	39,834,763	20,555,267	6,994,107	27,549,374
1994-2010 Change				
Natives	4%	3%	14%	6%
Immigrants	83%	120%	71%	108%
Non-EEA	*71%*	*92%*	*73%*	*87%*
EEA	*114%*	*191%*	*64%*	*159%*
Total	11%	12%	19%	13%
Contribution to total growth				
Natives	35%	27%	71%	42%
Immigrants	65%	73%	29%	58%
Non-EEA	*41%*	*40%*	*22%*	*34%*
EEA	*24%*	*33%*	*7%*	*24%*

The table reports in the first column of the top two panels the size of the working age population (16-65), overall and by immigrant status, in 1994 and 2010. The rightmost columns of the top two panels report the number of individuals employed in the public and private sector and overall, by immigrant status and for the whole population. The third panel reports the percentage change between 1994 and 2010 in each of the figures displayed in the top two panels. The left column of the bottom panel reports the share of total growth in the working age population between 1994 and 2010 that is due to growth in the native population and to the immigrant population. The right columns of the bottom panel report the share of total growth in employment in private and public sector, and overall, that is due to growth in native and immigrant employment.
Source: UK LFS

Table 3.3.1 – Descriptive Statistics

	1994			**2010**		
	Age	*% Women*	*Age left education*	*Age*	*% Women*	*Age left education*
Working age population						
Natives	38.9	50.2	16.7	40.4	50.1	17.6
All immigrants	39.9	52.9	18.1	37.8	51.1	19.6
Non-EEA immigrants	*39.0*	*52.3*	*18.4*	*38.6*	*50.7*	*19.6*
EEA immigrants	*42.2*	*54.6*	*17.5*	*36.1*	*52.0*	*19.7*
Private sector workers						
Natives	37.4	41.1	16.7	39.8	40.7	17.7
All immigrants	38.9	41.8	18.3	37.5	40.0	19.9
Non-EEA immigrants	*38.3*	*40.3*	*18.5*	*39.0*	*37.2*	*19.9*
EEA immigrants	*40.2*	*45.5*	*17.7*	*35.1*	*44.5*	*19.8*
Public sector workers						
Natives	40.0	59.3	17.5	42.5	64.8	18.5
All immigrants	41.0	60.6	19.3	41.2	62.7	20.8
Non-EEA immigrants	*40.3*	*57.6*	*19.6*	*41.4*	*61.4*	*20.7*
EEA immigrants	*42.7*	*68.5*	*18.5*	*40.9*	*66.3*	*21.1*

The table reports the average age, the share of women and the average age at which individuals left full time education in 1994 and 2010 for natives and immigrants, and distinguishing between all working age (16-65) individuals, private sector workers and public sector workers.
Source: UK LFS

Table 3.4.1 – Public employment

	1994/1996						
	Distribution across sectors in public employment				**% of public employees who are**		
	Natives	Immigrants	*Non-EEA*	*EEA*	Immigrants	*Non-EEA*	*EEA*
Public administration	25.0	17.7	*18.4*	*15.9*	5.4	*3.9*	*1.5*
Education	26.3	24.9	*24.1*	*26.9*	7.1	*4.8*	*2.3*
Health and social work	27.3	37.5	*36.4*	*40.1*	10.0	*6.8*	*3.2*
Other	21.5	19.9	*21.1*	*17.2*	7.0	*5.2*	*1.8*
Total working age population					8.4	*5.9*	*2.4*
	2008/2010						
	Natives	Immigrants	*Non-EEA*	*EEA*	Immigrants	*Non-EEA*	*EEA*
Public administration	25.6	17.9	*18.1*	*17.4*	7.7	*5.7*	*2.0*
Education	32.2	29.0	*25.9*	*37.5*	9.7	*6.4*	*3.3*
Health and social work	27.6	37.9	*41.2*	*29.0*	14.1	*11.2*	*2.9*
Other	14.6	15.2	*14.9*	*16.1*	11.1	*8.0*	*3.1*
Total working age population					13.8	*9.6*	*4.3*

The left panel of the table reports the distribution of natives and immigrants (overall and distinguishing between EEA and non-EEA immigrants) across sectors in public employment in years 1994/1996 pooled and 2008/2010 pooled. The right panel of the table reports the share of immigrants (overall and distinguishing between EEA and non-EEA immigrants) out of all public employees in different sectors in years 1994/1996 pooled and 2008/2010 pooled. The last row reports the share of Non-EEA and EEA immigrants in total working age population.
Source: UK LFS

Table 3.4.2 – Occupational distribution in public sector

	2001/2003			2008/2010			Average hourly pay
	Natives	*Non-EEA*	*EEA*	*Natives*	*Non-EEA*	*EEA*	
Managers and senior officials	6.9	6.5	7.2	8.3	5.5	5.6	16.6
Professional occupations	22.6	30.8	32.9	24.4	31.0	35.8	16.2
Associate professional and technical	22.1	25.4	24.2	23.7	27.5	20.6	12.3
Administrative and secretarial	19.2	14.9	9.9	16.4	11.3	11.8	8.6
Skilled trades occupations	2.9	1.3	2.1	2.2	1.1	1.4	8.8
Personal service occupations	13.8	11.8	12.3	14.6	12.7	14.2	7.5
Sales and customer service occupations	0.7	0.3	0.6	1.0	0.9	0.8	8.0
Process, plant and machine operatives	1.6	1.2	1.0	1.4	0.8	1.2	8.6
Elementary occupations	10.4	7.8	9.8	8.1	9.2	8.6	6.5

The table reports the distribution of natives, EEA and non-EEA immigrants in public employment across major occupation groups (1 digit SOC2000 categories) in years 2001/2003 pooled and 2008/2010 pooled. The lat column reports the average public sector hourly wage by occupation across all years 2001/2010, expressed in 2005-based GBP.
Source: UK LFS

Table 3.4.3 – Occupational distribution in public employment, by sector

	Public Administration			**Education**			**Health and social work**		
	Natives	*Non-EEA*	*EEA*	*Natives*	*Non-EEA*	*EEA*	*Natives*	*Non-EEA*	*EEA*
Managers and senior officials	13.6	10.7	11.2	2.9	2.3	2.0	7.6	3.2	5.0
Professional occupations	10.4	14.0	12.8	49.8	54.1	59.8	13.6	27.8	26.0
Associate professional and technical	35.7	34.1	36.9	6.6	6.7	6.5	35.8	40.2	32.1
Administrative and secretarial	29.2	26.2	25.2	7.7	6.6	6.0	14.7	6.2	8.5
Skilled trades occupations	1.8	2.8	0.6	1.2	0.3	0.7	0.9	0.5	1.0
Personal service occupations	2.3	4.3	4.3	22.3	17.1	17.3	21.7	16.6	19.1
Sales and customer service occupations	1.6	1.3	1.6	0.2	0.5	0.1	0.5	0.4	0.4
Process, plant and machine operatives	0.9	0.8	1.2	0.2	0.5	0.4	0.8	0.2	0.5
Elementary occupations	4.5	6.0	6.3	9.1	12.0	7.3	4.4	4.9	7.4

The table reports the occupational distribution of natives, EEA and non-EEA immigrants within different sectors of public employment in years 2008-2010 pooled.
Source: UK LFS

Table 3.5.1 – Regional distribution, 2008-2010

	% of working age population who is		% of public sector employees who are		% of each population group in public sector among all employed		
	non-EEA	EEA	non-EEA	EEA	Natives	Non-EEA	EEA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
North East	3.7	1.9	3.7	1.5	28.0	33.1	20.2
Yorkshire & the Humber	6.2	2.9	4.7	2.3	25.8	24.5	19.1
East Midlands	7.0	3.5	5.7	1.7	24.3	22.5	10.7
East Anglia	6.0	4.7	8.6	3.2	24.3	37.0	15.8
London	30.2	10.1	24.3	6.6	24.6	19.5	13.2
South East	8.6	4.2	9.1	3.3	22.1	24.1	16.8
South West	4.5	3.5	5.0	3.0	24.6	27.7	19.8
West Midlands	9.5	2.8	8.2	1.8	25.1	27.7	15.0
North West	6.5	2.9	4.5	1.8	27.3	22.8	15.0
Wales	3.1	2.5	2.8	1.9	31.0	28.4	21.7
Scotland	4.5	3.2	3.2	1.7	29.0	22.3	14.3
Northern Ireland	2.3	4.2	1.8	3.0	30.9	21.0	19.1
UK	9.5	4.2	7.8	2.8	25.6	23.0	15.5

The table reports, for each region and for the UK as a whole, in columns 1 and 2 the share of population that is foreign born, distinguishing between non-EEA (column 1) or EEA (column 2) immigrants. Columns 3 and 4 report the share of public sector employees that are EEA (column 3) or non-EEA) out of total public sector employment. Columns 5 to 7 report the fraction of natives (col.5), non-EEA immigrants (col.6) and EEA immigrants (col. 7) that work in the public sector out of total employed individuals in each group, by region and in the UK as a whole. Figures refer to years 2008-2010 pooled.
Source: UK LFS

Table 3.5.2 – Immigrant-natives occupational dissimilarity

	2001/2003		2008/2010	
	non-EEA	EEA	non-EEA	EEA
North East	26.1	22.8	23.4	10.9
Yorkshire & the Humber	10.0	23.6	14.0	3.2
East Midlands	8.1	2.4	10.6	8.9
East Anglia	24.6	12.0	18.8	14.7
London	4.6	10.5	10.4	11.0
South East	11.5	11.0	10.9	10.2
South West	12.7	6.5	10.0	11.3
West Midlands	8.4	10.4	4.8	12.0
North West	23.6	10.7	18.0	14.1
Wales	26.2	22.8	15.9	13.2
Scotland	26.2	6.5	18.4	7.1
Northern Ireland	19.5	15.8	8.5	13.4
UK	10.7	11.3	10.6	10.6

The table reports for each region and for the whole UK the effective Duncan index of dissimilarity for the distribution of EEA and non-EEA immigrants relative to natives across major occupation groups (1 digit SOC2000 categories) in years 2001/2003 pooled and 2008/2010 pooled.
Source: UK LFS

Tables Appendix

Table A1 – Regional distribution, 1994-1996

	% of working age population who is		% of public sector employees who are		% of each population group in public sector among all employed		
	non-EEA	EEA	non-EEA	EEA	Natives	Non-EEA	EEA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
North East	1.5	0.9	1.6	0.6	26.7	32.1	21.7
Yorkshire & the Humber	4.0	1.3	3.2	1.4	24.0	26.8	28.6
East Midlands	4.4	1.5	4.3	1.9	21.3	23.9	28.8
East Anglia	4.1	1.8	6.2	1.8	21.3	36.8	24.0
London	20.8	7.0	17.0	6.2	25.7	24.5	24.7
South East	5.0	2.5	5.3	2.6	21.3	24.9	24.5
South West	3.1	1.8	3.9	1.3	22.9	28.9	17.8
West Midlands	5.8	2.0	4.2	2.3	21.4	20.9	27.2
North West	3.7	1.9	2.5	1.9	24.4	21.6	28.2
Wales	1.9	1.2	2.0	1.0	28.2	34.3	26.9
Scotland	2.3	1.1	2.0	0.8	29.6	29.6	23.6
Northern Ireland	1.7	2.3	1.6	2.3	30.5	31.5	36.3
UK	5.9	2.4	5.2	2.3	24.0	25.3	25.1

The table reports, for each region and for the UK as a whole, in columns 1 and 2 the share of population that is foreign born, distinguishing between non-EEA (column 1) or EEA (column 2) immigrants. Columns 3 and 4 report the share of public sector employees that are EEA (column 3) or non-EEA) out of total public sector employment. Columns 5 to 7 report the fraction of natives (col.5), non-EEA immigrants (col.6) and EEA immigrants (col. 7) that work in the public sector out of total employed individuals in each group, by region and in the UK as a whole. Figures refer to years 1994-1996 pooled.
Source: UK LFS

Table A2 - Public-Private wage gap over time

	Raw	Conditional - 1	Conditional - 2
1994	0.247***	0.143***	0.127***
	(0.007)	(0.006)	(0.006)
1995	0.246***	0.146***	0.123***
	(0.007)	(0.007)	(0.007)
1996	0.242***	0.142***	0.122***
	(0.006)	(0.006)	(0.006)
1997	0.229***	0.132***	0.115***
	(0.005)	(0.005)	(0.004)
1998	0.208***	0.107***	0.088***
	(0.005)	(0.004)	(0.004)
1999	0.194***	0.102***	0.084***
	(0.005)	(0.004)	(0.004)
2000	0.182***	0.087***	0.069***
	(0.005)	(0.004)	(0.004)
2001	0.163***	0.075***	0.030***
	(0.006)	(0.005)	(0.005)
2002	0.165***	0.083***	0.032***
	(0.005)	(0.004)	(0.004)
2003	0.175***	0.092***	0.037***
	(0.005)	(0.004)	(0.004)
2004	0.186***	0.100***	0.044***
	(0.005)	(0.005)	(0.004)
2005	0.192***	0.106***	0.049***
	(0.005)	(0.005)	(0.004)
2006	0.195***	0.108***	0.055***
	(0.005)	(0.005)	(0.004)
2007	0.178***	0.104***	0.052***
	(0.005)	(0.005)	(0.004)
2008	0.183***	0.106***	0.051***
	(0.005)	(0.005)	(0.004)
2009	0.186***	0.113***	0.058***
	(0.006)	(0.005)	(0.005)
2010	0.210***	0.135***	0.071***
	(0.006)	(0.005)	(0.005)
Year dummies	Yes	Yes	Yes
Age	No	Yes	Yes
Education	No	Yes	Yes
Gender	No	Yes	Yes
Region dummies	No	Yes	Yes
Occupation dummies	No	No	Yes
N	898560	868302	868302

The table reports the percentage gap in average hourly wages between the public and private sector in all years 1994-2010. Gaps in column 1 are obtained from log-wage regressions on year dummies and interaction of public sector and year dummies. In column 2 we additionally control for a cubic form in age, age at which individuals left full time education and gender - all interacted with year dummies, and region dummies. In column 3 we add dummies for major occupation groups interacted with year dummies. Standard errors are reported in parenthesis.
* denotes significance at 10% ** denotes significance at 5% *** denotes significance at 1%

Table A3 - Native - immigrants wage gap over time and by sector

Year	Unconditional				Conditional			
	Public		Private		Public		Private	
	EEA	*non-EEA*	*EEA*	*non-EEA*	*EEA*	*non-EEA*	*EEA*	*non-EEA*
1994	0.03	0.104***	0.115***	0.066***	-0.058	-0.107***	-0.081***	-0.208***
	(0.038)	(0.026)	(0.031)	(0.021)	(0.036)	(0.024)	(0.027)	(0.020)
1995	0.084**	0.152***	0.028	0.106***	-0.037	-0.115***	-0.138***	-0.178***
	(0.038)	(0.028)	(0.039)	(0.025)	(0.035)	(0.027)	(0.034)	(0.023)
1996	0.055*	0.132***	0.106***	0.072***	-0.034	-0.087***	-0.058**	-0.209***
	(0.031)	(0.026)	(0.032)	(0.022)	(0.029)	(0.024)	(0.028)	(0.019)
1997	0.016	0.131***	0.028	0.026*	-0.072**	-0.087***	-0.131***	-0.260***
	(0.032)	(0.019)	(0.022)	(0.015)	(0.029)	(0.017)	(0.019)	(0.014)
1998	-0.002	0.069***	0.045**	0.087***	-0.091***	-0.153***	-0.107***	-0.219***
	(0.027)	(0.020)	(0.019)	(0.014)	(0.024)	(0.019)	(0.016)	(0.013)
1999	0.055**	0.119***	0.076***	0.069***	-0.066***	-0.116***	-0.085***	-0.230***
	(0.026)	(0.017)	(0.020)	(0.015)	(0.024)	(0.016)	(0.017)	(0.014)
2000	0.082***	0.133***	0.100***	0.103***	-0.035	-0.104***	-0.077***	-0.201***
	(0.026)	(0.018)	(0.020)	(0.015)	(0.024)	(0.017)	(0.018)	(0.014)
2001	0.125***	0.143***	0.144***	0.081***	-0.012	-0.096***	-0.058***	-0.213***
	(0.035)	(0.021)	(0.024)	(0.017)	(0.031)	(0.020)	(0.020)	(0.016)
2002	0.077***	0.113***	0.111***	0.083***	-0.047**	-0.113***	-0.071***	-0.222***
	(0.027)	(0.019)	(0.020)	(0.014)	(0.022)	(0.018)	(0.017)	(0.013)
2003	0.076***	0.066***	0.127***	0.069***	-0.067***	-0.141***	-0.086***	-0.230***
	(0.025)	(0.018)	(0.020)	(0.014)	(0.023)	(0.017)	(0.017)	(0.013)
2004	0.02	0.107***	0.112***	0.045***	-0.106***	-0.116***	-0.097***	-0.271***
	(0.033)	(0.020)	(0.023)	(0.015)	(0.032)	(0.019)	(0.019)	(0.014)
2005	0.017	0.106***	0.071***	0.048***	-0.113***	-0.117***	-0.117***	-0.247***
	(0.030)	(0.018)	(0.022)	(0.014)	(0.026)	(0.017)	(0.019)	(0.013)
2006	0.084***	0.104***	-0.042**	0.017	-0.079***	-0.099***	-0.212***	-0.257***
	(0.029)	(0.019)	(0.019)	(0.014)	(0.026)	(0.018)	(0.016)	(0.013)
2007	0.081***	0.091***	-0.070***	0.037***	-0.078***	-0.143***	-0.248***	-0.262***
	(0.028)	(0.018)	(0.016)	(0.014)	(0.024)	(0.017)	(0.014)	(0.013)
2008	0.070**	0.072***	-0.085***	0.019	-0.070***	-0.135***	-0.244***	-0.265***
	(0.032)	(0.017)	(0.016)	(0.014)	(0.027)	(0.017)	(0.014)	(0.013)
2009	0.004	0.102***	-0.069***	0.043***	-0.128***	-0.114***	-0.239***	-0.251***
	(0.029)	(0.017)	(0.016)	(0.014)	(0.028)	(0.016)	(0.014)	(0.013)
2010	0.070**	0.088***	-0.105***	0.021	-0.088***	-0.129***	-0.243***	-0.269***
	(0.028)	(0.018)	(0.017)	(0.014)	(0.026)	(0.017)	(0.015)	(0.014)
Year dummies	Yes		Yes		Yes		Yes	
Age	No		No		Yes		Yes	
Education	No		No		Yes		Yes	
Gender	No		No		Yes		Yes	
Region	No		No		Yes		Yes	
N	264315		634234		261984		606310	

The table reports the percentage gap in average hourly wages between natives and non-EEA and EEA immigrants in the public and private sector in all years 1994-2010. Unconditional gaps are obtained from log-wage regressions on year dummies and interaction of EEA and non-EEA dummies with year dummies, separately for private and public sector workers. For conditional gaps we additionally control for a cubic form in age, age at which individuals left full time education and gender - all interacted with year dummies, and region dummies. Standard errors are reported in parenthesis.
* denotes significance at 10% ** denotes significance at 5% *** denotes significance at 1%

Table A4 - Native - immigrants wage gap by sector and region, years 2005-2010

	Unconditional				Conditional			
	Public		Private		Public		Private	
	EEA	non-EEA	EEA	non-EEA	EEA	non-EEA	EEA	non-EEA
North East	0.111	0.206***	-0.097**	-0.150***	-0.049	-0.065	-0.221***	-0.302***
	(0.072)	(0.047)	(0.041)	(0.035)	(0.059)	(0.042)	(0.045)	(0.032)
Yorkshire & the Humber	0.071*	0.155***	-0.185***	-0.108***	-0.042	-0.069**	-0.252***	-0.277***
	(0.041)	(0.031)	(0.018)	(0.017)	(0.037)	(0.028)	(0.019)	(0.018)
East Midlands	0.017	0.110***	-0.175***	-0.090***	-0.102**	-0.054**	-0.265***	-0.245***
	(0.051)	(0.028)	(0.020)	(0.017)	(0.044)	(0.025)	(0.020)	(0.017)
East Anglia	0.016	0.118***	-0.160***	0.034	-0.114***	-0.022	-0.271***	-0.137***
	(0.043)	(0.036)	(0.024)	(0.028)	(0.039)	(0.034)	(0.023)	(0.027)
London	-0.01	-0.092***	-0.124***	-0.174***	-0.112***	-0.200***	-0.237***	-0.309***
	(0.026)	(0.014)	(0.018)	(0.011)	(0.024)	(0.014)	(0.015)	(0.011)
South East	-0.047*	0.037**	-0.104***	0.008	-0.106***	-0.115***	-0.214***	-0.179***
	(0.025)	(0.015)	(0.015)	(0.012)	(0.022)	(0.014)	(0.014)	(0.011)
South West	-0.023	0.109***	-0.076***	-0.035*	-0.081**	-0.032	-0.181***	-0.178***
	(0.039)	(0.028)	(0.021)	(0.021)	(0.037)	(0.024)	(0.021)	(0.021)
West Midlands	0.036	0.100***	-0.153***	-0.145***	-0.043	-0.074***	-0.218***	-0.332***
	(0.040)	(0.025)	(0.020)	(0.018)	(0.037)	(0.022)	(0.020)	(0.018)
North West	0.122***	0.053*	-0.149***	-0.159***	-0.014	-0.140***	-0.244***	-0.327***
	(0.047)	(0.028)	(0.022)	(0.017)	(0.039)	(0.027)	(0.021)	(0.018)
Wales	-0.039	0.214***	-0.151***	-0.046	-0.165***	0	-0.225***	-0.182***
	(0.059)	(0.052)	(0.029)	(0.033)	(0.062)	(0.042)	(0.030)	(0.033)
Scotland	0.026	0.153***	-0.141***	-0.033	-0.122***	-0.058**	-0.246***	-0.202***
	(0.043)	(0.029)	(0.022)	(0.024)	(0.039)	(0.028)	(0.021)	(0.024)
Northern Ireland	0.044	0.08	-0.189***	-0.142***	-0.063	-0.057	-0.223***	-0.304***
	(0.067)	(0.068)	(0.028)	(0.038)	(0.061)	(0.067)	(0.026)	(0.038)
Year dummies	Yes		Yes		Yes		Yes	
Region dummies	Yes		Yes		Yes		Yes	
Age	No		No		Yes		Yes	
Education	No		No		Yes		Yes	
Gender	No		No		Yes		Yes	
N	94261		210667		93407		201924	

The table reports the percentage gap in average hourly wages between natives and non-EEA and EEA immigrants in the public and private sector by region for years 2005-2010 pooled. Unconditional gaps are obtained from log-wage regressions on year dummies, region dummies and interaction of EEA and non-EEA dummies with region dummies, separately for private and public sector workers. For conditional gaps we additionally control for a cubic form in age, age at which individuals left full time education and gender - all interacted with region dummies. Standard errors are reported in parenthesis.
* denotes significance at 10% ** denotes significance at 5% *** denotes significance at 1%