

Department for Work and Pensions

Working Paper No 29

The impact of free movement of workers from Central and Eastern Europe on the UK labour market

**Nicola Gilpin, Matthew Henty, Sara Lemos, Jonathan Portes and
Chris Bullen**

A report of research carried out on behalf of the Department for Work and
Pensions

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Summary

The UK granted free movement of workers to nationals of the A10¹ countries following the enlargement of the European Union (EU) in May 2004. This paper describes the key features of migration to the UK since accession and evaluates the impact of migrant flows from these new EU Member States on the UK labour market, building on the initial assessment presented in Portes and French².

Between January and December 2005 claimant unemployment in the UK has risen by over 90,000 and it has been suggested that part of the explanation for this rise is the inflow of migrants from the new EU Member States. We have found no discernible statistical evidence to suggest that A8³ migration has been a contributor to the rise in claimant unemployment in the UK. The evidence presented in this paper supports the view put forward in Portes and French that, overall, the economic impact of migration from the new EU Member States has been modest, but broadly positive, reflecting the flexibility and speed of adjustment of the UK labour market.

¹ Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia, Slovakia, Malta and Cyprus.

² 'The Impact of Free Movement of Workers from Central and Eastern Europe on the UK Labour Market: early evidence' by Jonathan Portes and Simon French (May 2005).

³ This excludes Malta and Cyprus, whose citizens already had relatively free access to the EU labour market.

1 Introduction

On 1 May 2004 ten countries joined the EU (A10) – eight Central and Eastern European countries (A8), Cyprus and Malta. The EU guarantees free movement of workers (FMOW) for all its citizens and eventually citizens of the accession countries will be free to move anywhere within the expanded EU to look for work. Citizens of Malta and Cyprus already have relatively free access to the EU labour market, especially in the UK which has large Cypriot and Maltese communities. However, as with previous accessions, existing Member States had concerns about the impact of complete liberalisation on their labour markets. The Accession Treaties, therefore, gave the EU-15 countries the option of delaying the implementation of full FMOW for up to seven years⁴.

Most of the EU-15, including France, Germany, Italy, and Spain, chose to impose restrictions in one form or another on the A8 countries. The exceptions were Ireland, Sweden and the United Kingdom. From 1 May 2004, people from the A8 have been granted free access to the UK labour market. They are obliged to register on the Home Office administered Worker Registration Scheme (WRS) if they are employed in the UK for a month or more. This requirement, while not imposing any significant additional restrictions on free movement of labour, provides the UK government with an important new source of labour market information about migrant workers from the accession countries.

The purpose of this paper is to describe the key features of A8 migration to the UK since accession and to make an assessment of the impact of migrant flows from these countries on the UK labour market, building on the analysis presented in Portes and French (2005). In particular we will focus on the question of whether the opening up of the UK labour market to migrants from the A8 has led to an increase in claimant unemployment. Between January and December 2005, claimant unemployment in the UK has risen by over 90,000 and it has been suggested that

⁴ A thorough description of the complete regulatory framework applying to accession country nationals in the different existing EU states in the transition period can be found in Sriskandarajah *et al.* (2004).

part of the explanation for this rise is the inflow of migrants from the new EU Member States⁵.

Using data from the Labour Force Survey (LFS) and the Workers Registration Scheme, we have found no discernible statistical evidence to suggest that A8 migration has been a contributor to the rise in claimant unemployment in the UK.

⁵ Chartered Institute of Personnel and Development (CIPD) Quarterly Labour Market Outlook (December 2005), The Sunday Times (January 2006).

2 Literature review

There is an extensive literature on the impact of labour migration on economies and labour markets. We will not attempt to summarise it here. Useful review articles can be found in the Handbook of Labour Economics (Borjas, 1999). Most of the literature concentrates on the United States; there is considerably less evidence on the impact of migration in the UK (Dustmann, 2003). One of the reasons for the lack of empirical work on the impact of migration in the UK is the paucity of available data. Since the accession of the A8, the WRS has provided us with a new and large administrative source of data on migration from these countries. This data source was used to form the basis of the preliminary assessment of the impact of A8 migration on the UK labour market presented in Portes and French (2005).

The volume of people registering on the WRS since accession – almost 300,000, between May 2004 and September 2005, roughly equivalent to about one per cent of total employment in the UK – is sufficiently high that we might expect to see some impact of these flows on the UK labour market, particularly in areas and sectors with high concentrations of WRS workers. This impact may manifest itself in a number of ways. Increased competition for jobs may reduce the probability that an unemployed person may find work, leading to a fall in the outflow rate from unemployment and an increase in unemployment. The availability of migrant labour may displace native workers, leading to increased redundancies and a rise in inflows to unemployment and a fall in native employment rates. An increase in the supply of labour might also lead to a fall in wages in some sectors. Another view is that an increase in the supply of labour may lead to an increase in output and employment as it allows firms to expand, leaving wages and employment of the existing workforce unchanged.

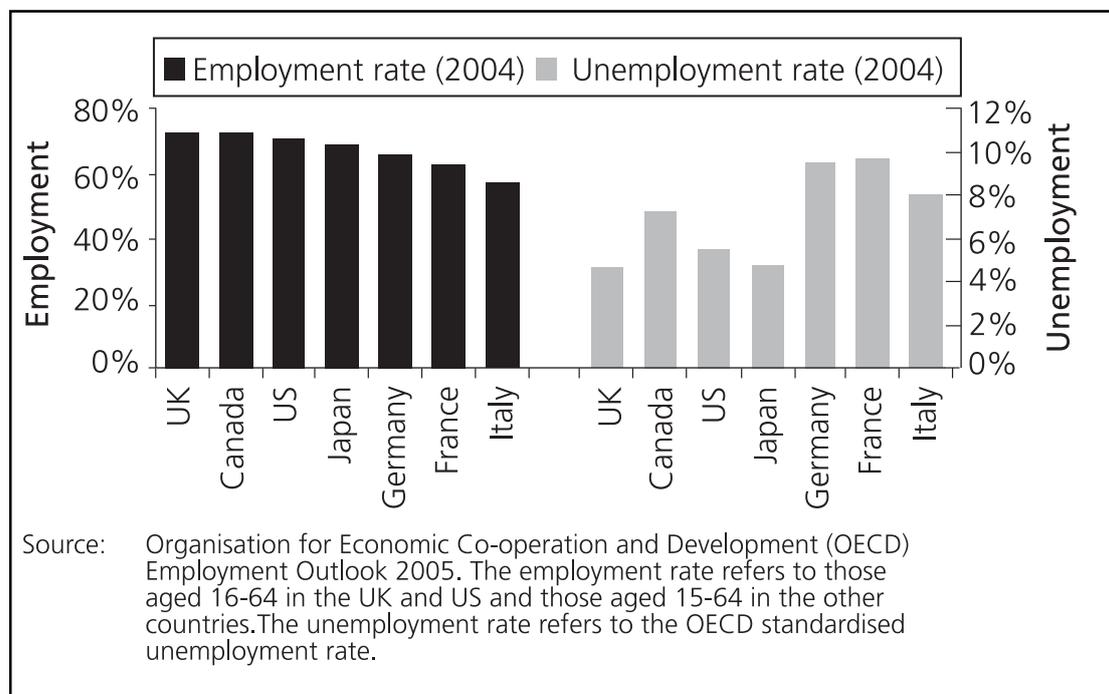
Portes and French (2005) used data from May 2004 to December 2004 and found that the primary impact of A8 migration to the UK since accession had been to increase output and total employment, with minimal impact on native workers, although they did find that higher levels of accession worker migration were associated with very small increases in claimant unemployment. At a sectoral level they found that by far the most significant observed changes had been in the agriculture and fishing sector. Here, employment appears to have grown sharply as a result of accession worker migration, while there is some mixed evidence that

growth in nominal wages in this sector may have been reduced relative to the rest of the economy. Portes and French (2005) concluded that the overall economic impact of migration from the new EU Member States had been modest, but broadly positive, reflecting the flexibility and speed of adjustment of the UK labour market.

3 The UK labour market pre- and post-accession

At the time of accession the UK labour market was performing strongly in both historic and international terms. The UK had the best combination of employment and unemployment amongst the G7 industrialised countries (Figure 3.1) and had one of the most strongly performing labour markets in the EU.

Figure 3.1 Employment and unemployment rates amongst the G7 countries



Since accession, the UK labour market has continued to perform strongly. Over the last year employment has grown by over 180 thousand and the employment rate stands at 74.5 per cent (Labour market statistics, February 2006) – one of the highest figures on record. Despite recent increases, unemployment remains close to its lowest level for 30 years, redundancies remain low and vacancies are at historically high levels.

Although the UK labour market has continued to perform strongly, there has been a rise in claimant unemployment in the UK of over 90,000 between January and December 2005 and more recently a rise in International Labour Organisation (ILO) unemployment (Labour market statistics, February 2006). There is a widespread perception that migration from the A8 may provide part of the explanation for this rise, working primarily through two channels. Firstly, as A8 migrants are predominantly working in low-skilled areas, it has been suggested that this could be increasing the competition for entry-level jobs, reducing the probability that unemployed people move into work.

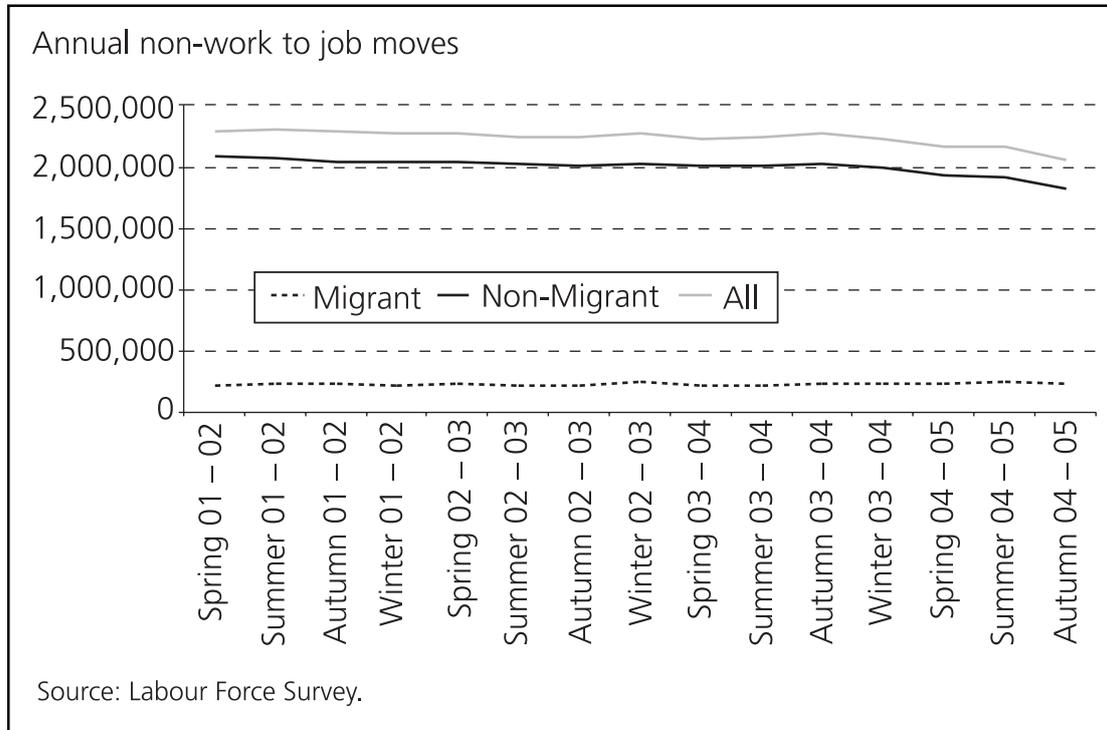
The LFS suggests that this is not the case. Recruitment⁶ has indeed declined in the past year, but there is little evidence of migrants displacing non-migrants. In terms of job-to-job moves⁷, migrants and non-migrants have both experienced a fall in recruitment over the last year – almost 13 per cent for non-migrants and around seven per cent for migrants. There has also been a decline in moves from non-work to work – around 10.5 per cent amongst non-migrants and around 2.5 per cent amongst migrants (Figure 3.2). So while the slowdown in recruitment has affected non-migrants somewhat more than migrants, migration does not appear to be causing the slowdown, and the differential is not large enough to explain any significant part of the rise in unemployment.

The other channel through which A8 migration might be affecting claimant unemployment is via vacancies notified to Jobcentre Plus offices. Employers might be recruiting A8 migrants via alternate channels rather than placing vacancies at Jobcentre Plus. This paper will examine whether there is any statistical evidence for these assertions.

⁶ Employment durations of under three months are used as a proxy for recruitment.

⁷ A job to job move is defined as when an individual leaves one job and begins another with a different employer between two quarters of the LFS.

Figure 3.2 Recruitment from non-work (unemployment and economic inactivity) to work



4 A8 migrants in the UK

4.1 Data

This chapter will use the LFS and the WRS data to describe some of the key features of A8 migration in the UK since accession. There are a number of important data caveats to consider when using these data sources to analyse migration. Between May 2004 and September 2005 there have been almost 300,000 registrations on the WRS – the majority of whom arrived in the UK post-accession. Over roughly the same period (spring 2004-summer 2005), the LFS shows an increase in the stock of A8 migrants aged 16 and over of around 120,000. It is important to draw the distinction between these two figures, the WRS measures gross inflows of A8 migrants while the LFS measures stocks.

Given that the WRS records gross inflows only, it should not be used as an indication of the increase in the stock of A8 migrants in the UK since accession – the WRS is likely to overstate the true increase in the stock of A8 migrants as it does not take into account A8 migrants who work in the UK for only a short time, returning to their country of origin relatively quickly. There are no requirements to de-register from the WRS so we have no usable administrative data on outflows to construct an estimate of net A8 migration (the increase in the stock of A8 migrants). Another issue is that there is anecdotal evidence that there is some non-registration amongst migrants from the A8 countries (Association of Labour Providers, 2005). There are two main reasons for this: some individuals arriving in the UK since May 2004 might not comply with registration and some individuals who were in the UK before May 2004 might have chosen not to register. This would affect the WRS data in the opposite direction, leading to an underestimate of the total inflows of migrants from these countries. We have no data on the extent of under-registration to gauge the magnitude of this off-setting effect on the WRS data.

The Labour Force Survey (LFS) provides us with an estimate of the stock of A8 migrants living in households in the UK. However, the LFS is likely to underestimate the stock of A8 migrants in the UK, particularly those who have been here for less than six months and those living in communal establishments. Due to the small sample sizes for A8 migrants on the LFS, the LFS measure of the increase in the stock

of A8 migrants in the UK should be viewed with a degree of caution. However, the LFS data does seem to suggest that net migration from the A8 countries is likely to be smaller than the number of WRS registrations.

4.2 Labour Force Survey analysis

4.2.1 The stock of A8 migrants in the UK

Over the last two years the stock of A8 migrants aged 16 or over living in the UK has more than doubled. In summer 2003, there were around 110,000 A8 migrants in the UK, by summer 2005 the number had risen to around 245,000. In summer 2003, A8 migrants made up around 2.8 per cent of all migrants aged 16 and over and around 0.24 per cent of the population aged 16 and over in the UK. By summer 2005, A8 migrants made up around 5.6 per cent of all migrants aged 16 and over and around 0.53% of the population aged 16 and over. Almost a third of the current stock of A8 migrants in the UK arrived since 2004.

Table 4.1 Stock of A8 migrants in the UK aged 16 and over

	Stock of A8 migrants aged 16+	A8 migrants as a percentage of the migrant population aged 16+	A8 migrants as a percentage of the total population aged 16+
Summer 2005	245,000	5.6	0.53
Summer 2004	165,000	4.0	0.36
Summer 2003	110,000	2.8	0.24

Source: LFS.

Table 4.2 Proportion of A8 migrants aged 16 and over in the UK by year of arrival

Year of arrival	Proportion of A8 population aged 16+ %
2004-2005	32.9
2000-2003	27.1
1990-1999	15.0
Pre-1990	23.6
Not known	1.3

Source: Four quarter average of LFS autumn 2004 – summer 2005.

4.2.2 Employment rates of A8 migrants in the UK

Since accession the employment rates of A8 migrants in the UK have risen sharply. In summer 2003, the employment rate of working age A8 migrants was 57.3 per cent – below both the average for all migrants (65.3 per cent) and the average of non-migrants (75.8 per cent). By summer 2005, the employment rate of working age A8 migrants had increased by over 23 percentage points to 80.6 per cent – above both the average for all migrants (66.4 per cent) and the non-migrant average (76.1 per cent).

The sharp increase in the employment rate of A8 migrants in the UK reflects the fact that new migrants from these countries are coming to the UK to work and not claim benefits – this view is supported by the WRS data. In addition, as highlighted in Portes and French (2005), the increase in employment rates amongst existing A8 migrants in the UK since accession supports the view that illegal or unreported working amongst these groups may have been reduced as a result of the decision to open the UK labour market to individuals from the A8 countries.

4.3 Worker Registration Scheme data

A summary of the main characteristics of A8 migrants registering on the WRS can be found in the latest Home Office Accession Monitoring Report⁸, published 28 February 2006. An overview of the main characteristics of people registering on the WRS is presented here, based upon data for the period May 2005 – September 2005.

4.3.1 Numbers registering on the WRS

Between 1 May 2004 and 30 September 2005, there were 293,000 applicants to the WRS (Home Office Accession Monitoring Report, November 2005). Figure 4.1 shows the monthly profile of processed WRS applications⁹. In the first few months of the WRS a large proportion of applications processed were from people already living in the UK prior to accession. In the first six months of the scheme 30 per cent of processed applications – around 30,000 – came from people already living in the UK.

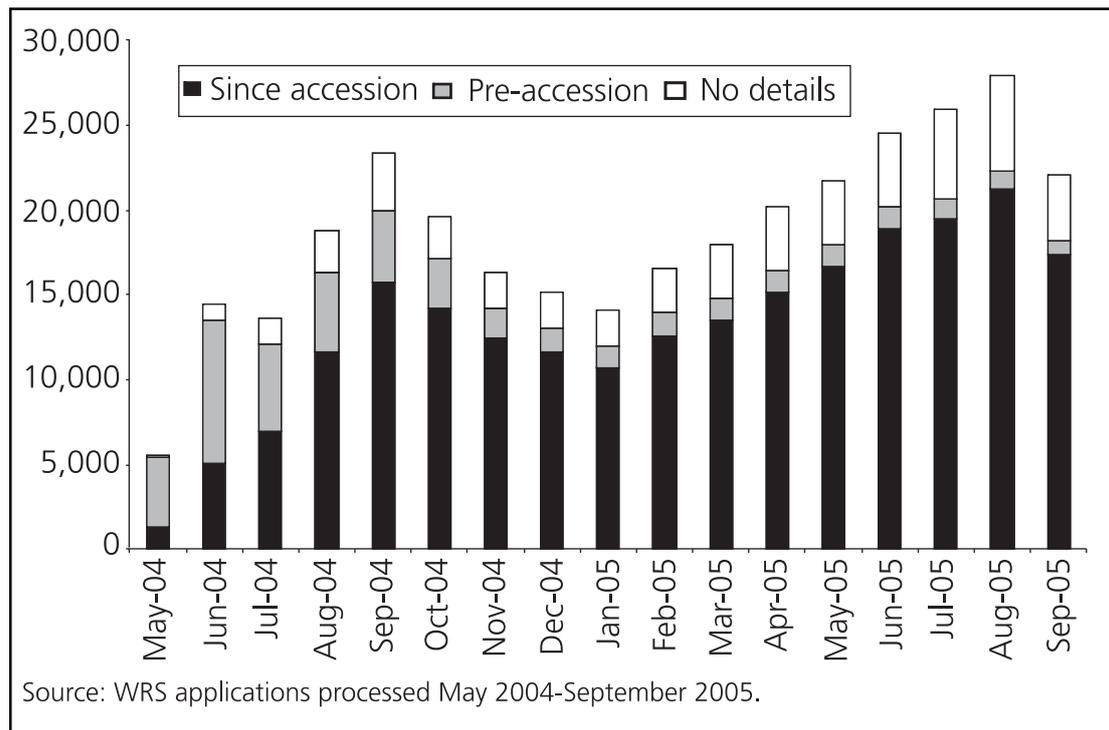
Some of those in the UK prior to accession will have been in the UK legally as visitors or non-working students, while others will have been working legally (with a work permit or self-employed) and registered a change of job after 1 May 2004. However, some proportion is likely to have been working illegally and accession has offered the opportunity and incentive to formalise their employment status.

⁸ The latest report can be found at www.ind.homeoffice.gov.uk/ind/en/home/about_us/reports/accession_monitoring.html

⁹ It should be noted that the registrations data used in this paper and the applications data used for the Home Office monitoring reports differ in their monthly profile.

However, when we look over the whole period since the start of the scheme, the vast majority of processed applications have been from people who have arrived in the UK post-accession – around 70 per cent (225,000). Around 14 per cent (43,000) of the total number of applications processed report being in the UK prior to accession and a further 16 per cent (50,000) gave no indication.

Figure 4.1 WRS applications processed by month, May 2004 – September 2005



4.3.2 Nationalities of those registering on the WRS

The vast majority of applicants to the WRS are Polish (58 per cent), followed by Lithuanian (14 per cent) and Slovak (11 per cent). Figure 4.2 shows the breakdown of applicants by nationality. Prior to accession there was a large Polish community living in the UK – around 60,000 people aged 16 and over, representing over half the stock of A8 migrants aged 16 and over in the UK at that time (LFS, Summer 2003). Poland is also the largest of the accession countries with a population of almost 40 million (Eurostat, 2005) and it has one of the weakest labour markets in the EU, so it is perhaps not surprising that Poland accounts for the largest share of applicants post-accession.

Figure 4.2 WRS applicants by nationality, May 2004 – September 2005

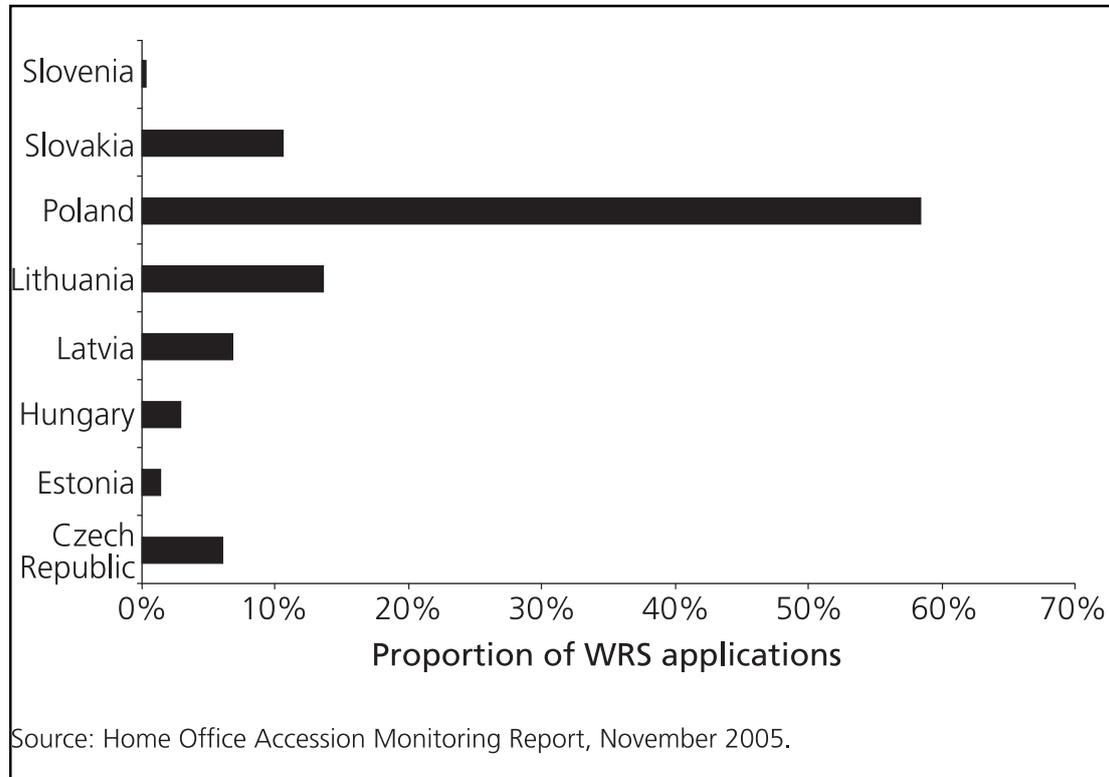


Table 4.3 expresses WRS registrations as a proportion of the population of the country of origin. Even though Polish nationals are making the largest number of WRS registrations, it is Lithuanians and Latvians who have the greatest propensity to enter the UK labour market relative to the population size of their country of origin.

Table 4.3 WRS applications May 2004 – September 2005 as a proportion of country of origin population

	WRS registrations as a percentage of home country population	GDP per head in country of origin (Euros per inhabitant at 1995 exchange rates and prices)
Lithuania	1.16	2,500
Latvia	0.86	3,100
Slovakia	0.57	4,200
Poland	0.44	4,200
Estonia	0.30	4,000
Czech Republic	0.17	5,200
Hungary	0.08	5,000
Slovenia	0.01	11,400

Source: Home Office Accession Monitoring Report, November 2005.

Eurostat total population figures, 2005.

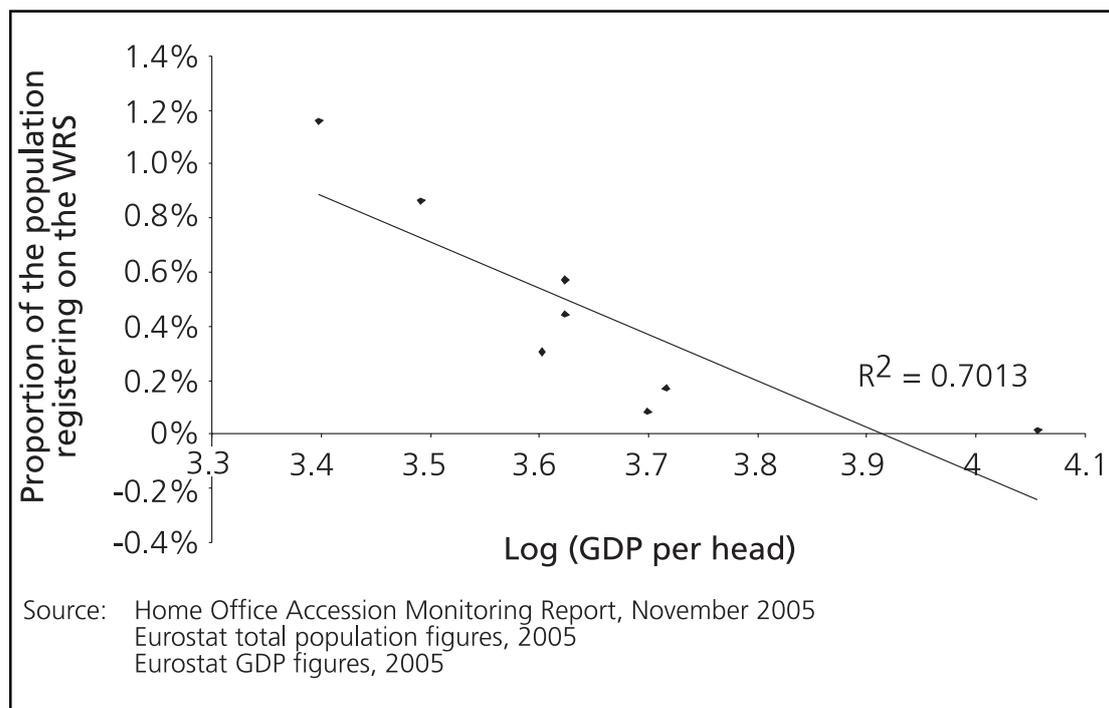
Eurostat GDP figures, 2005.

There could be a variety of reasons why migrants from the new EU Member States are choosing to come to the UK. This could include the pre-existence of migrant communities in the UK, labour market conditions in the UK or their country of origin or a number of other cultural and social factors. A full analysis of what might be driving migrants from the new EU Member States to enter the UK labour market is beyond the scope of this paper. Some initial analysis is presented here, but this is an area where much more detailed analysis is needed and we will continue to work on this area to develop a better understanding of the factors which drive migration.

Based on our initial work, there appears to be a statistical association between the level of GDP per head in the new EU Member States and the propensity to enter the UK labour market. The countries with the lowest GDP per head have a greater propensity for their population to register on the WRS than those with higher GDP per head.

Figure 4.3 shows the relationship between GDP per head in the accession countries and the proportion of the population that have registered on the WRS. When a line of best fit is put through the data we observe a negative correlation between GDP per head and the proportion of the population registering on the WRS. (Although there are few observations).

Figure 4.3 Correlation between GDP per head in country of origin and proportion of the population registering on the WRS



The continuing strong performance of the UK labour market makes it an attractive destination for migrants looking for work and this may provide part of the reason why migrants from the A8 are choosing to come to the UK. In comparison, the labour markets of the A8 countries are characterised by relatively low employment rates and high unemployment rates. In 2004, only Slovenia and the Czech Republic had an employment rate above the EU25 average.

Table 4.4 A comparison of employment and unemployment rates in the A8 countries

	Unemployment Rate (2004) %	Employment rate (2004) %
Poland	19.0	51.7
Hungary	6.1	56.8
Slovakia	18.2	57.0
Lithuania	11.4	61.2
Latvia	10.4	62.3
Estonia	9.7	63.0
Czech Republic	8.3	64.2
Slovenia	6.3	65.3
UK	4.7	71.6
EU-25	9.1	63.3

Source: Eurostat, refers to persons aged 15-64.

4.3.3 Age profile of A8 migrants

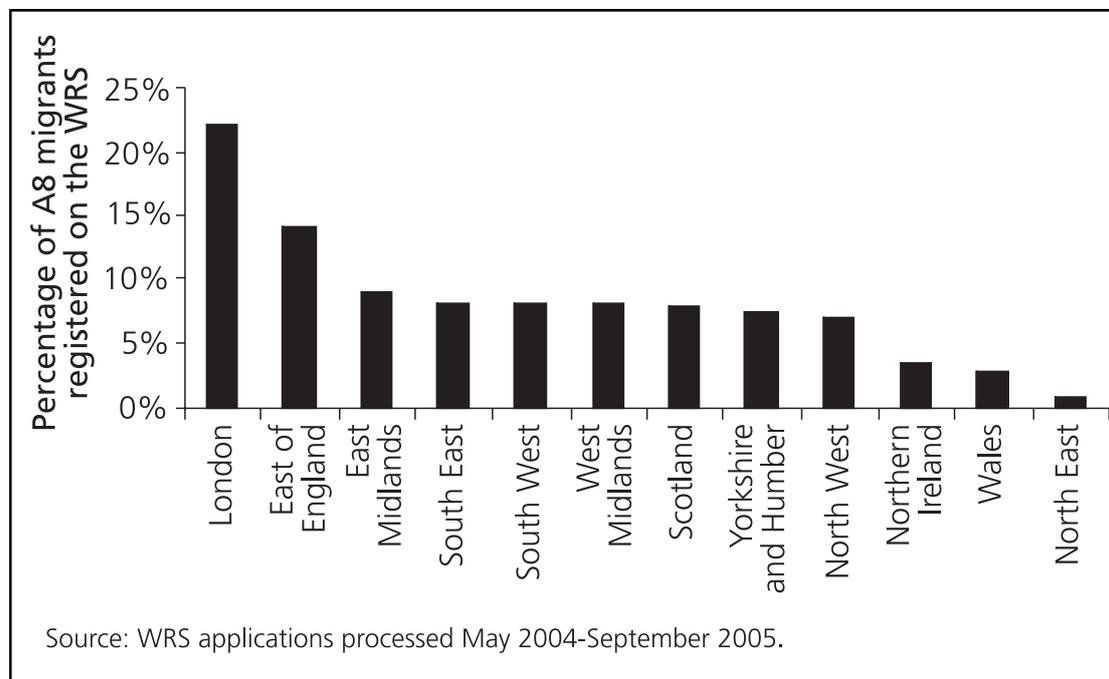
The vast majority of applicants who have registered on the WRS are young and single (Home Office Accession Monitoring Report, November 2005). Around 44 per cent are aged between 18 and 24 and a further 39 per cent are aged between 25 and 34. This supports the evidence from the LFS which suggests that the age profile of A8 migrants in the UK has changed substantially since accession. Prior to accession a substantial proportion – around 40 per cent – of the stock of A8 migrants in the UK were aged 65 and over, reflecting the post-war migration of refugees from Central and Eastern Europe (LFS, Summer 2003). The age profile of A8 migrants in the UK is now similar to that of all migrants aged 16 and over. Around 86 per cent of the stock of A8 migrants in the UK are aged 16-64 (compared to 88 per cent for all migrants) and just 13 per cent are aged 65 and over (compared to 12 per cent for all migrants) (LFS, Summer 2005).

4.3.4 Geography of A8 migrants

Prior to accession, the stock of A8 migrants in the UK was concentrated in London and the South East. Over 50 per cent of all working age A8 migrants living in the UK prior to accession lived in London and around three-quarters were concentrated in London and the South East (LFS, Summer 2003). London has seen the biggest inflow of migrants from the A8 since May 2004. Figure 4.4 shows the inflows of A8 migrants by region – over 20 per cent of A8 migrants registered on the WRS are in London.

Whilst London has been a popular destination for migrants from the A8 since accession, migrants from these countries have also flowed to parts of the UK not traditionally associated with migrants from these countries or other migrant communities. Figure 4.5 shows the concentrations of WRS registrations by Jobcentre Plus district. The Jobcentre Plus districts with the highest concentration of A8 registrations relative to the working age population are in London, but there are also high concentrations of A8 migrants in the East of England, parts of Yorkshire and the Humber, Scotland, Wales and the East Midlands.

Figure 4.4 Inflows of A8 migrants by region, May 2004 – September 2005



The evidence we have suggests a relatively weak relationship between the concentration of pre-existing migrant communities at a Local Authority District (LAD) level and subsequent concentrations of WRS registrations. Figure 4.6 shows that although there is a positive relationship between pre-existing migrant communities and subsequent WRS registrations, the concentration of WRS registrations is higher in LADs with greater concentrations of existing migrants, this relationship is relatively weak as the correlation between these variables is relatively poor. A8 migrants appear to be flowing to parts of the country not traditionally associated with large concentrations of migrants.

Figure 4.5 Concentrations of WRS registrations by Jobcentre Plus districts

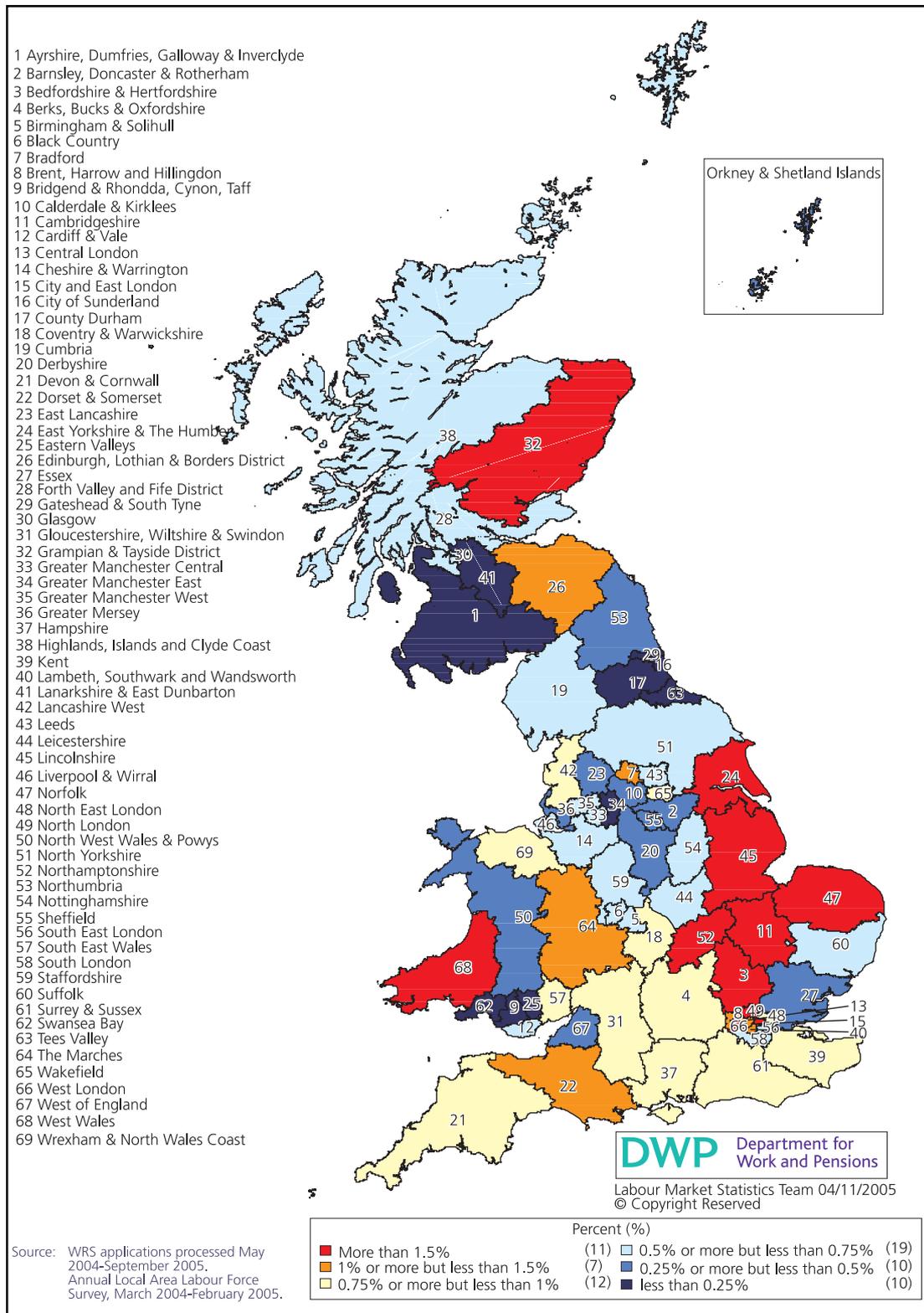
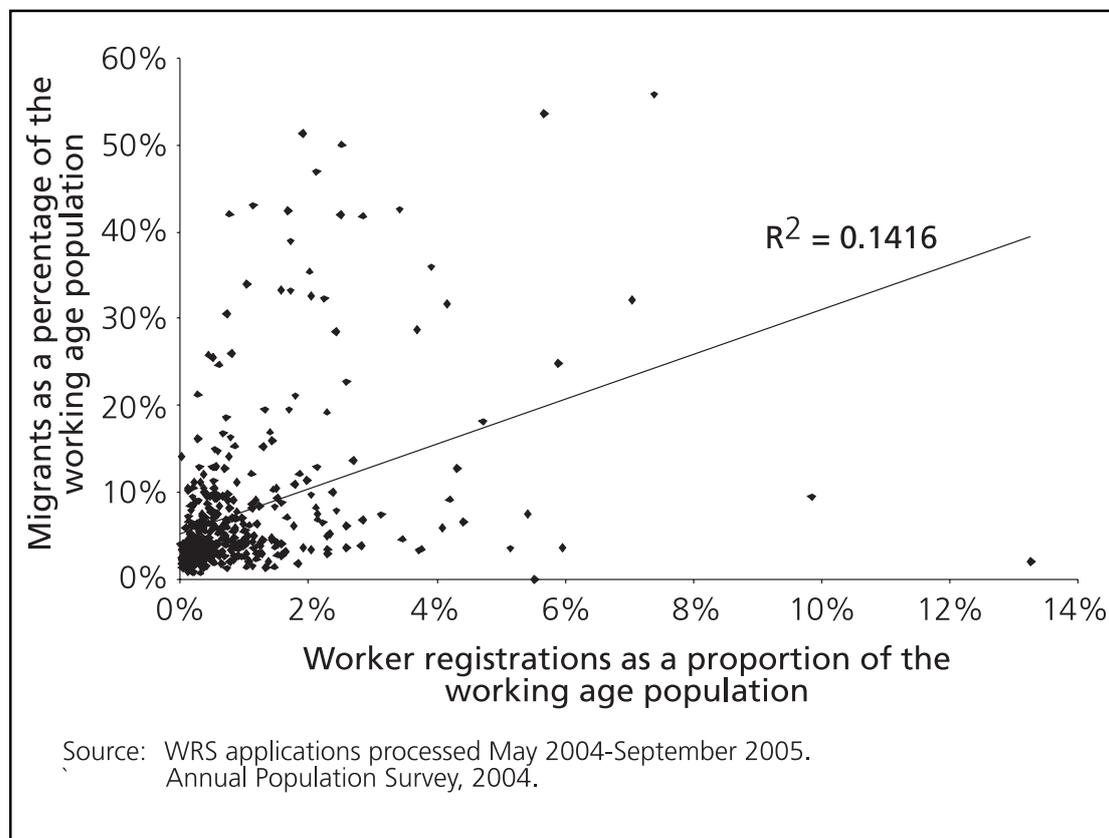


Figure 4.6 Correlation between existing migrant communities and subsequent WRS registrations

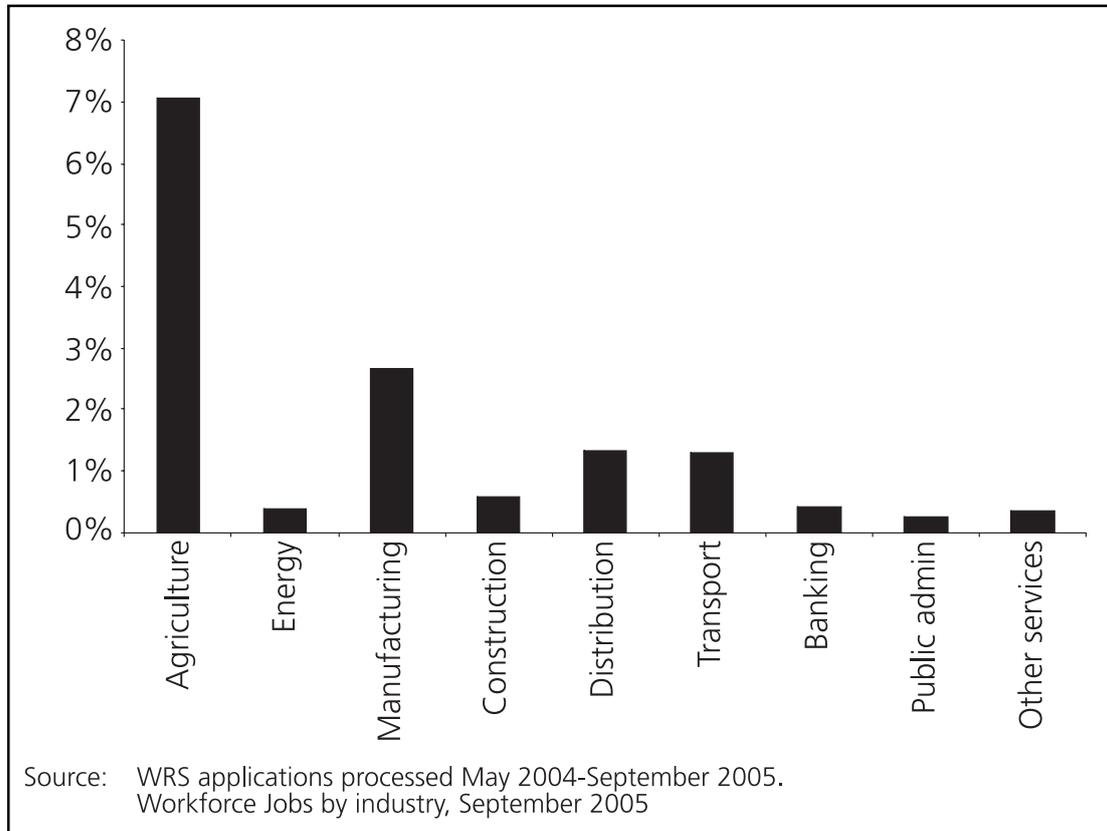


4.3.5 Employment sectors

A8 migrants seem to be predominantly filling low-skilled vacancies within the UK labour market. The most popular sectors amongst A8 migrants registering with the WRS are distribution, hotels and restaurants with almost 30 per cent of registrations, followed by manufacturing with around 28 per cent of registrations. The next biggest sector is agriculture and fishing with around ten per cent of all registrations. There is considerable diversity across the country in the sectors which A8 migrants are registering. In London the majority of A8 migrants are registering in distribution, hotels and catering. In other parts of the country there are very high proportions of A8 migrants registering in agriculture, such as in Kent, the Marches, Norfolk, Lincolnshire, Cambridgeshire and in the Grampians. Other areas have high concentrations of A8 migrants registering in manufacturing, such as in West Wales and East Yorkshire (WRS applications processed May 2004 – September 2005).

Figure 4.7 shows the number of WRS registrations as a proportion of all employees in the sector. The notable point here is that in most sectors WRS registrations represent only a small proportion of the total number of employees in the sector – in most cases less than three per cent. The exception to this is agriculture where WRS registrations, as a proportion of all employees in the sector, are around seven per cent.

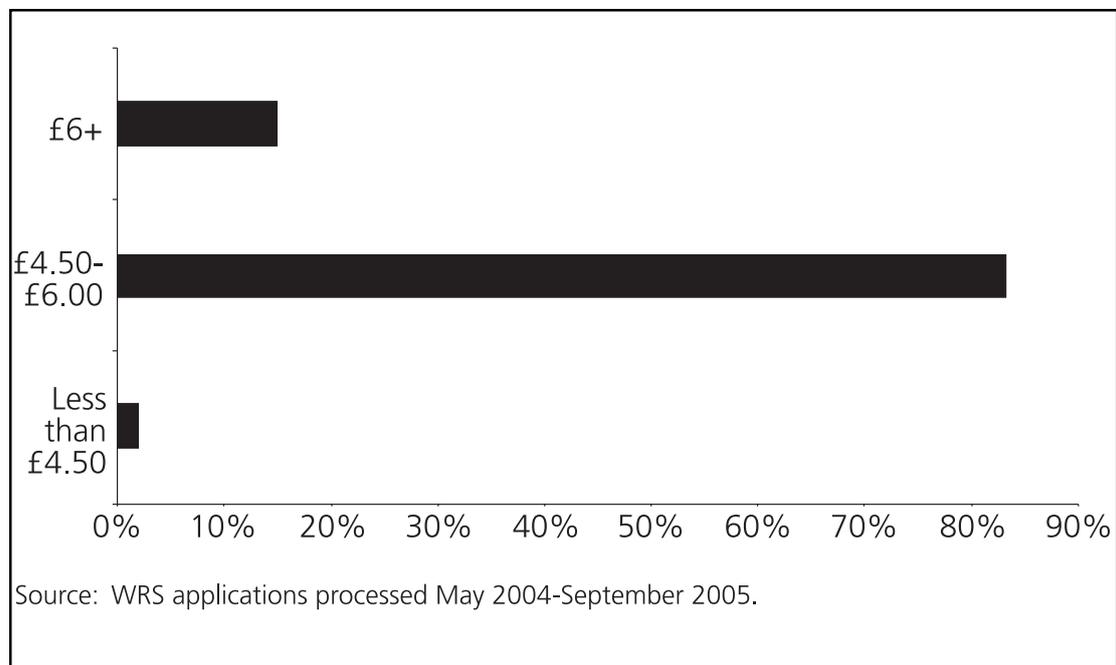
Figure 4.7 Worker registrations, May 2004 – September 2005 as a proportion of all employees by sector in the UK



4.3.6 Wages of A8 migrants

Over 80 per cent of A8 migrants who have registered on the WRS are earning between £4.50 and £6.00 an hour (Figure 4.8); this is between 47 per cent and 63 per cent of average UK hourly earnings. The median hourly gross pay for UK employees is £9.56 (Annual Survey of hours and Earnings, 2005).

Figure 4.8 Hourly wages of A8 migrants registering with the WRS



4.3.7 Benefit claims by A8 migrants

Prior to accession concern was expressed about A8 migrants coming to the UK 'benefit shopping'. The data we have from the WRS shows that A8 migrants have come to the UK to work, not to claim benefits (Home Office Accession Monitoring Report, November 2005). Ninety-nine per cent of applications for National Insurance numbers made by accession country nationals between May 2004 and September 2005 were for employment purposes. The numbers of A8 nationals applying for tax-funded income-related benefits, child benefit, tax credits and housing support remain very low. For example, only 2,501 applications for Income Support (IS) and Jobseeker's Allowance (JSA) were processed between May 2004 and September 2005, and of these applications, only 100 (less than four per cent) were allowed to proceed for further consideration. To put this figure into context, around 200,000 people flow onto JSA each month, whereas fewer than ten benefit applications per month from A8 nationals have been able to proceed for further consideration.

5 Impact assessment

5.1 Possible impacts on the labour market

As highlighted earlier in the paper, the volume of people registering on the WRS is sufficiently high that we might expect to see some impact of these flows on the UK labour market, particularly in areas and sectors with high concentrations of WRS workers. This impact may manifest itself in a number of ways:

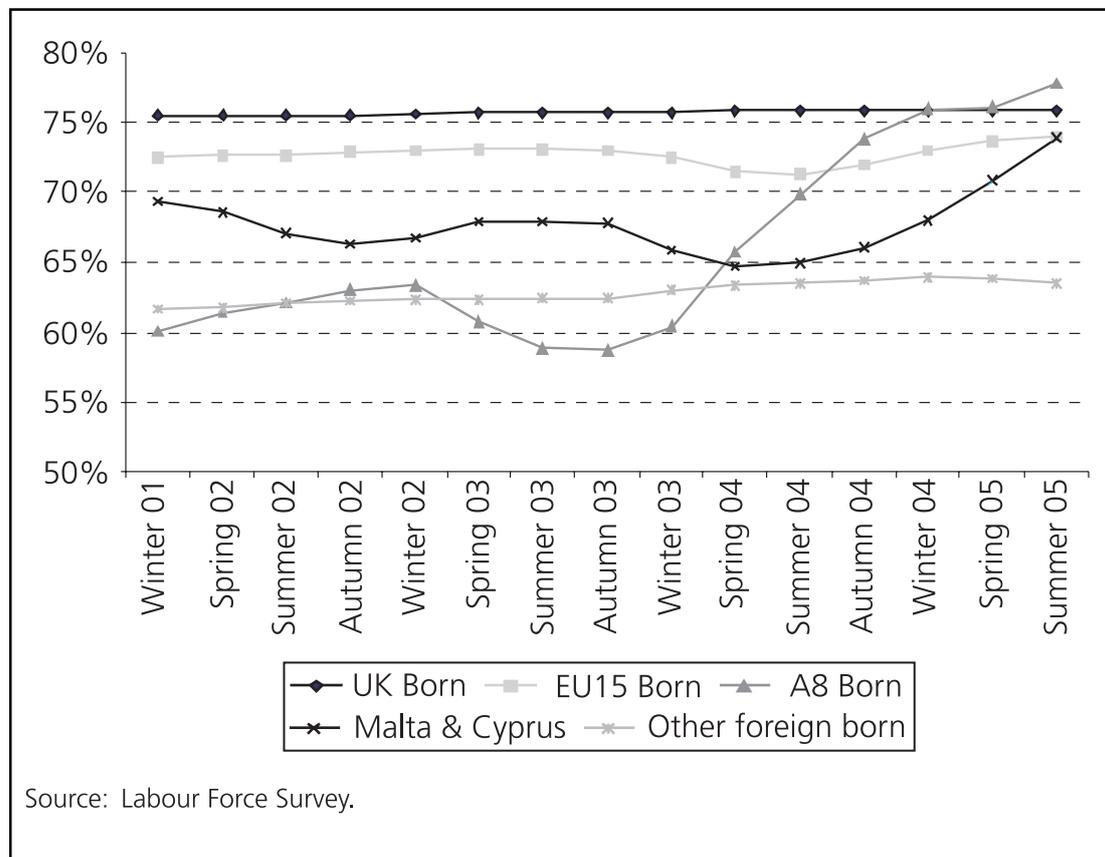
- falls in employment rates amongst other groups in the labour market;
- increased unemployment and rises in redundancies;
- lower probability of some groups finding jobs (increased competition from migrants);
- reductions in notified vacancies at Jobcentre Plus offices;
- falls in wages; and
- an increase in output and employment.

This chapter will look at some of the statistical evidence for these potential impacts on the labour market.

5.2 Employment

Figure 5.1 gives a comparison of migrant and UK-born employment rates using a four quarter rolling average. At the same time as the substantial rise in the employment rate of A8 migrants over the last two years, there has been no compensating fall in the employment rates of other migrant groups or amongst non-migrants in the UK. The employment rate of non-migrants has remained broadly constant and the employment rates of other migrant groups have continued to grow including those from Malta and Cyprus who have seen an increase of almost six percentage points in their employment rate over the last two years.

Figure 5.1 Migrant and UK born employment rates (four quarter rolling averages)

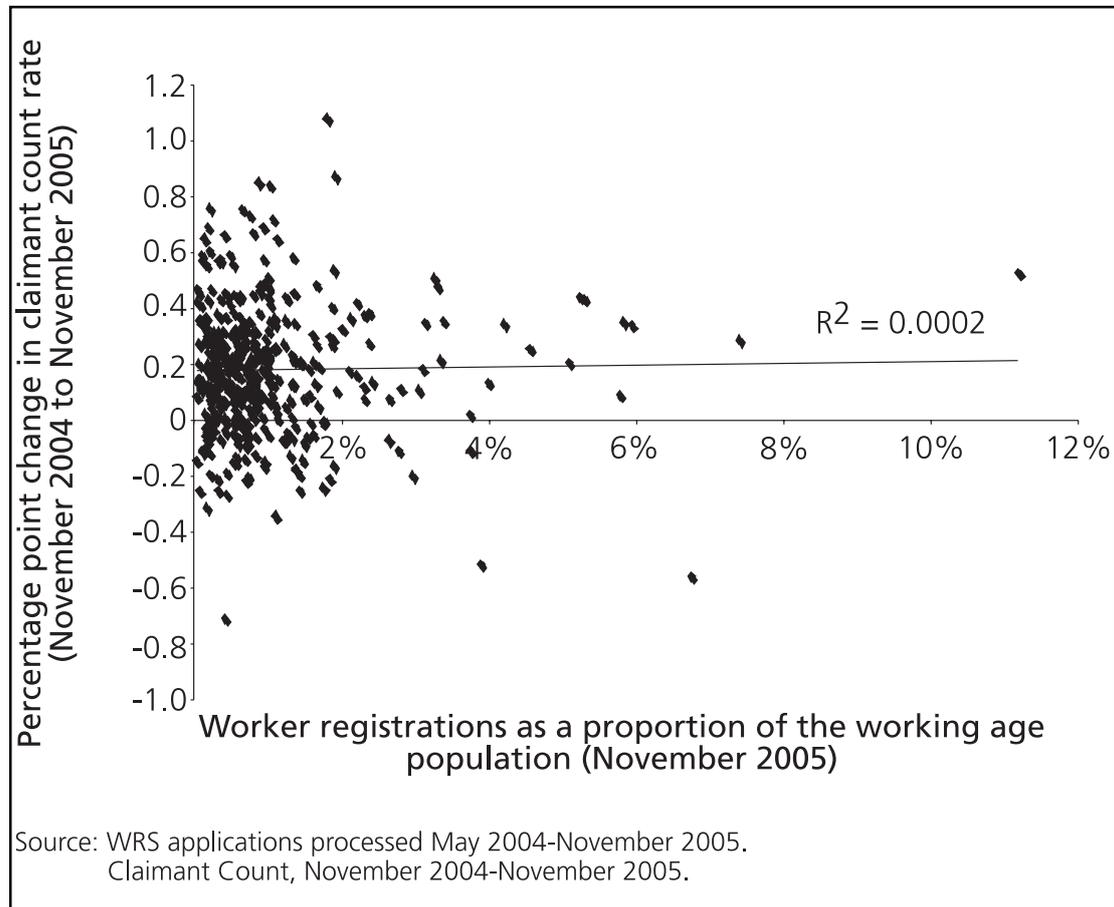


5.3 Claimant unemployment

Commentators have argued that increased competition from A8 migrants for entry-level jobs may be having an impact on the probability of Jobcentre Plus clients moving into work. It has been suggested that this increased competition from A8 migrants could potentially be part of the explanation for the rise in claimant unemployment in the UK between January and December 2005.¹⁰ Figure 5.2 plots WRS registrations as a proportion of the working age population at LAD level against the percentage point change in the claimant count rate over the period November 2004 – November 2005.

¹⁰ Chartered Institute of Personnel and Development (December 2005), Sunday Times (January 2006).

Figure 5.2 Correlation between the percentage point change in the claimant count rate and WRS concentrations

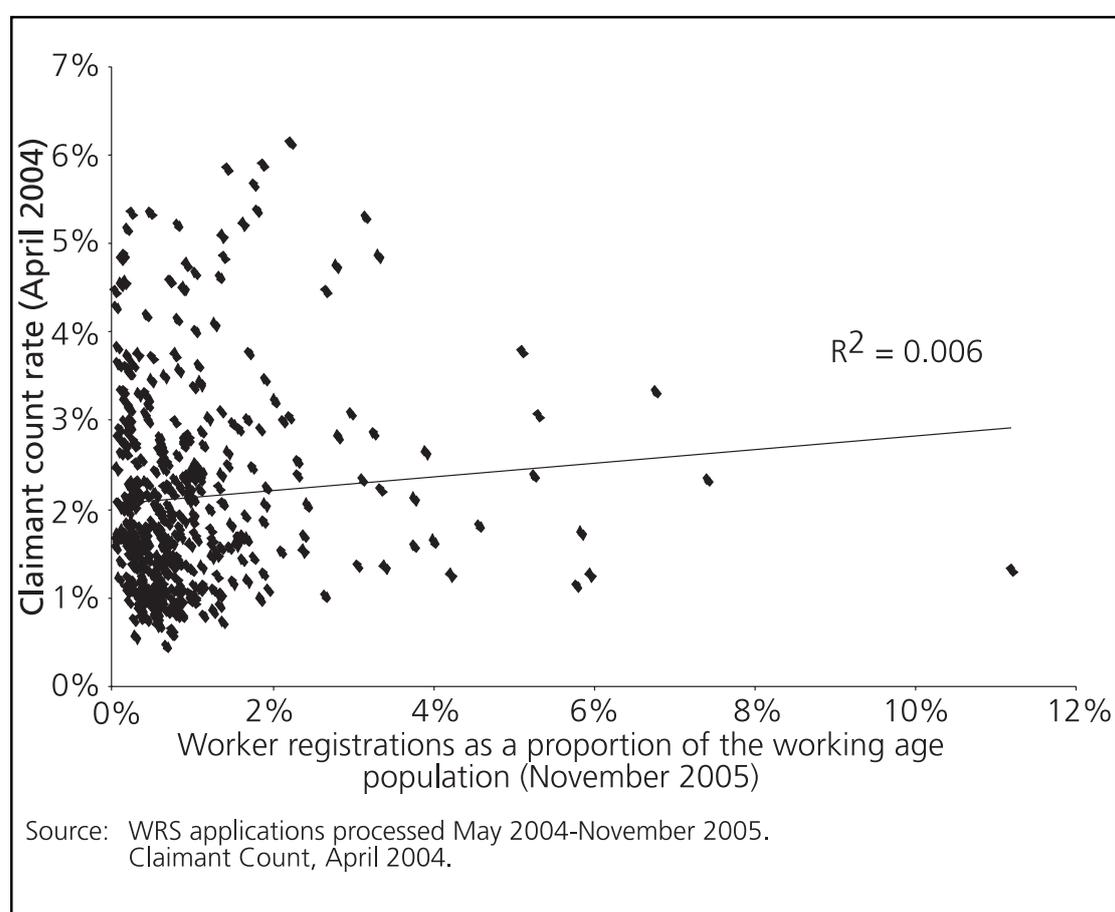


If there was some association between concentrations of WRS registrations and rises in the claimant count, we would expect to see a positively sloped line of best fit. Although the line is slightly positive, it explains close to zero of the variation in the claimant count. Based on this simple correlation between two variables, there is no significant statistical relationship between concentrations of WRS applicants at the LAD level and increases in the claimant count rate.

Of course, it may be the case that migrants from the new EU Member States are flowing to areas with buoyant labour market conditions. In which case, we might not expect to pick up a positive relationship between concentrations of WRS registrations and rises in the claimant count rate. The issue of endogeneity is discussed extensively in the literature on migration and is one of the reasons why it can be difficult to isolate the impact of migration on labour market outcomes. We will look into this more carefully when discussing our empirical models. Figure 5.3 shows the correlation between the claimant count rate just prior to accession (April 2004) and the subsequent flows of A8 migrants. If migrants were flowing to areas with buoyant labour market conditions, we would expect to see a negatively sloped line of best fit. In fact we observe a slightly positive relationship, suggesting A8 migrants are more likely to flow to areas with a higher claimant count rate. However

the correlation between the two variables is close to zero, suggesting that there is little evidence that A8 migrants have gone to areas with either more or less buoyant labour market conditions. This suggests that endogeneity is not a major concern and the simple correlation in Figure 5.2 is unlikely to be affected by migrants flowing to areas of buoyant labour demand. Nonetheless, we carefully account for that in our empirical models later in the paper.

Figure 5.3 Correlation between the claimant count rate in April 2004 (pre accession) and subsequent WRS concentrations

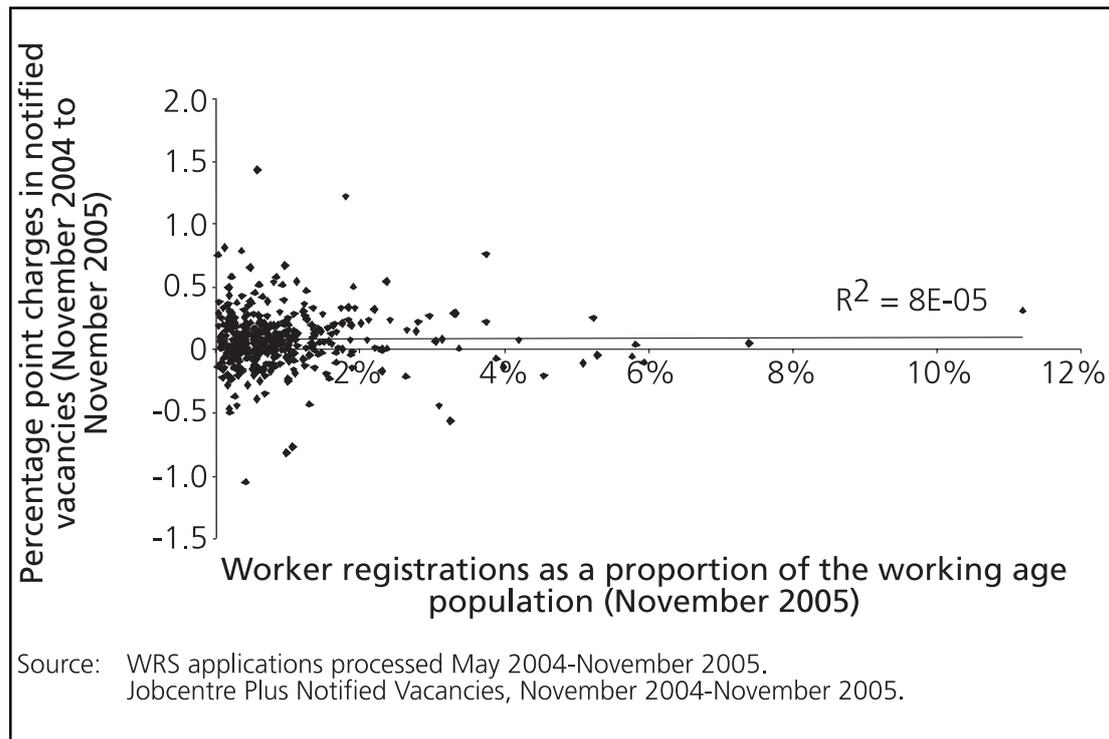


5.4 Jobcentre Plus notified vacancies

There has been some anecdotal evidence that employers are recruiting A8 migrants via alternate channels and are no longer placing their vacancies with Jobcentre Plus. There has been speculation that this may explain part of the decline, since the turn of 2005, in Jobcentre Plus notified vacancies. Figure 5.4 shows the correlation between percentage point changes in notified vacancies and concentrations of A8 migrants at LAD level over the period November 2004 – November 2005. If there was a strong association between LADs that had high proportions of A8 registrations and large falls in vacancies, we would expect to see a negatively sloped line of best

fit through the data. This simple correlation between two variables shows that there is no observable statistical link between A8 concentration and changes in Jobcentre Plus notified vacancies at LAD level.

Figure 5.4 Correlation between percentage point changes in Jobcentre Plus notified vacancies and concentrations of A8 migrants



Given that London has received the largest inflow of migrants from the new EU Member States, we might see a stronger relationship between declines in Jobcentre Plus notified vacancies and concentrations of WRS registrations in London. Figure 5.5 shows the correlation between changes in notified vacancies in London Jobcentre Plus districts between November 2004 and November 2005 and concentrations of WRS registrations. There is no observable statistical correlation between changes in Jobcentre Plus notified vacancies and concentrations of people on the WRS in London.

This analysis has also been repeated for vacancies in elementary occupations¹¹ only – a sector which is particularly important for Jobcentre Plus in terms of vacancies (Figure 5.6). Again, we can find no observable statistical relationship between changes in Jobcentre Plus notified vacancies in this sector and concentrations of people registering on the WRS. Based on this series of simple correlations, there appears to be no observable statistical relationship between changes in Jobcentre Plus notified vacancies and inflows of migrants from the new EU Member States.

¹¹ Examples of elementary occupations include labourers, kitchen assistants or cleaners.

Figure 5.5 Correlation between percentage point changes in Jobcentre Plus notified vacancies and concentrations of A8 migrants in London

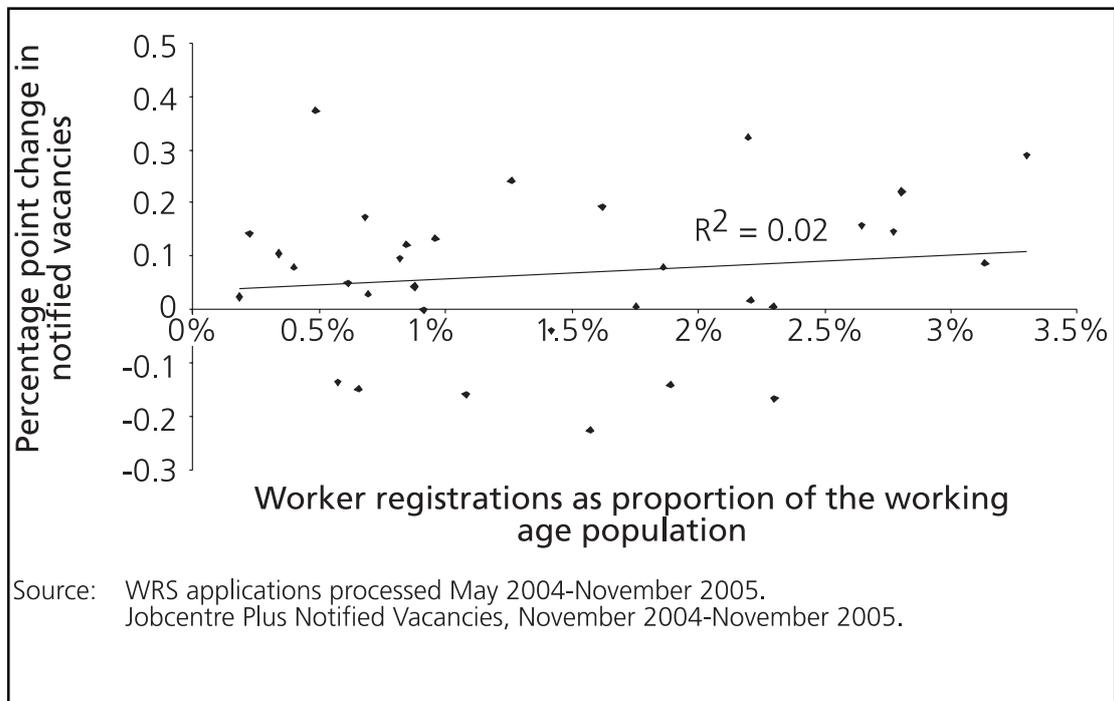
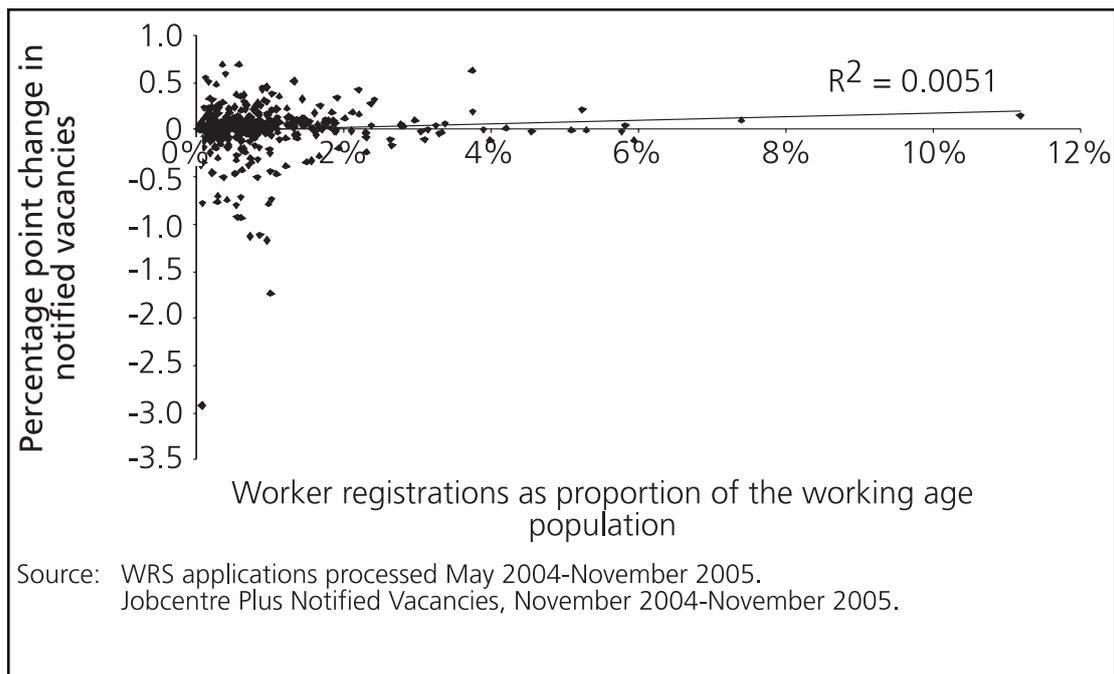


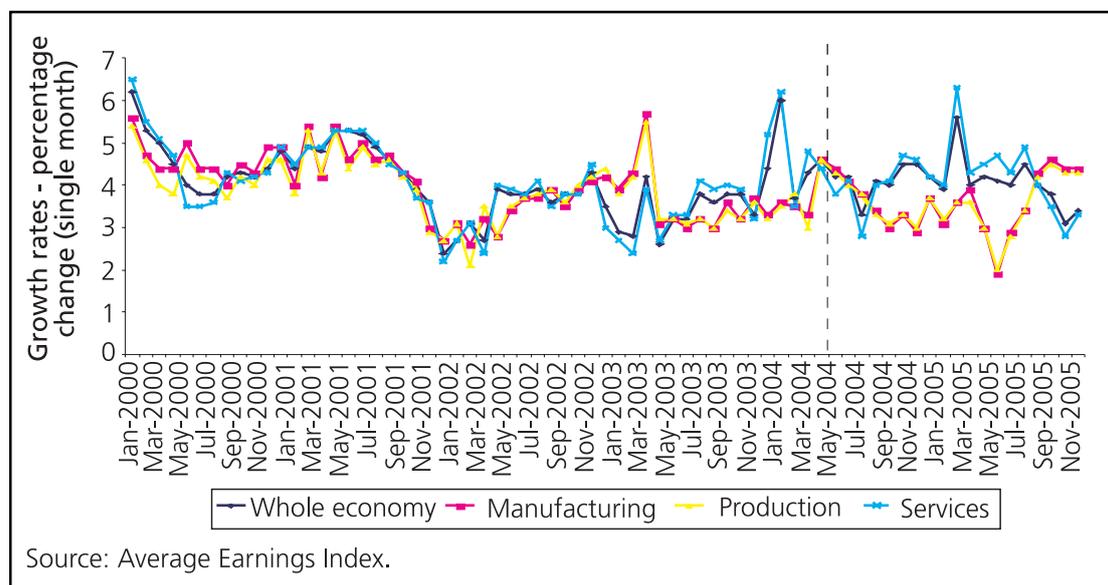
Figure 5.6 Correlation between percentage point changes in Jobcentre Plus notified vacancies in elementary occupations and concentrations of A8 migrants



5.5 Wages

The most reliable and frequent source of data on earnings is the Average Earnings Index (AEI) (Office for National Statistics). Figure 5.7 shows the monthly growth in the AEI for the whole economy and for each of the main industrial sectors since January 2000. Of course, we do not know the counterfactual, but there appears to be little evidence of a fall in nominal wage growth in the whole economy and across the main industrial sectors since accession.

Figure 5.7 Growth in average earnings in the main industrial sectors (seasonally adjusted, including bonuses)



In this next section we will formalise some of this descriptive analysis in a regression analysis framework, focusing on the impact of A8 migration on claimant unemployment. We focus on claimant unemployment as this is the area we have good quality data at a disaggregated level. It is also of key policy interest given the backdrop of rising claimant unemployment in the UK during 2005. The model we will use builds upon the work presented in Portes and French (2005).

5.6 Data

The data we use to estimate combines administrative data on claimant unemployment with data from the WRS on concentrations of A8 migrants by LAD and LFS data. In the Portes and French (2005) model they used WRS data for the first few months of the scheme up until December 2004. We now have WRS data running from May 2004 to the end of November 2005 and we make use of this longer run of data in this paper.

5.7 Empirical specification

We estimate the effects of migration from the A8 countries on the claimant count rate of UK natives using a reduced form equation, typically used in the literature that is grounded on the standard neoclassical model (Borjas, 1999):

$$\Delta u_{it} = \alpha + \beta m_{it} + \delta w_{it} + \lambda X_{it} + \sum_{l=1}^L \rho_l \Delta u_{it-l} + f_i + f_t + \varepsilon_{it} \quad (1)$$

where u_{it} is our measure of unemployment, m_{it} is our measure of migration, w_{it} is average wages, X_{it} are labour supply shifters, f_i and f_t are individual and time fixed effects, and ε_{it} is the error term in local authority district i and month $t = 1 \dots, 409$, and $t = 1, \dots, 17$.

We define our unemployment measure as the proportion of the working age population in receipt of JSA and we refer to it simply as the claimant count rate or native unemployment. We define our migration measure as the number of registered A8 migrants as a proportion of the working age population and refer to it as the (gross) migration rate. Thus, the interpretation of our coefficient of interest is that a one percentage point increase in the proportion of A8 registrations in the working age population increases the unemployment rate of UK natives by β percentage points.

Ideally, we would use a measure of net migration. But, as set out in Chapter 4, WRS registrations are an inaccurate estimate of net migration for two reasons:

- The WRS data measures gross inflows only. We have no usable data on outflows.
- Some A8 migrants will not have registered on the WRS.

How does this affect the analysis? If outflows and non-registration are systematic in relation to registration (across regions and over time), but not in relation to the error term, then we have what is known as a scaling effect in the literature (ie, $m = cm^*$, where m^* is the true migration variable, m is the observed migration variable and c is the scaling factor). This would not affect the econometrics analysis presented in this paper (just as the coefficient is scaled up or down, so would the standard errors, and the diagnosis tests would not be affected), but the coefficient β would be scaled up or down, depending on whether the variable m is under or over estimated. For example, if m was the double of the true m^* , then β would be half of the true β^* . If we knew the exact scaling factor, we could report the correct coefficient. However, the difficulty here is that we do not know the exact scaling factor (e.g. 50 per cent, 15 per cent, etc.) and we do not know whether non-registration outweighs outflow or vice versa. All we can say is that the coefficient β will be over or under-estimated, depending on whether net non-registration outweighs outflows or vice versa. If, as suggested by the LFS data, net migration is smaller than the number of registrations, then the coefficient will be underestimated. However, the estimate of the net impact on the resident labour market (native unemployment) will not be changed (that is, m will have been overestimated, β underestimated, but the impact assessment derived by multiplying m by β will be unchanged).

If outflows and non-registration are systematic in relation to the error term, (i.e. $m=m^*+e$, where e is the error of measurement and where e correlated with \mathcal{E} and/or m^* is correlated with \mathcal{E}), this would affect the econometrics analysis presented in this paper, as the coefficient β would be biased and the standard errors incorrect. Furthermore, the direction of the bias would not be obvious. (If we assume instead that $m=m^*+e$ but that neither e nor m^* are correlated with \mathcal{E} , then our estimate will be biased towards zero). We have no evidence that non-registrations are more or less prevalent in any region or sector and no evidence as to whether non-registrations increase or decrease over time. However, it does seem likely that outflows will vary – in particular, outflows are likely to be higher in agriculture because of its seasonal nature. Our robustness checks address this issue.

Supply shifters separate the effect of supply shocks from the effect of A8 migrants on the claimant count rate. The supply shifters included are the proportion of the total population who are women, who are ethnic minorities and who are migrants coming from outside the A8 countries including Malta and Cyprus of the A10 countries.

We include dynamics to allow for lagged adjustment, as the arrival of migrants might not affect the claimant count rate contemporaneously, but in future periods. The lagged unemployment variable is also typically used as a measure of labour demand and it alleviates problems arising from serial correlation in the residuals. The number of lags and leads is an empirical matter and is discussed in the results section. We also include the proportion of the working age population in the agriculture industry as a further measure of labour demand, as the descriptive analysis suggests that there is a high concentration of A8 migrants registered to work in that sector.

We model individual and time fixed effects by using LAD and month dummies. Firstly, by defining one dummy for each time period, we control for the effect of macro shocks on native unemployment. In other words, we separate the effect of other macro shocks (such as seasonal factors, international events, national policies, etc.) from the effect of migration on native unemployment. That way we are able to estimate the net effect of extra migrants arriving in the labour market after we have accounted for the effect of other shocks simultaneously affecting the labour market and, therefore, native unemployment. Secondly, by defining one dummy for each LAD to a specification already in differences, we control for the effect of LAD specific growth trends on the claimant count rate. Put differently, we remove any permanent differences across LADs and make them equally attractive to migrants and natives. This way we are able to estimate the net effect of migrants after we have accounted for the specificities of each district. That is because specific factors in a district (such as more jobs, more schools, more housing, etc.) might make that district more attractive to migrants or more attractive to natives or more attractive to both, and we want to separate the effect of such factors on native unemployment in that district from the effect of more migrants on native unemployment in the same district.

Finally, we perform a Generalized Least Square correction to correct for heteroskedasticity arising from aggregation and to account for the relative importance of each LAD. For example, this accounts for larger numbers of migrants in London than in other regions of the country. Also, standard errors are corrected for serial correlation across and within regions. Given such stringent specification, we are confident that the remaining variation in the claimant count rate is due to changes in the flow of migrants from the A8 countries.

5.8 Results

Table 5.1 shows Ordinarily Least Square β estimates from Equation 1. Our starting point is an ad hoc base specification where all coefficients in Equation 1 are assumed to be zero, except β . This gives us the raw correlation between our measures of unemployment and migration. The -0.01 estimate in row one suggests that a one percentage point increase in the proportion of A8 migrants in the working age population decreases the native unemployment rate by 0.01 percentage points. As this is a raw correlation, the negative sign might be driven by omitted variables that simultaneously affect both variables, such as the fact that London is more attractive to migrants as well as to natives and, therefore, a larger inflow of migrants might simply reflect the better employment possibilities. This is confirmed by the positive sign of the 0.01 estimate in row two when we control for individual and time fixed effects. This estimate now suggests that a one percentage point increase in the proportion of A8 migrants in the working age population increases the native unemployment rate by 0.01 percentage points when we account for the effect of other macro shocks common to all LADs and for LAD specific growth trends on native unemployment. However, both these estimates are statistically insignificantly different from zero and, therefore, indicate that an increase in migration from the A8 countries has no measurable effect on native unemployment.

Rows three and four show that the estimates are smaller but still insignificantly different from zero when we add respectively one and three time periods dynamics. Similarly, the long run estimates suggest that even after three months of adjustment, native unemployment is not affected by migrants from the A8 countries. Our estimates were also robust to longer six months dynamics. Row five shows that the estimates change little when we correct for heteroskedasticity and serial correlation by using a Generalized Least Square estimation method.

We further control for the effect of wages on native unemployment in row six but the results remain unchanged. They also remain unchanged when we control for the proportion of workers in agriculture in row seven. Similarly, the results are unchanged when we control for other supply side shifters in row eight where finally all coefficients in Equation 1 are allowed to differ from zero. However, some of these results might be due to lack of enough variation in the data. We will re-address the issue of variation in our wages variable and supply shifters later in the paper when we are able to perform further estimations.

5.9 Instrumental variable estimation

Our uninstrumented β estimates discussed so far suggest that the increase in migration from the new EU Member States has had no effect on native unemployment in the UK. We now use Instrumental Variable estimation methods to test whether such a weak unemployment effect is underestimated. It might be that the underlying true effect is actually positive and significant, but endogeneity in the regressors are driving our estimates to be insignificant and downwardly biased. In particular, if A8 migrants are attracted to areas with low (or falling) unemployment, then our coefficient will be downwardly biased. This is the standard endogeneity problem in estimating the labour market impact of migration discussed in section 5.3. However, we do not expect this to be strong enough to severely bias our estimates here. Firstly, raw correlations in figure 5.3 are reassuring that endogeneity does not appear to be a major issue. Secondly, we have already controlled for macro shocks common to all LADs and to LAD specific growth trends, which if omitted would bias our results. Thirdly our independent variables, in particular our migration variable is not thought to be simultaneously correlated with the error term because new migrants from A8 countries do not have immediate access to social security payments such as Jobseeker's Allowance (our dependent variable) and thus we do not expect it to be simultaneously determined with it. Fourthly, the flow of migrants from A8 countries results from an exogenous policy change, not from changes in the UK labour market, at least in the first few months. Nonetheless, we account for potential endogeneity biasing our results in our re-estimations.

Table 5.1 Unemployment effect of an increase in the percentage of A8 migrants in the working age population

Models	Short run coefficient	Standard errors	Long run coefficient	Standard errors
(1) Raw coefficient	-0.01	0.02		
(2) Controlling for individual and time fixed effects	0.01	0.03		
(3) Allowing for dynamic adjustment (one time period)	0.00	0.03	0.00	0.03
(4) Allowing for dynamic adjustment (three time periods)	0.00	0.03	0.00	0.03
(5) Correcting for serial correlation and heteroskedasticity	0.01	0.03	0.01	0.03
(6) Controlling for average wages	0.01	0.03	0.01	0.03
(7) Controlling for the proportion of workers in agriculture	0.01	0.03	0.01	0.03

Continued

Table 5.1 Continued

Models	Short run coefficient	Standard errors	Long run coefficient	Standard errors
(8) Controlling for supply side shocks	0.01	0.03	0.01	0.03

(a) These are Generalized Least Square (GLS) estimates where the weights are the square root of the inverse of the population sample size.

(b) The dependent variable is the Claimant count rate and the independent variable of interest is the proportion of migrants from the A8 countries in the working age population.

(c) Time fixed effects are modelled with month dummies, individual fixed effects are modelled with local authority district dummies, and labour supply shifters are included as controls.

(d) The interpretation of the coefficient is that an increase of one percentage point in the proportion of migrants from the A8 countries in the working age population increases the Claimant count rate of UK natives by b percentage points.

We begin by using the first three lags of our migration variable, which is a typical instrument used in the literature (lagged unemployment is instrumented with two of its past lags). This instrument fulfils the two validity conditions for an instrument, i.e. relevance and non-endogeneity. Firstly, it is relevant because it is obviously correlated with the endogenous variable (our migration variable). Secondly, it is non-endogenous because it is predetermined in relation to the dependent variable (our unemployment variable). The estimates, shown in the top panel of Table 5.2, are larger but remain statistically insignificantly different from zero. The associated F test in the first step of the estimation suggests that the instruments are highly relevant, as shown in the top panel of Table 5.3. However, we report a low Shea R^2 , which suggests that after intercorrelations among the instruments are accounted for, the instruments have little explanatory power (Shea, 1997). This implies that lags of the migration variable are not valid instruments. Furthermore, the Hansen-Sargan test (Sargan, 1958; Hansen, 1982) indicates that the presence of serial correlation in the errors invalidates the instruments. Therefore our coefficients are not statistically consistent.

As a result, we need excluded instruments, uncorrelated with the error term and all its past history, in order to ensure that any bias in our estimates is properly corrected and that our estimates are statistically consistent. A typical instrument, suggested in the literature, is the proportion of migrants in the population. Although this variable is more exogenous than the proportion of (A8) migrants in the working age population, it might still be simultaneously determined with native unemployment, as some of the migrants in the population are able to claim benefits. As expected, preliminary results using this instrument and its lags indeed failed the validity tests. We, thus, use the proportion of migrants in the population who are 16 years of age or under. We argue that this instrument fulfils the two conditions for a valid instrument because it is correlated with the proportion of (A8) migrants in the working population (because of networking and clustering effects) but is not correlated with the number of claimants as those who are 16 or below are not eligible to claim JSA.

Table 5.2 Unemployment effect of an increase in the percentage of A8 migrants in the working age population (instrumented)

Models	Short run coefficient	Standard errors	Long run coefficient	Standard errors
IV: Lagged endogenous variables				
(1) Raw coefficient	0.00	0.02		
(2) Controlling for individual and time fixed effects	0.14	0.09		
(3) Allowing for dynamic adjustment (one time period)	0.14	0.09	0.17	0.11
(4) Allowing for dynamic adjustment (three time periods)	0.16	0.10	0.16	0.10
(5) Correcting for serial correlation and heteroskedasticity	0.16	0.11	0.16	0.11
(6) Controlling for average wages	0.16	0.11	0.16	0.11
(7) Controlling for the proportion of workers in agriculture	0.16	0.11	0.16	0.11
(8) Controlling for supply side shocks	0.16	0.11	0.16	0.11
(9) Controlling for further endogeneity from the lagged dependent variable	0.12	0.17	0.73	1.39
IV: Proportion of migrants in the population				
(1) Raw coefficient	0.03	0.05		
(2) Controlling for individual and time fixed effects	0.01	0.13		
(3) Allowing for dynamic adjustment (one time period)	0.03	0.13	0.03	0.15
(4) Allowing for dynamic adjustment (three time periods)	0.04	0.13	0.04	0.12
(5) Correcting for serial correlation and heteroskedasticity	0.04	0.14	0.04	0.14
(6) Controlling for average wages	0.04	0.14	0.04	0.14
(7) Controlling for the proportion of workers in agriculture	0.04	0.14	0.04	0.14
(8) Controlling for supply side shocks	0.04	0.14	0.04	0.14
				Continued

Table 5.2 Continued

Models	Short run coefficient	Standard errors	Long run coefficient	Standard errors
(9) Controlling for further endogeneity from the lagged dependent variable	0.02	0.20	0.22	2.06

(a) These are GLS estimates where the weights are the square root of the inverse of the population sample size.

(b) The dependent variable is the Claimant count rate and the independent variable of interest is the proportion of migrants from the A8 countries in the working age population.

(c) Time fixed effects are modelled with month dummies, individual fixed effects are modelled with local authority district dummies, and labour supply shifters are included as controls.

(d) The interpretation of the coefficient is that an increase of one percentage point in the proportion of migrants from the A8 countries in the working age population increases the Claimant count rate of UK natives by b percentage points.

(e) The instruments used in the top panel are the three first lags of the endogenous variable. The instruments used in the bottom panel are: the proportion of dependants of A8 countries migrants under 16 in the population from the WRS; the proportion of migrants from the A8 countries in the working age population increases the claimant Count rate of UK natives by b percentage points.

Table 5.3 Specification tests – for models in Table 5.2

Model	Hansen-Sargan test degrees of freedom (1)	Hausman test degrees of freedom (2)	F test degrees of freedom (3)	Cragg-Donald test degrees of freedom (4)	Shea R ² (5)			
IV: Lagged endogenous variables								
(1) Raw coefficient	57.82	14.30	1	582.85	3,6524	5647.39	1,6	0.72
(2) Controlling for individual and time fixed effects	15.44	3.33	1	257.99	3,6102	257.99	1,6	0.11
(3) Allowing for dynamic adjustment (one time period)	12.32	3.06	1	258.12	3,6101	258.12	1,6	0.11
(4) Allowing for dynamic adjustment (three time periods)	17.61	2.84	1	194.55	3,5692	194.55	1,6	0.09
(5) Correcting for serial correlation and heteroskedasticity	17.61	2.84	1	29.59	3,5692	194.55	1,6	0.09
(6) Controlling for average wages	17.61	2.84	1	29.59	3,5692	194.55	1,6	0.09
(7) Controlling for the proportion of workers in agriculture	17.61	2.84	1	29.59	3,5692	194.55	1,6	0.09
(8) Controlling for supply side shocks	17.61	2.84	1	29.59	3,5692	194.55	1,6	0.09
(9) Controlling for endogeneity from the lagged dependent variable	1.43	0.30	1	13.91	5,4877	40.76	2,7	0.08
			14.21	5,4878			0.04	
IV: Proportion of migrants in the population								
(1) Raw coefficient	21.99	8.82	1	95.24	6,5400	458.92	1,6	0.34
(2) Controlling for individual and time fixed effects	2.54	0.02	1	70.47	5,4992	70.47	1,6	0.07
(3) Allowing for dynamic adjustment (one time period)	2.57	0.02	1	70.37	5,4991	70.37	1,6	0.07
(4) Allowing for dynamic adjustment (three time periods)	2.92	0.15	1	70.75	5,4989	70.75	1,6	0.07
(5) Correcting for serial correlation and heteroskedasticity	2.92	0.15	1	16.52	5,4989	70.75	1,6	0.07
(6) Controlling for average wages	2.92	0.15	1	16.52	5,4990	70.75	1,6	0.07

Continued

Table 5.3 Continued

Model	Hansen-Sargan test degrees of freedom (1)	Hausman test degrees of freedom (2)	F test degrees of freedom (3)	Cragg-Donald test degrees of freedom (4)	Shea R ² (5)
(7) Controlling for the proportion of workers in agriculture	2.92	0.15	16.52	70.75	0.07
(8) Controlling for supply side shocks	2.92	0.15	16.52	70.75	0.07
(9) Controlling for endogeneity from the lagged dependent variable	1.18	0.69	14.69	10.31	0.07
			3.74	7,4705	0.01

(a) Each row shows specification tests for the associated models in Table 5.2.

(b) Columns 1 to 5 show respectively Hansen-Sargan test, Hausman test, F test in the first step of the estimation, Cragg-Donald test and the Shea R². F tests and Shea R² are shown for two endogenous variables in the last row of each panel. That is because the first lag of the dependent variable is here assumed endogenous in addition to the migration variable, which is assumed to be endogenous throughout the table.

Unfortunately, this variable is only available at the local authority district level in the Census and, therefore, does not vary over months. We, thus, interact this variable with a trend and a trend square (we also experimented with a logarithmic and exponential trend) to obtain an instrument that varies across districts and time (across months). We acknowledge that interacting with a trend is a restrictive assumption and future work should experiment with a more sophisticated population model. Furthermore, it can be argued that interactions 'fake' the correlation with the endogenous variable and 'create' a weak instrument, though we believe that this issue primarily concerns weak instruments, not interactions *per se* (Angrist *et al.*, 1999; Staiger and Stock, 1997). Nonetheless, to try to circumvent these criticisms we also define a similar instrument using WRS data which varies across districts and months. We define our new instrument as the proportion of A8 migrants' dependants who are 16 years of age or below in the working population. We use a similar argument to before, as this is correlated with the proportion of (A8) migrants in the working age population (because of networking and clustering effects and because the more migrants the more dependants) but is not correlated with the number of claimants as those who are 16 or below are not eligible to claim JSA.

We then use the two above variables and their first three lags as our instruments. The estimates, shown in the bottom panel of Table 5.2, are again a bit larger than their uninstrumented counterparts in Table 5.1 but remain statistically insignificantly different from zero. The associated F test in the first step of the estimation suggests that the instruments are highly relevant, as shown in the bottom panel of Table 5.3. However, once again the Shea R^2 is low, which indicates that after intercorrelations among the instruments are accounted for, the instruments have little explanatory power. This suggests that our instruments might be correcting little bias and that our estimates might still be downwardly biased. Unfortunately data limitations prevent us to define other instruments at the LAD and month level. Nonetheless the Hausman test (Hahn and Hausman, 2002) suggest that there was no endogeneity in the model in the first place and the Hansen-Sargan test does not fail the instruments. We will re-address the issue of instrument relevance later in the paper when we are able to perform further Instrumental Variable estimation.

5.10 Robustness checks

We investigate further our small and insignificant estimates by restricting our sample to LADs which, according to our earlier descriptive analysis, are either preferred destinations for migrants from the A8 countries or have higher concentrations of A8 migrants relative to the working age population. The motivation here is that our estimates so far are for the entire working age population, which might be diluting more adverse employment effects for particular LADs. We define five different sub-samples and re-estimate our model in turn for each of these sub-samples.

Firstly, the top panel of Table 5.4 shows estimates for London and Eastern regions only. These estimates are negative in the first four rows, suggesting that variables that simultaneously affect both variables might have been omitted, as discussed before. This is confirmed by the estimates in row five, where the serial correlation correction accounts for some of the persistent presence of omitted variables. However, all estimates for London and Eastern regions are statistically insignificantly different from zero and, thus, suggest that an increase in migration from A8 countries has no effect on native unemployment in those regions of the country either in the short or in the long run.

Secondly, we restrict further our sample to London only and the estimates are shown in the second panel of Table 5.4. The results do not differ much from before and our conclusion from above remains unchanged. The increase in migration from A8 countries in London has not increased the number of native unemployed.

Thirdly, we restrict our sample to local authority districts where five per cent or more of the working population is in the agriculture and fishing industries. As highlighted earlier in this section, we would ideally use a measure of net migration to estimate the impact on native unemployment. We do not have an accurate measure of net migration from the A8 countries, so we use a measure of gross inflows. If non-registration and outflows are not distributed randomly our estimates might be biased. It seems plausible that outflows are likely to be higher in agriculture given the seasonal nature of the work. By reproducing our analysis for agriculture only, we are able to address this issue to some degree.

The third panel of Table 5.4 once again shows estimates statistically insignificantly different from zero, suggesting that the increase in migrants from A8 countries in more agricultural regions of the country is not increasing the number of unemployed natives. However, these estimates might again be diluting more adverse unemployment effects for particular LADs as it includes districts which might not be a destination for migrants from the A8 countries, despite being agricultural districts. We, thus, restrict further our sample to districts where there was 30 or more A8 migrant arrivals in a given month. The fourth panel of Table 5.4 shows that our previous conclusion is once again unaltered as the estimates remain insignificantly different from zero. Thus, an increase in A8 countries' migrants does not adversely affect native unemployment even in the more agricultural regions where migrants are clustering. In both panels, negative estimates when including dynamics might suggest omitted seasonal factors affecting simultaneously the rate of unemployment of natives and the rate of arrival of migrants. In both cases, though, the negative sign vanishes away when serial correlation correction accounts for some of the persistent presence of omitted variables.

Finally, we restrict our sample to LADs where there were 20 or more Polish migrant arrivals in a given month. The bottom panel of Table 5.4 shows that even in the regions of the country where there is a strong clustering of Polish migrants, their arrival does not have an adverse effect on native unemployment. Thus, our main conclusion remains unchanged throughout the analysis. These estimates are in line

with recent evidence for the US, where no adverse effects on native unemployment have been documented.

Table 5.4 Unemployment effect of an increase in the percentage of A8 migrants in the working age population (robustness checks)

Models	Short run coefficient	Standard errors	Long run coefficient	standard errors
Subsample: London and Eastern region				
(1) Raw coefficient	-0.05	0.03		
(2) Controlling for individual and time fixed effects	-0.02	0.06		
(3) Allowing for dynamic adjustment (one time period)	-0.02	0.06	-0.02	0.07
(4) Allowing for dynamic adjustment (three time periods)	-0.01	0.07	-0.01	0.07
(5) Correcting for serial correlation and heteroskedasticity	0.06	0.06	0.05	0.05
(6) Controlling for average wages	0.06	0.06	0.05	0.05
(7) Controlling for the proportion of workers in agriculture	0.06	0.06	0.05	0.05
(8) Controlling for supply side shocks	0.06	0.06	0.05	0.05
Subsample: London				
(1) Raw coefficient	-0.13	0.06		
(2) Controlling for individual and time fixed effects	0.08	0.13		
(3) Allowing for dynamic adjustment (one time period)	0.03	0.15	0.03	0.15
(4) Allowing for dynamic adjustment (three time periods)	0.00	0.17	0.00	0.14
(5) Correcting for serial correlation and heteroskedasticity	0.12	0.17	0.10	0.13
(6) Controlling for average wages	0.12	0.17	0.10	0.13
(7) Controlling for the proportion of workers in agriculture	0.12	0.17	0.10	0.13
(8) Controlling for supply side shocks	0.12	0.17	0.10	0.13

Continued

Table 5.4 Continued

Models	Short run coefficient	Standard errors	Long run coefficient	standard errors
Subsample: LADs where five per cent or more of the working age population is in the agriculture and fishing industries				
(1) Raw coefficient	0.02	0.04		
(2) Controlling for individual and time fixed effects	0.00	0.05		
(3) Allowing for dynamic adjustment (one time period)	0.01	0.05	0.01	0.07
(4) Allowing for dynamic adjustment (three time periods)	-0.01	0.06	-0.01	0.06
(5) Correcting for serial correlation and heteroskedasticity	0.00	0.06	0.00	0.06
(6) Controlling for average wages	0.00	0.06	0.00	0.06
(7) Controlling for the proportion of workers in agriculture	0.00	0.06	0.00	0.06
(8) Controlling for supply side shocks	0.00	0.06	0.00	0.06
Subsample: LADs where there were 30 or more A8 migrants arriving in agriculture or fishing in a given month				
(1) Raw coefficient	0.13	0.04		
(2) Controlling for individual and time fixed effects	0.02	0.05		
(3) Allowing for dynamic adjustment (one time period)	-0.01	0.06	-0.01	0.06
(4) Allowing for dynamic adjustment (three time periods)	-0.01	0.06	0.00	0.05
(5) Correcting for serial correlation and heteroskedasticity	0.06	0.04	0.06	0.04
(6) Controlling for average wages	0.06	0.04	0.06	0.04
(7) Controlling for the proportion of workers in agriculture	0.06	0.04	0.06	0.04
(8) Controlling for supply side shocks	0.06	0.04	0.06	0.04
				Continued

Table 5.4 Continued

Models	Short run coefficient	Standard errors	Long run coefficient	standard errors
Subsample: LADs where there were 20 or more Polish migrants in a given month				
(1) Raw coefficient	-0.01	0.02		
(2) Controlling for individual and time fixed effects	0.00	0.04		
(3) Allowing for dynamic adjustment (one time period)	0.00	0.04	0.00	0.05
(4) Allowing for dynamic adjustment (three time periods)	0.00	0.04	0.00	0.04
(5) Correcting for serial correlation and heteroskedasticity	0.01	0.03	0.01	0.03
(6) Controlling for average wages	0.01	0.03	0.01	0.03
(7) Controlling for the proportion of workers in agriculture	0.01	0.03	0.01	0.03
(8) Controlling for supply side shocks	0.01	0.03	0.01	0.03

(a) These are GLS estimates where the weights are the square root of the inverse of the population sample size.

(b) The dependent variable is the Claimant count rate and the independent variable of interest is the proportion of migrants from the A8 countries in the working age population.

(c) Time fixed effects are modelled with month dummies, individual fixed effects are modelled with local authority district dummies, and labour supply shifters are included as controls.

(d) The interpretation of the coefficient is that an increase of one percentage point in the proportion of migrants from the A8 countries in the working age population increases the Claimant count rate of UK natives by b percentage points.

5.11 Aggregation at the government region and quarter level

Data limitations mean that for some of the above variables we do not have data varying over time and at the local authority district level. We address some of these limitations in two ways.

One example of limitations in our data is that our supply side variables do not vary over time within each LAD. As a result, they are dropped from our models due to perfect collinearity with the time dummies. The same also occurs with the agricultural labour demand measure and the average wage. Therefore, the estimates in Tables 5.1 to 5.4 really are simply the effect of an increase in the proportion of migrants from the A8 countries in the working age population on the claimant count rate controlling for local authority and monthly macro shocks, for lagged unemployment adjustments and for labour demand shocks. Consequently, not only do our

estimates not account for wage pressures and for supply side factors, but also they are not efficient. To check the sensitivity of our results to accounting for wages and supply shifters, we re-estimate Equation 1 using data at the Government Office Region (GOR) and quarter level. At this aggregation level we are able to obtain data on all our variables with variation across regions and over time. Table 5.5 shows that the results are qualitatively similar to those at the local authority and month level in Table 5.1. The estimates are now larger, in particular in the long run, though they remain statistically insignificantly different from zero. This is probably the case because GOR and quarter dummies do not control for as many regional and macro shocks as LAD and month dummies do. Despite that, our main conclusions remain unaltered.

Table 5.5 Unemployment effect of an increase in the percentage of A8 migrants in the working age population (Government Region level)

Models	Short run coefficient	Standard errors	Long run coefficient	standard errors
(1) Raw coefficient	-0.08	0.13		
(2) Controlling for individual and time fixed effects	-0.08	0.25		
(3) Allowing for dynamic adjustment (one time period)	0.02	0.14	0.17	0.98
(4) Correcting for serial correlation and heteroskedasticity	0.08	0.09	0.65	0.85
(5) Controlling for average wages	0.08	0.09	0.63	0.82
(6) Controlling for the proportion of workers in agriculture	0.08	0.10	0.60	0.86
(7) Controlling for supply side shocks	0.10	0.10	0.79	0.98

(a) These are GLS estimates where the weights are the square root of the inverse of the population sample size.

(b) The dependent variable is the Claimant count rate and the independent variable of interest is the proportion of migrants from the A8 countries in the working age population.

(c) Time fixed effects are modelled with quarter dummies, individual fixed effects are modelled with Government Region dummies, and labour supply shifters are included as controls.

(d) The interpretation of the coefficient is that an increase of one percentage point in the proportion of migrants from the A8 countries in the working population increases the Claimant count rate of UK natives by b percentage points.

The new level of aggregation also enabled us to collect data on our instruments with genuine variation across regions and time and we are now more confident of our results. We once again begin by using the first two lags of our migration variable, which is a typical instrument used in the literature as discussed above. The estimates, shown in the top panel of Table 5.6, are marginally larger than those in Table 5.5 and remain statistically insignificantly different from zero. The associated F test in the first step of the estimation suggests that the instruments are highly relevant, as shown in

the top panel of Table 5.7. Unlike in the previous results, this is now confirmed by the high Shea R^2 , which suggests that even after intercorrelations among the instruments are accounted for, the instruments still have a high explanatory power. This implies that lags of the migration variable might now be a valid instrument. Nonetheless, although relevant, the instruments appear to be, as before, endogenous, as indicated by the Hansen-Sargan test. This is again probably due to the presence of serial correlation contaminating the instruments which would otherwise be non-endogenous.

As a result, we again need excluded instruments, uncorrelated with the error term and all its past history. We are now able to obtain data for both our instruments defined earlier with variation across regions and time. The estimates, shown in the bottom panel of Table 5.6, are again a bit larger than their uninstrumented counterparts in Table 5.5 but remain statistically insignificantly different from zero. The associated F test in the first step of the estimation suggests that the instruments are highly relevant, as shown in the bottom panel of Table 5.7 and the Shea R^2 now confirms that even after intercorrelations among the instruments are accounted for, the instruments still have a high explanatory power. This suggests that our instruments are now more powerful in correcting potential bias. This is confirmed by the Cragg-Donald test (Cragg and Donald, 1993; Stock *et al.*, 2002; Stock and Yogo, 2005), which indicates that the maximum bias we would be accepting is ten per cent in most of the models. This is relatively small in the context here, as even a bias as large as 50 per cent still leaves us within the confidence interval and is not sufficient to render the estimate significant. Furthermore, the Hansen-Sargan test confirms the validity of the instruments. Finally, the Hausman test indicates that there is no evidence of endogeneity between our migration and unemployment variable in the first place. Thus, these results suggest that the weak relationship between the two is not driven by endogeneity.

Table 5.6 Unemployment effect of an increase in the percentage of A8 migrants in the working age population (Government Office Region level and instrumented)

Models	Short run coefficient	Standard errors	Long run coefficient	standard errors
IV: Lagged endogenous variables				
(1) Raw coefficient	-0.11	0.11		
(2) Controlling for individual and time fixed effects	0.09	0.23		
(3) Allowing for dynamic adjustment (one time period)	0.08	0.13	0.56	0.96
(4) Correcting for serial correlation and heteroskedasticity	0.08	0.11	0.56	0.84
				Continued

Table 5.6 Continued

Models	Short run coefficient	Standard errors	Long run coefficient	standard errors
(5) Controlling for average wages	0.08	0.11	0.61	0.89
(6) Controlling for the proportion of workers in agriculture	0.08	0.12	0.58	0.93
(7) Controlling for supply side shocks	0.10	0.14	0.69	1.10
(8) Controlling for further endogeneity from the lagged dependent variable	0.08	0.14	0.15	0.26
IV: Proportion of migrants in the population				
(1) Raw coefficient	0.01	0.13		
(2) Controlling for individual and time fixed effects	0.24	0.35		
(3) Allowing for dynamic adjustment (one time period)	0.13	0.19	0.93	1.48
(4) Correcting for serial correlation and heteroskedasticity	0.13	0.15	0.93	1.13
(5) Controlling for average wages	0.10	0.13	0.76	1.01
(6) Controlling for the proportion of workers in agriculture	0.09	0.13	0.63	1.01
(7) Controlling for supply side shocks	0.13	0.19	0.94	1.49
(8) Controlling for further endogeneity from the lagged dependent variable	0.13	0.23	0.27	0.48

(a) These are GLS estimates where the weights are the square root of the inverse of the population sample size.

(b) The dependent variable is the Claimant count rate and the independent variable of interest is the proportion of migrants from the A8 countries in the working age population.

(c) Time fixed effects are modelled with month dummies, individual fixed effects are modelled with local authority district dummies, and labour supply shifters are included as controls.

(d) The interpretation of the coefficient is that an increase of one percentage point in the proportion of migrants from the A8 countries in the working population increases the Claimant count rate of UK natives by b percentage points.

(e) The instruments used in the top panel are the two first lags of the endogenous variable. The instruments used in the bottom panel are: the proportion of dependants of A8 countries migrants under 16 in the population from the WRS.

Table 5.7 Specification tests – for models in Table 5.6

Model	Hansen-Sargan test degrees of freedom (1)	Hausman test degrees of freedom (2)	F test degrees of freedom (3)	Cragg-Donald test degrees of freedom (4)	Shea R ² (5)
IIV: Lagged endogenous variables					
(1) Raw coefficient	27.52	1.94	998.50	1521.37	0.97
(2) Controlling for individual and time fixed effects	5.50	4.76	250.77	250.77	0.89
(3) Allowing for dynamic adjustment (one time period)	5.74	1.62	258.76	258.76	0.89
(4) Correcting for serial correlation and heteroskedasticity	5.74	1.62	231.86	258.76	0.89
(5) Controlling for average wages	5.94	1.97	153.34	173.91	0.89
(6) Controlling for the proportion of workers in agriculture	6.01	1.87	192.85	236.60	0.89
(7) Controlling for supply side shocks	6.34	1.79	143.45	204.06	0.88
(8) Controlling for endogeneity from the lagged dependent variable	7.69	1.17	116.69	6.24	0.88
		5.92	3.58	0.25	
IV: Proportion of migrants in the population					
(1) Raw coefficient	16.25	4.48	67.64	65.82	0.84
(2) Controlling for individual and time fixed effects	12.69	5.31	6.52	6.52	0.39
(3) Allowing for dynamic adjustment (one time period)	9.88	1.47	6.60	6.60	0.40
(4) Correcting for serial correlation and heteroskedasticity	9.88	1.47	4.83	6.60	0.40
(5) Controlling for average wages	10.06	1.50	8.40	8.12	0.46
(6) Controlling for the proportion of workers in agriculture	10.18	1.50	8.20	7.69	0.45
(7) Controlling for supply side shocks	9.86	2.53	4.39	5.79	0.39
(8) Controlling for endogeneity from the lagged dependent variable	9.77	1.05	3.79	3.90	0.39
			4.12	7.54	0.41

(a) Each row shows specification tests for the associated models in Table 5.1.

(b) Columns 1 to 5 show respectively Hansen-Sargan test, Hausman test, F test in the first step of the estimation, Cragg-Donald test and the Shea R². F tests and Shea R² are shown for two endogenous variables in the last row of each panel. That is because the first lag of the dependent variable is here assumed endogenous in addition to the migration variable, which is assumed to be endogenous throughout the table.

In the final row of Table 5.6 we allow for endogeneity arising from the first lag of the dependent variable in addition to endogeneity arising from the simultaneous determination of our migration and unemployment variables as assumed throughout. That did not change the results qualitatively and our main conclusion from before remains unchanged: an increase in the proportion of migrants from the A8 countries in the working age population does not adversely affect native unemployment either in the short or in the long run.

Another example of limitations in our data is that the working age population data does not vary over time within each local authority district, which implies that the denominator of our claimant count rate and migration measures are constant. The ratio still varies over time because the numerator varies every month. While assuming that the working age population does not change much from month to month is not a severe drawback, it is nonetheless an unrealistic assumption. Furthermore, the working age population data we have does not include the new workers from the A8 countries. We re-estimated Equation (1) redefining u_{it} as the number of unemployed people in receipt of JSA and redefining m_{it} as the number of registered A8 migrants. The interpretation of our coefficient of interest in the new estimations is that the arrival of one extra A8 country migrant increases the number of UK JSA claimants by β people. The new estimates – which are not included here for the sake of conciseness are available on request – were qualitatively robust and the policy implications deriving from this robustness check were not altered. This robustness check further circumvents problems caused by the potential endogeneity of our migration measure as first defined. That is because in our initial definition, the denominator of the migration measure is a function of the number of JSA claimants, which is also our dependent variable. Though we do not regard this as a very severe source of endogeneity, robust results are reassuring that indeed this source of endogeneity is not contaminating our previous results.

In sum, the coefficient of our A8 migration variable is small and insignificant across all specifications. This result is robust to a number of specification checks and estimation methods as well as to various different groups of workers. These results are in line with our earlier descriptive analysis and suggest that under no specification do the coefficient estimates suggest that A8 migration has been a contributor to the rise in claimant unemployment observed since January 2005. The initial small, but statistically significant effect found in Portes and French (2005) does not seem to be robust to a more complete and demanding specification. Therefore, the recent rises in claimant unemployment (since January 2005) do not seem to be caused by an inflow of migrants from the new EU Member States.

6 Conclusion

The evidence presented in this paper supports the view put forward in Portes and French (2005) that overall, the economic impact of migration from the new EU Member States has been modest, but broadly positive, reflecting the flexibility and speed of adjustment of the UK labour market. Despite anecdotal evidence, there is no discernible statistical evidence which supports the view that the inflow of A8 migrants is contributing to a rise in claimant unemployment in the UK.

Appendix A

Data

Data sources used in this paper include:

WRS data

All A8 nationals taking up employment of more than one month with a UK employer are required to register on the WRS. One important caveat associated with the WRS data is that it measures gross flows only – there is no requirement to de-register if a worker leaves the country – so the total number of registrations should not be used as an indication of the current stock of A8 migrants in the UK. The WRS has provided us with a new and large administrative data source on migrant workers coming to the UK since accession.

The data used in the impact assessment covers the period 1 May 2004 to 30 November 2005 a period during which there were 370,000 processed applications by A8 nationals.

Claimant Count data

The claimant count is a by-product of administrative records of people claiming benefits. Each claimant gives their National Insurance number, address, sex, date of birth and marital status to the Jobcentre Plus local office. Details are also collected on the start and end dates of each claim and on the reason for ceasing a claim. These details provide data on the number of claimants for one particular day (the second Thursday) each month (the stock) as well as the numbers joining and leaving the count each month (the flows).

Labour Force Survey

The LFS interviews over 60,000 households every quarter and is the largest regular household survey in the UK. The survey collects information about the personal circumstances and work of everyone who lives in these households.

There are a number of important caveats when using the LFS to analyse migrants:

- the LFS refreshes just one-fifth of its sample each quarter as all respondents are interviewed for five successive quarters. As a result, it can be expected that a time lag will be present in picking up a representative sample of the population;
- the LFS is likely to undercount migrants living in communal establishments and with irregular housing arrangements;
- if a migrant has been in the country for less than six months, then they will not be asked to participate in the LFS. As a result, the LFS will not reflect those migrants who have recently moved to the UK;
- in our analysis we define migrants as those people who are born outside the UK, this may not match the internationally agreed definition of a migrant (that is a person who changes his usual country of residence for at least a year).

Average Earnings Index

The Office for National Statistics calculates the AEI, based on a sample survey of 8,400 employers for the whole economy, public sector, private sector, manufacturing industries, service industries, production industries and private sector service industries, and also for 20 industry groupings.

Workforce jobs

The number of jobs is measured by workforce jobs and is the sum of employee jobs (as measured by surveys of employers), self-employment from the LFS, those in HM Forces, and government-supported trainees. Vacant jobs are not included.

Appendix B

Technical annex

There are two main reasons for bias in our estimates, which means that our estimates may be either under or overestimates of the true unknown underlying value:

Measurement error in our migration variable. The recorded number of migrants in the WRS might be:

- a) an overestimate of the true number of migrants (as the WRS measures gross inflow only, and it does not measure outflow, i.e. migrants are not asked to de-register);
- b) an underestimate of the true number of migrants (as some migrants will not have registered with the WRS either because they were here before May 2004 and failed to register or because they came after and failed to register).

Endogeneity in our migration variable. This could be due to three main reasons:

- a) simultaneous determination of the number of migrants and the number of unemployed natives in the labour market, for example, migrants will be primarily looking at the labour market performance when making a decision on whether or not to migrate;
- b) a common omitted variable that might be driving both the number of migrants and the number of unemployed natives, for example, London might have a higher proportion of migrants and a lower rate of unemployed but one is not causing the other;
- c) the measurement error in our migration variable.

Measurement error

Writing a simplified version of the model, we have:

$$y = \beta x^* + u^* \quad (1)$$

where y is the number of unemployed, x^* is the true number of migrants, and u^* is the error term. We will never be able to estimate β because we cannot observe x^* . Instead, we observe x , which is the observed number of migrants (which might be an under or a over estimate of x^*), and that we define as $x = x^* + \varepsilon$, where ε is the measurement error in our migration variable x . Thus, what we estimate is:

$$y = bx + u \quad (2)$$

which we can also write as

$$\begin{aligned} y &= b(x - \varepsilon) + v \\ y &= bx + [b\varepsilon + v] \end{aligned} \quad (3)$$

Thus, the $\text{cov}(x, u) = \text{cov}[(x^* + \varepsilon)(-b\varepsilon + v)]$ is no longer zero even if we assume that $\text{cov}(x^*, v) = 0$ (no simultaneity determination bias) and $\text{cov}(\varepsilon, v) = 0$ (the measurement error in the migration variable is not systematically correlated with unemployment).¹

Endogeneity

Once again we use Equations (1) and (2) above.

Now we assume that the error term u includes an omitted variable which is correlated with the migration variable, for example a variable that attracts both migrants and natives to the same area (say some specific characteristics of London that makes it more appealing to both migrants and natives), $u = w - b\varepsilon + v$, we then have:

$$y = b(x - \varepsilon) + v + w \quad (4)$$

$$y = bx + (w - b\varepsilon + v) \quad (4a)$$

¹ If we further assume that $\text{cov}(x^*, -b\varepsilon) = 0$ and write $\text{cov}(\varepsilon, -b\varepsilon) = b\sigma_\varepsilon^2$, then it can

be shown that $\text{plim} b = \beta \left[\frac{1}{1 + \sigma_\varepsilon^2 / \sigma_{x^*}^2} \right]$, which implies that the b is biased towards zero.

To assess the potential sources of bias in our estimates, we need to analyse the signs and magnitudes of

$$\begin{aligned} \text{cov}(x,u) &= \text{cov}[(x^* + \varepsilon)(w - b\varepsilon + v)] \\ &= \text{cov}(x^*,w) + \text{cov}(x^*, -b\varepsilon) + \text{cov}(x^*,v) + \text{cov}(\varepsilon,w) + \text{cov}(\varepsilon, -b\varepsilon) + \text{cov}(\varepsilon,v) \end{aligned}$$

We analyse each of these four components in turn:

- 1) If a variable that drives both the number of migrants and the number of natives to the labour market is omitted, as described above, then $\text{cov}(x^*,w) \neq 0$. We argue that there is three main reasons why this should not be a severe source of endogeneity biasing our estimates (i.e. $\text{cov}(x^*,w)$ is small or zero):
 - a) We control for as many variables as we can, to avoid omitting relevant variables. We include the following variables in our model: agriculture labour demand measure, lagged unemployment as a labour demand measure, and labour supply shifters;
 - b) We control for permanent differences across regions by taking first differences;
 - c) We control for specific growth rate trends across regions by including region specific dummies.

This results in a demanding specification where all regions are made equally attractive. In other words, we remove any region specific factors that make a particular region more appealing for either migrants or natives. Table 5.1 shows that most of this source of endogeneity is thus removed. Further endogeneity is removed when controlling for lagged unemployment.

- 2) If we assume that measurement error is a function of the migration variable, then $\text{cov}(x^*, -b\varepsilon) \neq 0$. We might believe that the measurement error depends on the number of migrants, i.e. $\varepsilon = g(x^*)$, because of two reasons:
 - a) The larger the number of registered migrants (inflow), the larger [or smaller] the number of unregistered migrants, and therefore,

$$\frac{\partial \varepsilon}{\partial x^*} > 0 \left[\text{or } \frac{\partial \varepsilon}{\partial x^*} < 0 \right];$$

- b) The larger the inflow the larger [or smaller] the outflow, and therefore,

$$\frac{\partial \varepsilon}{\partial x^*} > 0 \left[\text{or } \frac{\partial \varepsilon}{\partial x^*} < 0 \right];$$

Here, b can only be corrected if c , d and $\frac{\partial \varepsilon}{\partial x^*}$ are known. We would then ideally need a model for $\varepsilon = g(x^*)$. For example, the measurement error might vary over time: Outflow might become weaker over time, perhaps those who come later will find established clusters and networks of the same nationalities? Outflow might vary

across regions depending on which regions and nationalities have the most established clusters and networks? By the same token, under-registration might be weaker/stronger over time and across regions.

- 3) If the number of migrants and the number of unemployed are simultaneously determined, then $\text{cov}(x^*, v) \neq 0$. We argue that there is two main reasons why this should not be a severe source of endogeneity biasing our estimates (i.e. $\text{cov}(x^*, v)$ is small or zero):
 - a) The accession of the A8 countries was an exogenous policy change, and not the result of changes in the UK labour market that would have induced a new wave of migration;
 - b) Our migration variable is not thought to be simultaneously determined with unemployment because A8 countries migrants do not have immediate access to social security payments such as Jobseeker's Allowance (our dependent variable) and thus we do not expect it to be simultaneously determined with it.
- 4) If the measurement error in our migration variable is correlated with an omitted variable, then $\text{cov}(\varepsilon, w) \neq 0$. We hope to have accounted for this in our points 1) and 3) above.
- 5) If we have the standard measurement error problem, then $\text{cov}(\varepsilon, -b\varepsilon) \neq 0$, which is the case analysed above.
- 6) If the measurement error in our migration variable is correlated with unemployment, then $\text{cov}(\varepsilon, v) \neq 0$. For example in a boom, when unemployment is lower, there might also be less outflow and less/more under-registration. We argue that there is three main reasons why this should not be a severe source of endogeneity biasing our estimates (i.e. $\text{cov}(\varepsilon, w)$ is small or zero):
 - a) We control for as many variables as we can, to avoid omitting relevant variables. We include the following variables in our model: agriculture labour demand measure, lagged unemployment as a labour demand measure, and labour supply shifters;
 - b) We control for common macro shocks across regions that might be driving unemployment;
 - c) We correct for serial correlation, to account for persistency in the errors.

Though we argue that each component should not severely bias our estimates, we nonetheless accounted for potential endogeneity biasing our results in our IV estimations. (See Tables 5.2 and 5.6).

Measurement error

Functional form

Ideally we would like to estimate Equation (1) and obtain $\frac{\partial y}{\partial x^*} = \beta$ (which is the marginal effect of one extra migrant on the number of unemployed). However, we can only estimate Equation (2) from which we obtain $\frac{\partial y}{\partial x} = b$. The relationship between b and β can be obtained by expanding Equation 2:

$$y = bx[f(x^*(x) + \varepsilon(x))] + u \quad (2a)$$

Thus, $\frac{\partial y}{\partial x^*} = \frac{\partial y}{\partial x} \frac{\partial x}{\partial x^*}$, which we can re-write as $\beta = b \frac{\partial x}{\partial x^*}$, which shows that our b estimate has to be corrected by a factor of $\frac{\partial x}{\partial x^*}$.

Thus, the final correction factor depends on the relationship between x and x^* .

Assuming the general form of $x = cx^* + d\varepsilon(g(x^*))$, then $\frac{\partial x}{\partial x^*} = c + d \frac{\partial \varepsilon}{\partial x^*}$, and the correction factor then depends on the direction and magnitudes of c and d , as well as whether the measurement error is a function of the true number of migrants, i.e.

whether $\frac{\partial \varepsilon}{\partial x^*}$ is non-zero:

- i. We might believe that the measurement error does not depend on the number of migrants, and then $\frac{\partial \varepsilon}{\partial x^*} = 0$ and $\frac{\partial x}{\partial x^*} = c$, and $\beta = bc$, which is just a scaling of b . That does not affect our tests and b can be corrected if c is known.
- ii. We might believe that the measurement error depends on the number of migrants, i.e. $\varepsilon = g(x^*)$, because of two reasons:
 - a. The larger the number of registered migrants (inflow), the larger [or smaller] the number of unregistered migrants, and therefore, $\frac{\partial \varepsilon}{\partial x^*} > 0$ [or $\frac{\partial \varepsilon}{\partial x^*} < 0$];
 - b. The larger the inflow the larger [or smaller] the outflow, and therefore, $\frac{\partial \varepsilon}{\partial x^*} > 0$ [or $\frac{\partial \varepsilon}{\partial x^*} < 0$];

Here, b can only be corrected if c , d and $\frac{\partial \varepsilon}{\partial x^*}$ are known. We would then ideally need a model for $\varepsilon = g(x^*)$. For example, the measurement error might vary over time: Outflow might become weaker over time, perhaps those who come later will find established clusters and networks of the same nationalities? Outflow might vary across regions depending on which regions and nationalities have the most established clusters and networks? By the same token, under-registration might be weaker/stronger over time and across regions.

- iii. We might believe that the measurement error depends on unemployment conditions, i.e. $\varepsilon = j(u)$, because measurement error would be related to whether we have a recession or a boom. For example, during a boom, the outflow might be smaller and the number of unregistered workers might be larger. (See above assumption of $\text{cov}(\varepsilon, v) \neq 0$).

Thus, if we focus on the simple case (i) above, where $x = cx^*$ and then $\frac{\partial x}{\partial x^*} = c$, we can argue the following:

- 1) That $c \cong 1$, which would be the case if the two measurement error sources offset each other. We have no reason to believe that the outflow is bigger than under-registration or vice-versa.
- 2) However, some might argue this is a strong assumption, and that it is more likely that:
 - a) either outflow is larger than under-registration, i.e. $c < 1$.
 - b) or that under-registration is larger than outflow, i.e. $c > 1$

In order to proceed, here we either have to have an informed guess of c , which might come from comparing the WRS with the LFS, and/or we can hypothesize relatively large upper and lower bounds that are likely to bracket the true estimate: $b_L < \beta < b_U$.

- c) The informed guess we use in the paper is that the LFS suggests that net migration is smaller than the number of registrations, i.e. $c < 1$ and our b underestimates β , but we don't know by how much.
- d) Assume the following relatively extreme case scenarios:
 - i. If we assume that $x = 2x^*$, i.e. that we observe twice as many migrants as in fact there is in the labour market (in other words, that the outflow rate is half of the inflow rate, or that for each two migrants entering the country one is leaving), then $b = \frac{\beta}{2}$. Here we can interpret this as follows: if the true effect is $\beta = 0.026$ for $x^* = 150.000$ migrants, then when we attribute that same effect to $x = 300.000$ migrants, we find that each migrant now contributes with half, $b = 0.13$. It is as if the migration effect on unemployment – which never changes and is always $\beta = 0.026$ – had been diluted among more migrants.

- ii. If we assume that $x = \frac{x^*}{2}$, i.e. that we observe half as many migrants as in fact there is in the labour market (in other words, that the number of unregistered migrants is twice the number of registered migrants, or that only half of those who enter the country register), then $b = 2\beta$.² Here we can interpret this as follows: if the true effect is $\beta = 0.065$ for $x^* = 300.000$ migrants, then when we attribute that same effect to $x = 150.000$ migrants, we find that each migrant now contributes with double, $b = 0.13$. It is as if the migration effect on unemployment – which never changes and is always $\beta = 0.026$ – had been concentrated among less migrants. For example, it is like if 10Kg of rice had been lifted by 20 men, and then by 10 men.³

Applying this to our largest estimates, 0.13 (Table 5.6 Panel 2 Row 8), we would have $b_L < \beta < b_U$ is $0.06 < 0.13 < 0.20$, which is still a very small effect. As the error terms would be corrected by the same amount, then we effectively have an interval of ‘zeros’ bracketing a true ‘zero’.

² In both cases, if we had a model in logs, the scaling would not matter at all. For example, $\log x = \log 2 + \log x^*$ and $\frac{\partial \log x}{\partial \log x^*} = 1$.

³ Another way to see this is that the total effect does not change. On a deterministic model: $y = \beta x^*$ just as $y = 2\beta \frac{1}{2} x^*$, then re-define $y = bx$.

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