

The Effects of Eastern European Migration in Wales

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The enlargement of the European Union in May 2004 triggered a rapid, concentrated and relatively large migration inflow into Wales. As this inflow was concentrated into narrow areas and occupations, it can be seen as a natural experiment that arguably corresponds closely to an exogenous supply shock. We exploited this natural experiment to separately identify the effect of the migration shock from the effect of other supply and demand shocks on unemployment and wages. We found little evidence that the inflow of accession migrants contributed to a fall in wages or a rise in claimant unemployment in Wales between 2004 and 2006. In particular, we found no evidence of an adverse impact on young, female or low-skilled claimant unemployment and no evidence of an adverse impact on the wages of the low-paid. If anything, we found a positive effect on the wages of higher paid workers and some weak evidence of a potentially favourable impact on claimant unemployment.

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Executive Summary

- The enlargement of the EU in May 2004 triggered a rapid, concentrated and relatively large migration inflow into Wales.
- Around 16,000 [25,000] accession migrants joined the Welsh labour market between May 2004 and May 2006 [May 2004 and December 2008], according to the Worker Registration Scheme (WRS) [UK Border Agency]. This migration inflow was equivalent to roughly 1% of the Welsh working age population and to roughly a third of the Jobseeker's Allowance (JSA) claimant unemployment by May 2006.
- Accession migrants were overwhelmingly concentrated in low pay low-skilled jobs in elementary occupations (36%) and machine operative occupations (49%) in the manufacturing (48%) and catering sectors (23%) in Wales. They concentrated mainly in cities bordering England – which have been historically more associated with migration – such as Newport, Cardiff, Wrexham and Flintshire. They also went to Carmarthenshire, which is in West Wales and is predominantly rural.
- Given the size of the migration shock in Wales, adverse effects on wages, employment and unemployment were expected. Prior to the EU enlargement, the Welsh labour market, and more generally also the UK labour market, were performing well. The overall UK employment rate in May 2004 was relatively high at 74.7%, while UK claimant unemployment was relatively low at 2.7%. However, in early 2006 the labour market weakened and claimant unemployment increased both in the UK and in Wales, which coincided with substantial Eastern European migration. Nonetheless, despite the continuing migration inflow, the labour market began to recover in late 2006 in the UK and in Wales and stayed strong until late 2007, when the current financial crisis started.
- Claimant unemployment in Wales rose by roughly 5,000 (or 12%) between May 2004 and May 2006; and by roughly 40,000 between May 2004 and December 2008. Average wages increased by 4%, whereas the wages of the low-paid (at the 5th and 10th percentiles of the wage distribution) increased by 4.6% and 3.9%, and the wages of higher paid workers (at the 70th percentile), by 3.1% between May 2004 and May 2006 in Wales.

- We found little evidence that the inflow of accession migrants contributed to a fall in wages or a rise in claimant unemployment in Wales between 2004 and 2006. In particular, we found no evidence of an adverse impact on young, female or low-skilled claimant unemployment and no evidence of an adverse impact on the wages of the low-paid. If anything, we found a positive effect on the wages of higher paid workers and some weak evidence of a potentially favourable impact on claimant unemployment.
- Our unemployment effect estimates were small and in the main insignificant. These estimates were reassuringly robust to a number of specification checks and estimation methods as well as to several different stratifications of the labour market and to different sub-samples of workers.
- Our wage effect estimates were positive, small and insignificant at the very bottom of the wage distribution, and were larger higher up, though still insignificant below the median. Estimates for higher paid workers were significant. An increase of one percentage point in the migration rate raises wages of workers in the 60th (70th) percentile of the wage distribution by 3.9% (5.2%), while it raises average wages by 3.4%.
- These results are in line with standard theory, which predicts adverse wages and/or employment effects following a migration inflow that is unbalanced across area or skill. As the accession migration inflow was large, rapid and not balanced across districts or occupations, we expected downward pressure on wages and employment in low-paid low-skilled jobs in occupations and cities where migrants concentrated. In particular, we expected the wage structure to be affected: competing (complement) workers should have lower (higher) wage increases.
- We found evidence that higher paid (complement) workers had larger positive and significant wage increases, whereas lower paid (competing) workers had smaller and insignificant wage increases. One interpretation here is that, relative to higher paid workers, lower paid workers had less favourable (though not adverse) wage increases. Incidentally, more adverse wage effects for lower paid (competing) workers may have been potentially mitigated or offset because they were protected by a concurrently increasing minimum wage.

1. Introduction

The enlargement of the European Union (EU) in May 2004 – which granted workers from ten accession countries free movement within the union (Sriskandarajah 2004; Doyle et al. 2006) – triggered a rapid, concentrated and relatively large migration inflow into Wales. As Wales has historically experienced both net outmigration of younger people and inflow of older people, inflows of younger workers has been seen as one solution to problems caused by an ageing workforce (Drinkwater and Blackaby 2004). Thus, the analysis of the effects of the recent accession migration inflow on the Welsh labour market provides a particularly interesting case study.

Around 16,000 [25,000] accession migrants joined the Welsh labour market between May 2004 and May 2006 [May 2004 and December 2008], according to the Worker Registration Scheme (WRS) [UK Border Agency]. This migration inflow was equivalent to roughly 1% of the Welsh working age population and to roughly a third of the Jobseeker's Allowance (JSA) claimant unemployment by May 2006. As a result, adverse effects on wages, employment and unemployment were expected. Indeed, claimant unemployment rose by roughly 5,000 (or 12%) between May 2004 and May 2006. Average wages increased by 4%, whereas the wages of the low-paid (at the 5th and 10th percentiles of the wage distribution) increased by 4.6% and 3.9%, and the wages of higher paid workers (at the 70th percentile), by 3.1% during the same period.

Therefore, the main contribution of this paper is to investigate whether this claimant unemployment rise and wage increase were due to the accession migration shock or to other supply and demand shocks simultaneously affecting claimant unemployment and wages. As the accession migration inflow was concentrated into narrow areas and occupations within Wales, it can be seen as a natural experiment that arguably corresponds closely to an exogenous supply shock (Card 2007; Dustman and Glitz 2005). We exploit this variation in the distribution of accession migrants across areas and occupations to identify our estimates.

More specifically, we estimate the effect of the accession migration inflow on the claimant unemployment and on the distribution of wages using micro level monthly WRS and JSA data, as well as data from the Annual Survey on Hours and Earnings (ASHE) between 2004 and 2006. This new and large source of data on

migration (WRS) combined with data on claimant unemployment (JSA) permits disaggregation at fine (district and month) levels and offers invaluable insights into the Welsh labour market. Given that paucity of suitable data is one of the main reasons for scarce evidence on the migration literature for UK, this paper is a timely contribution.

That is, this paper helps to fill a gap on the migration literature for Wales and the UK, which really is very limited – specially so on the effects of the recent EU enlargement (Dustmann et al. 2005 and 2007; Drinkwater et al. 2006; Manacorda et al. 2006). Furthermore, this paper helps to inform policymaking on the face of further EU enlargement. It is especially opportune, given the current heated public debate on migration – and in particular on migration from current and future accession countries.

We found little evidence that the inflow of accession migrants contributed to a fall in wages or a rise in claimant unemployment in Wales between 2004 and 2006. In particular, we found no evidence of an adverse impact on young, female or low-skilled claimant unemployment and no evidence of an adverse impact on the wages of the low-paid. If anything, we found a positive effect on the wages of higher paid workers and some weak evidence of a potentially favourable impact on claimant unemployment. Our results are robust to a number of specification checks and are in line with other results in the literature.²

They are also in line with standard theory, which predicts adverse wages and/or employment effects following a migration inflow that is unbalanced across areas or skills. We found evidence that higher paid (complement) workers had larger, positive and significant wage increases, whereas lower paid (competing) workers had smaller and insignificant wage increases. One interpretation here is that, relative to higher paid workers, lower paid workers had less favourable (though not adverse) wage increases. Incidentally, more adverse wage effects for lower paid (competing) workers may have been potentially mitigated or offset because they were protected by a concurrently increasing minimum wage.

² Our results are in line with evidence in the international (mainly US) literature of little or no effect on employment and wages (Chiswick 1978; Grossman 1982; Card 1990, 2001, 2005 and 2007; LaLonde and Topel 1991; Altonji and Card 1991; Pischke and Velling 1997; Friedberg 2001; Dustmann et al. 2005 and 2007; Manacorda et al. 2006; Carrasco et al. 2008; Lemos and Portes 2008), though in contrast with other evidence of more adverse effects (Borjas 1999, 2003 and 2006; Angrist and Kugler 2003; Orrenius and Zavodny 2007). As we discuss in Sections 3 and 4, the disagreement in the literature is underlined by an ongoing debate on identification issues arising from natives' mobility and migrants' self-selection.

The remainder of this paper is organised as follows. In Section 2 we describe our data. In Section 3 we carefully discuss our empirical approach and several associated identification issues. In Section 4 we specify our empirical model. In Section 5 we discuss our results in light of the existing literature and perform a number of robustness checks. In Section 6 we summarise and conclude.

2. Data

2.1 Sources

The migration data we use is from the WRS, the unemployment data is from the JSA, and the wages data is from the ASHE. We discuss each in turn.

In order to work in the UK for a month or longer, accession nationals are obliged to register on the Home Office administered Worker Registration Scheme (WRS). Registration, in addition to being a legal requirement for accession migrants, offers incentives such as certain social security benefits (Home Office 2004). As a result, compliance is high (Blanchflower et al. 2007). Between May 2004 and May 2006 [May 2004 and December 2008], around 560,000 [870,000] migrants registered, according to the WRS [UK Border Agency]. In Wales, these figures were respectively 16,000 and 25,000. The left panel of Figure 1 shows the quarterly inflow between May 2004 and December 2008 according to the UK Border Agency.³ The trend shows a seasonal pattern where numbers peak in the summer and bottom in the winter. This trend is also observed in the WRS data (see Figure 3). Furthermore, a downwards trend can be observed from 2008 onwards.⁴ The migrant headcount is relatively small for Wales when compared with other parts of the UK (also see Figure 3). This is also illustrated in Figure 2,

³ The typical migrant enters the UK, finds a job, and then applies to the WRS. We use "start of work date" to best capture labour market effects, whereas Gilpin et al. (2006) use "entry date", the Home Office (2006) uses "application date" and the UK Border Agency uses application "approval date", which explains different figures across available studies.

⁴ In our regression analysis in Sections 4 and 5 we use WRS data from May 2004 to May 2006, whereas in some of our descriptive analysis in Sections 2 and 3 we use UK Border Agency data from May 2004 to December 2008. This is primarily because, although our first request for WRS and JSA monthly micro level data was successful in 2007, our second request in 2009 was not. Therefore, to gather a sense of more recent descriptive figures we use quarterly UK Border Agency data, which displays lower overall numbers (also see Footnote 3). In addition to exploiting the higher quality of the WRS data, further arguments for restricting the regression analysis to the first two years only are that: in the longer run labour markets adjust (which might dilute potentially adverse effects) (Altonji and Card 1991; Dustmann et al. 2005); and in the longer run labour markets are hit by other shocks (which makes identification of migration effects more challenging).

which shows that Wales received a smaller migration inflow relative to its working age population than other parts of the UK.

The WRS is rich, large, frequent and timely. It records nationality, address, age, gender, number of dependents, application date, entry date, start of work date, hourly wage rate, hours worked, sector, occupation and industry. Table 1 shows that many WRS migrants are young, male, Polish, childless, working full time in low pay jobs in elementary and machine operative occupations and in manufacturing and catering (also see Home Office 2006; Blanchflower et al. 2007; Pollard et al. 2008). We restrict our sample to eight accession countries (A8), namely: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia and Slovakia. We exclude Malta and Cyprus, which already had relative access to the EU labour market. A caveat with the WRS is that it measures inflows only, as migrants are not required to de-register when leaving the UK, and thus the associated netflow and stock cannot be calculated.⁵

In order to claim unemployment benefit, workers are obliged to register on the Department for Work and Pensions administered Jobseeker's Allowance (JSA) programme. Registration is a legal requirement to qualify for the benefit, and therefore compliance is full. Between May 2004 and May 2006 [May 2004 and December 2008], JSA claimant unemployment rose by roughly 96,000 [690,000]. In Wales, these figures were respectively 5,000 and 40,000. Figure 3 shows the monthly JSA stock during this period. As before, the trend shows a seasonal pattern during the summer and winter. Claimant unemployment was roughly stable in 2005; it increased in 2006, and then decreased in 2007, despite a continuous inflow of migrants, before sharply increasing from 2008 onwards, which coincides with the current financial crisis.

The JSA is large, frequent and timely, and like the WRS, permits

⁵ The WRS records jobs, not people; migrants leaving are not counted whereas migrants re-entering the UK are double counted (Coats 2008; Pollard et al. 2008). Blanchflower et al. (2007) analyse A8 migration figures across several data sources and conclude that a stock of 500,000 migrants by late 2006 is likely to be an upper bound (for example, among other reasons, the WRS data shows a high proportion of registrations for temporary jobs and few migrants indicating "likely length of stay" over an year). Pollard et al. (2008) and Coats (2008) provide similar analysis and conclude that outflow is not zero, in line with evidence on return migration (Chiswick and Hatton 2003; Dustmann 2003; LaLonde and Topel 1997). If outflow is not random, β^n in Equation 1 could be biased (see Sections 3 and 4). Gilpin et al. (2006) provide a detailed discussion on measurement error in the WRS and conclude that any associated bias is not too severe. Another caveat with the WRS is that registration is not a requirement for the self-employed (who are a minority that already had relative access to the EU labour market), which explains the larger number of Polish plumbers in anecdotal evidence (Home Office 2007).

disaggregation at fine (district and month) levels.⁶ This is in contrast with the more widely used Labour Force Survey (LFS), where migration analysis below the region and quarter level is not feasible due to sample size limitations. Furthermore, the JSA measures claimant unemployment, which is directly relevant for policymaking. The JSA records address, gender, age, usual and sought occupations, claim start and end dates. Table 1 shows that many JSA unemployed are over 35 years old, female and work in low pay jobs in elementary occupation (also see Layard et al. 1991; Machin and Manning 1999).

The Annual Survey of Hours and Earnings (ASHE), collected by the Office for National Statistics (ONS), is derived from employers' data and represents 1% of all employees, containing around 160,000 responses per year. It collects, among other variables, address, gender, age, hourly pay, hours worked, occupation and industry. Table 1 shows various percentiles and the average of the ASHE and WRS hourly wage distributions, whereas Figure 4 plots both distributions for those earning £7 or below. The WRS distribution 50th percentile is roughly lined up with the ASHE distribution 5th percentile (see Table 1). This indicates that the typical WRS migrant earns around the minimum wage, which is also the wage for the lowest paid UK workers. The left panel of Figure 4 shows a sizeable spike at the minimum wage in the WRS distribution, which dwarfs the spike in the ASHE distribution. It also shows how remarkably compressed the WRS distribution is: over 90% (75%) of migrants earn between £2.00 (£4.00) and £7.00 an hour. While the average wage is £5.56 for a WRS migrant, it is £12.57 for a UK worker, though caution should be taken here, as ASHE includes WRS migrants after 2004.

Finally, we define control variables that describe the natives' population from the LFS, collected by the Office for National Statistics (ONS). ("Natives" here and throughout the paper include UK born and overseas born nationals who are UK residents.) The LFS is a rotating panel survey that interviews around 60,000 households with about 140,000 respondents every quarter and represents 0.5% of the population. It collects information on personal characteristics and labour market variables. Table 1 summarises some variables from the LFS between April 2004 and June 2006.

⁶ The UK ONS-defined geographical areas we use are: 409 Local Authority Districts, 49 counties and 12 Government Regions (ONS 2003) (see Table 1). Wales comprises 22 Unitary Authority Districts (also see Footnote 10).

2.2 Descriptive Analysis

Prior to the EU enlargement, both the overall UK labour market and the Welsh labour market were performing well (Coats 2008; Welsh Assembly Government 2005). The left panel of Figure 5 shows the trend for quarter rolling average employment rates between April 2001 and December 2007. The overall UK employment rate in May 2004 was relatively high at 74.7%, while UK claimant unemployment was relatively low at 2.7%. However, in early 2006 the labour market weakened and claimant unemployment increased both in the UK and in Wales, as shown in Figure 3, which coincided with substantial A8 migration. Nonetheless, despite the continuing migration inflow, the labour market began to recover in late 2006 in the UK and in Wales and stayed strong until late 2007, as shown in Figure 3, when the current financial crisis started. Figure 3 provides little evidence that WRS migration is associated with a rise in claimant unemployment in Wales. Although Figure 5 provides, perhaps, some weak evidence that the employment rate of A8 migrants since 2004 might be associated with a fall in the employment rates of UK born and EU15 born.⁷

In contrast, the right panel of Figure 5 and Figure 6 provide little evidence that WRS migration and monthly average wage growth are associated nationally, or for manufacturing and services. Figure 6 shows wage growth throughout the wage distribution for both the UK and Wales, relatively more generous at the very bottom of the distribution – where it is probably driven by minimum wage increases. This is also illustrated in the right panel of Figure 4, which shows the wage distribution change for those earning below £7.

Within Wales, WRS migrants concentrated in five main districts, as illustrated in the right panel of Figure 1: Newport, Cardiff, Carmarthenshire, Wrexham and Flintshire. These districts form two clusters of relatively bigger cities bordering England (except for Carmarthenshire, which is in West Wales and is predominantly rural) that are historically more associated with migration and have a long term trend of outmigration (Drinkwater and Blackaby 2004). These clusters are also traditionally linked to manufacturing, though the service sector has been

⁷ The dip in the A8 employment rate in 2003 suggests that migrants deferred their decisions to join the UK labour market to take advantage of the new accession status, which was announced in December 2002 (Doyle et al. 2006). The employment rate is highest for A8 migrants, perhaps because of their younger age, although some argue that this is because of their skills, higher productivity and better work ethic (more reliability, less sick leave, longer working hours, etc.) (see Table 1), while a few argue that this is because of their lower wage costs (Dustmann et al. 2003b).

growing in Newport and Cardiff. The left panel of Figure 7 shows that apart from Cardiff, these are not areas of particularly high or low unemployment (also see Drinkwater and Blackaby 2004). (Within Cardiff, it is possible that WRS migrants shun away from high or low unemployment areas too.)

Given the disproportionate numbers of WRS migrants and claimants in Cardiff, and to a lesser extent in the other four districts, it is likely that both groups compete for the same jobs and therefore two obvious questions arise. The first question is whether migrants pushed natives out of their jobs or made it harder for them to go back into jobs in these districts. The right panel of Figure 7 shows a continuing inflow of migrants and an upwards trend on the number of claimants in these districts. This provides some evidence of an adverse association between WRS migration and claimant unemployment in Newport and Cardiff, but perhaps less evidence for Carmarthenshire, Wrexham and Flintshire.

The second question is whether migrants depressed wages. Average wages in Wales increased by 4%, whereas the wages of the low-paid (at the 5th and 10th percentiles of the wage distribution) increased by 4.6% and 3.9%, and the wages of higher paid workers (at the 70th percentile), by 3.1%. This provides little evidence that the WRS migrants depressed the wages of the low-paid, despite being disproportionately concentrated in low-skilled jobs (see Figure 8 and Table 1). Figure 6 shows that wages grew strongly in the bottom half of the distribution during the whole period, and that this wage growth was stronger in Wales than in the UK. This again provides little evidence of an adverse association between WRS migration and wages growth in Wales.

Figure 8 shows that WRS migrants concentrated in elementary (36%) and machine operative (49%) occupations in the manufacturing (48%) and distribution hotels and restaurants (23%) sectors (see Table 1).⁸ The obvious question is again whether migrants pushed natives out of, or made it harder for them to go back into jobs in these occupations. The left panel of Figure 9 shows that despite the continuing inflow of migrants into machine operatives occupations, more claimants switched to this from other (usual) occupations.⁹ Also, wages grew faster in machine operatives between 2005 and 2006 (3.8%) than in elementary (2.7%) or

⁸ We use the nine Standard Occupation Codes: 1 Managerial and senior officials, 2 Professional, 3 Associate professional and technical, 4 Administrative and secretarial, 5 Skilled trades, 6 Personal service, 7 Sales and customer service, 8 Process plant and machine operatives and 9 Elementary.

⁹ We observe both usual and sought occupation for the claimant unemployed, thus overcoming a common difficulty in the literature, where occupation is often not observed (Card 2001).

other occupations (3.5%) for the whole of the UK. This suggests that demand side factors may have driven both migrants and claimants into machine operative jobs.

The right panel of Figure 9 also shows a continuing inflow of migrants into elementary occupations, where they were probably more able to find jobs because of language or other labour market barriers (Card and DiNardo 2000; Friedberg 2001; Drinkwater et al. 2006). This is also the usual occupation for most claimants (34%) and Figure 9 shows that some of them switched from looking for jobs in (usual) elementary to other (sought) occupations. The switch could be because natives were pushed out of their jobs, which would suggest some evidence of an adverse association between WRS migration and claimant unemployment in elementary occupations. However, the switch could also be because of other factors, including occupational progression, sectoral or occupational shocks, macro shocks, etc., which we account for in our empirical models in Section 4. An example of such shocks, as discussed above, is the claimant unemployment increase across all occupations in early 2006, which hints at macro effects in addition to any WRS migration effects.

In sum, the inflow of WRS migrants in Wales represents a rapid, concentrated and relatively large shock into two main occupations and five main districts. There is some weak evidence that in these occupations and locations the inflow might be associated with adverse unemployment effects, though less evidence that it might be associated with adverse wage effects. We exploit the variation in these occupation and location choices to separately identify the effect of the migration shock from the effect of other supply and demand shocks on unemployment and wages in our empirical models, as we discuss in Sections 3 and 4.

3. Empirical Approach

We argue that the rapid, concentrated and relatively large inflow of WRS migrants into two main occupations and five main districts in Wales comprise two separate natural experiments: an occupational experiment and a location experiment. Our occupation and location natural experiments arguably correspond more closely to exogenous supply shocks than most migration shocks studied in the literature (Card 1990 and 2007; Altonji and Card 1991; LaLonde and Topel 1991; Friedberg 2001). This helps to circumvent two main identification issues that

usually pose difficulties in the literature.

The first such identification issue is migrants' self-selection into labour markets experiencing more favourable conditions (Card 1990 and 2005; Borjas 2003). The difficulty here is that it is hard to capture adverse wage and employment effects in booming labour markets. In other words, we do not normally observe what would have been the wages and employment level in a particular labour market if migrants had not flooded in (i.e. the counterfactual or a credible control group). We argue that WRS migrants' initial occupational and location choices within Wales were primarily driven by language and other labour market barriers and by existing clusters (Card and DiNardo 2000; Friedberg 2001; Drinkwater et al. 2006) and not by particularly favourable conditions in those labour markets (see Section 2.2). For example, elementary occupations received substantially more migrants (36%) than other occupations (1% to 5% excluding machine operatives) because this is where they were probably more able to find jobs, despite any higher qualifications they might possess.¹⁰

The second such identification issue is natives' mobility in response to the migration inflow (Chiswick 1991; Altonji and Card 1991; LaLonde and Topel 1991; Borjas 1999; Card 2001). The difficulty here is that if natives respond to the inflow by moving away, potentially adverse effects in a particular labour market may be offset. In other words, we might not observe what would have been the wages and employment level in that labour market if natives had not fled (i.e. a fully treated treatment group). In our occupation natural experiment, we argue that WRS migrants chose relatively closed labour markets in Wales – i.e. low-skilled jobs in elementary occupations – and that most competing low-skilled natives may not have had the option of an immediate move to jobs in other (higher up) occupations, as this often requires retraining (Friedberg 2001; Borjas 2003). (Some limited mobility here derives from occupational progression, which we control for in our regression models, as discussed in Sections 2.2 and 4.)

¹⁰ We argue that this is the case for elementary occupations, but perhaps not for machine operatives, where migrants' self-selection may have been demand driven, as discussed in Section 2.2. Because machine operatives may have been hit simultaneously by demand (e.g. booming construction industry) and supply shocks (e.g. WRS migration inflow), we perform robustness checks excluding it from our regression models in Section 5.2. We also perform robustness checks using alternative models and techniques to account for potentially remaining self-selection bias in Sections 4 and 5. On a similar note, although early cohorts' location choices were primarily driven by existing clusters, subsequent cohorts may have self-selected into districts experiencing more favourable conditions (Bartel and Koch 1991; Zavodny 1999).

Therefore, our treatment group is fully treated because it received high proportions of migrants and it is a relatively closed market; and our control group is relatively uncontaminated because it received low proportions of migrants. Thus, we have clearly defined treatment and control groups: natives in the treatment group did compete with migrants (did not skip treatment), and natives in the control group did not compete with migrants (did not receive treatment).

In our location natural experiment, whereas five districts received relatively high proportions of WRS migrants, the other 17 districts in Wales received varying degrees of the treatment (see Section 2.2). One interpretation here is to treat all districts as treatment groups, exploiting the variation in the proportion of migrants across districts and time. Figure 7 shows a great deal of variation both across district and across time. One concern here, as in much of the literature, is that those five districts may not have received a full course of the treatment – i.e. that some natives moved out of those districts and skipped the treatment. As discussed in Section 2.2, these districts display a long term trend of outmigration (Drinkwater and Blackaby 2004) and evidence that this trend stiffened after accession is scarce. Furthermore, as the migration inflow was substantially larger and faster than expected (Dustmann et al. 2003a), any natives' mobility response is probably sufficiently lagged to allow identification of more adverse effects (Friedberg and Hunt 1995; Card 2001; Borjas 2006).

Moreover, WRS migrants concentrate in low paid jobs (see Table 1 and Figure 8) and thus compete with low-skilled natives, who are less mobile because moving costs might be prohibitive (McCormick 1997; Borjas 1999). This effectively means that they compete in a relatively more closed market. As the boundaries of the actual radius of job search for low-skilled natives is an empirical matter – ideally the level of data aggregation should conform to the actual radius of job search for natives competing with migrants – we experiment with several levels of aggregation (i.e. several degrees of natives' mobility), allowing the search to take place on ever wider labour markets (Borjas 2006). We start with a Twenty-Two-Way district aggregation, followed by a Seven-Way and a Three-Way district aggregation.¹¹

¹¹ We start with the 22 Unitary Authorities districts defined by the ONS (2003) (see Section 2.1). We then aggregate these 22 districts into 7 areas: North-West Wales (Anglesey, Conwy, Denbighshire and Gwynedd), North-East Wales (Flintshire and Wrexham), Mid-West Wales (Carmarthenshire, Ceredigion and Pembrokeshire), Mid-East Wales (Powys), South-West Wales

So, we initially assume that there are 22 closed labour markets in Wales. While districts are unlikely to exactly coincide with local labour markets, they may represent a fairly realistic practical radius of job search for most low-skilled natives competing with WRS migrants.¹² We then relax this by assuming that there are seven (and then three) independent and closed labour markets in Wales. The underlying assumption is that the Three-Way is a more closed labour market than the Seven-Way, which is a more closed labour market than the Twenty-Two-Way aggregation. Thus, if natives are relatively district-bound, then estimates at the three different levels of aggregation should not differ much. That is because the natives' mobility bias is larger the greater the degree of natives' mobility (Borjas 2006). Our final level of aggregation is the national-occupation level, as we discuss below, which scrapes all boundaries – allowing natives full mobility within the country – and is therefore more robust to natives' mobility bias (Friedberg and Hunt 1995; Dustmann and Glitz 2005).

The implicit assumption so far is that all WRS migrants compete with all natives in each district, which may not be realistic. This is because the vast majority of WRS migrants do not compete with highly skilled natives. We relax this by assuming that WRS migrants are only substitutes for low-skilled natives (not for high-skilled) within each district. We also experiment with other vulnerable groups, such as female and young natives. Here, the assumption is that WRS migrants are only substitutes for female (young) natives within each district.

We finally relax the assumption that all WRS migrants compete with all natives by assuming that low-skilled (high-skilled) WRS migrants compete with low-skilled (high-skilled) natives in a national market. That is, we aggregate the data across occupations and assume that migrants and natives are only substitutes within occupations (Card 2001; Friedberg 2001).

In sum, we stratify local labour markets in several ways (across different levels of aggregation and across alternative demographic groups). This enables us to consider several alternative local labour markets where migrants might be

(Bridgend, Neath Port Talbot, Swansea and Vale of Glamorgan), South Wales (Blaenau Gwent, Caerphilly, Cardiff, Merthyr Tydfil, Newport, Rhondda, Cynon, Taff and Torfaen) and South-East Wales (Monmouthshire). We finally aggregate these into 3 areas: North Wales, Mid Wales and South Wales.

¹² We use work address for WRS migrants and ASHE workers (to eliminate concerns that they may live in one district and work in another) and home address for JSA claimants, who we assume, search for jobs primarily in their neighbourhood.

affecting natives. In other words, we modify, in several alternative ways, our assumptions on substitutability between migrants and natives. It is this degree of substitutability that will determine the magnitude of any claimant employment or wage effect estimates in our empirical models in Sections 4 and 5.

The top left panel of Figure 10 plots our claimant unemployment (netflow) rate variable ΔN_{it} against our migration (inflow) rate variable ΔM_{it} across t months (between May 2004 and April 2006) and i districts (i districts is replaced with j occupations in the top right panel of Figure 10). This provides little evidence of an adverse association between the two variables, in line with our analysis at the national level in Section 2. The raw data suggests that claimant unemployment did not grow faster in districts and occupations that received relatively more migrants. The two bottom panels of Figure 10 also plot the average (and 10th percentile) of the distribution of log hourly pay W_{iy} in first-difference across y years (2004 to 2006) and i districts against the yearly migration rate ΔM_{iy} . Again, in line with our analysis at the national level in Section 2, this provides little evidence of an adverse association between the two variables. The raw data suggests that wages did not grow slower in districts that received relatively more migrants.¹³

4. Model Specification

Using a reduced form equation grounded on standard theory (Borjas 1999; Card

¹³ We define $\Delta N_{it} = \frac{\Delta N_{it}^*}{P_{it}}$ and $\Delta M_{it} = \frac{\Delta M_{it}^*}{P_{it}}$, where N_{it}^* is the number (stock) of JSA claimants,

M_{it}^* is the number (stock) of WRS migrants, and P_{it} is working age population. As discussed in Section 2.1, whereas we observe the stock of claimants and can calculate the netflow of claimants as $\Delta N_{it}^* = N_{it}^* - N_{it-1}^*$; we do not observe the stock of migrants. We therefore re-define the netflow of migrants as $\Delta M_{it}^* = I_{it} - O_{it}$, where I_{it} is inflow and O_{it} is outflow of migrants. As we do not observe outflow, we again re-define $\Delta M_{it}^* = I_{it}$, as it is common in the literature (Card 2001;

Dustmann and Glitz 2005). Similarly, we define natives' netflow rate as $\Delta A_{it} = \frac{\Delta A_{it}^*}{P_{it}}$ and

$\Delta A_{it}^* = I_{it}^A - O_{it}^A$, where I_{it}^A is inflow and O_{it}^A is outflow of natives. We also run robustness checks where our migration and unemployment variables in Equation 1 were not standardised (i.e. re-defining $\Delta N_{it} = \Delta N_{it}^*$ and $\Delta M_{it} = \Delta M_{it}^*$) and found qualitatively similar results (Peri and Sparber 2008) (also see Section 4 and Footnote 16).

2001; Dustmann et al. 2005), we estimate the effect of the WRS migration inflow on the claimant unemployment netflow in Wales:

$$\Delta N_{it} = \beta^n \Delta M_{it} + \lambda^n \Delta X_{it} + f_t^n + \Delta \varepsilon_{it}^n \quad (1)$$

where ΔN_{it} and ΔM_{it} are our unemployment and migration variables, defined in Section 3, X_{it} are labour supply and demand shifters, f_t^n is time fixed effects, and ε_{it}^n is the error term in district $i=1,...,22$ and month-year $t=1,...,24$. The interpretation of our coefficient of interest is that a one percentage point increase in the migration rate changes the claimant unemployment rate by β^n percentage points.

As we estimate Equation 1 in first-difference, district fixed effects were differenced out. This enables us to separate the effect of district specific factors, which might make a particular district more attractive to migrants or natives or both (such as more schools, more housing, higher wages, etc.), from the effect of the WRS shock on claimant unemployment. We model time fixed effects using 24 month-year dummies. This enables us to separate the effect of other macro shocks (such as seasonal shocks, national and international shocks, etc.) from the effect of the WRS shock on claimant unemployment.

We also control for supply and demand shifters. This enables us to separate the effect of supply and demand shocks from the effect of the WRS shock on claimant unemployment. Controls in X_{it} include the proportion of the total population who are women, young (those between 18 and 24 years of age), ethnic minorities and migrants from outside the A8 countries. This enables us to control for higher unemployment in a particular district due to the presence of relatively more women, young, minorities or other migrants – which are groups who often experience high unemployment (see Section 2). Further controls include the lagged proportion of WRS migrants who are women, young and parents (along with average number of children). We also control for the lagged average hours worked by WRS migrants to account for potentially higher claimant unemployment in districts where migrants work longer hours (which may increase substitutability). We also include the lagged proportion of WRS migrants in elementary and machine operative occupations to control for occupation-district specific shocks affecting claimant unemployment. Finally, we include the lagged proportion of unemployed who are women and young, and lagged average claim duration.

Lagged claim duration accounts for higher unemployment in districts with historically long spells of unemployment; it also alleviates problems arising from serial correlation in the residuals and it can be interpreted as a measure of labour demand.¹⁴

Next, we control for natives' mobility. This allows us to separate the effect of the WRS shock on claimant unemployment from the effect of natives moving away from (or refraining to move into) a district. Put differently, this allows us to some extent to build a counterfactual of how mobile natives would have been in the absence of the migration inflow. Therefore, it helps to correct for both natives' mobility (omitted variable) bias and migrants' self selection (omitted variable) bias (see Section 3). The severity of any such omitted variable bias depends on the extent of the correlation between the migrant inflow and natives' netflow (Card and DiNardo 2000; Card 2001; Borjas 2003 and 2006; Dustmann and Glitz 2005). Ideally, we want to use a variable that measures what would have been the observed natives' net migration had migrants not arrived (Borjas 1999 and 2006). As such a counterfactual is not observable, we add two observable proxies to ΔX_{it} , in turn. The first proxy we use is lagged working age population growth (Borjas et al. 1997; Borjas 2006) – which incidentally ensures that the variation in ΔM_{it} that identifies β^n comes from the numerator (migration inflow) and not from the denominator (working age population) (Borjas 2003). To avoid repeating the dependent variable as a regressor, we use lagged working age population growth by education group (Dustmann et al. 2005; Borjas 2006; Peri and Sparber 2008).¹⁵ The second proxy we use is the native netflow rate ΔA_{it} , defined in Section 3 (Borjas 1999).

We perform a Generalized Least Square (GLS) correction to account for the relative importance of each district, for heteroskedasticity arising from aggregation, and for serial correlation across and within districts.¹⁶ Given such stringent

¹⁴ As in Gilpin et al. (2006), we experimented with two types of dynamics (lagged migration rate and lagged claimant unemployment rate), which, however, that did not alter our main result. Although dynamics allow for lagged adjustments due to slow responses in employment, migration effects are generally expected to be lower in the longer run than in the shorter run (Altonji and Card 1991; Dustmann et al. 2005).

¹⁵ We use a group comprising those with a degree or equivalent and above, a group comprising those with GCSE or equivalent and below, and a group comprising those in between; the last was omitted in alternative robustness checks, which did not qualitatively alter the main results.

¹⁶ The appropriate weight here is the sample size used to calculate the dependent variable (working age population), but our estimates were robust to using total population as weight instead

specifications, and given the careful consideration of our treatment and control groups (see Section 3), we argue that the remaining variation in the claimant unemployment rate is likely due to changes in the WRS migration inflow – and this ensures the identification of β^n .

5. Results

5.1 Unemployment Effects

Table 2 shows our results across aggregation levels. The UK results are borrowed from Lemos and Portes (2008) and are provided for comparison and completeness, but the main analysis here focuses on the results for Wales. Row 1 of Panel A shows an insignificant -0.115 (unweighted OLS) β^n estimate, which corresponds to the raw data in Figure 10. Row 2 shows an insignificant 0.024 (GLS) estimate when we control for district fixed effects. Row 3 shows an insignificant 0.006 estimate when we control for month-year fixed effects. Row 4 shows an insignificant 0.012 when we control for other supply and demand shocks. These estimates are numerically close to zero and statistically indifferent from zero. This suggests little evidence of adverse claimant unemployment effects at the district level.

Rows 5 and 6 show that, controlling for respectively lagged working age population growth and native netflow rate does not alter the estimates qualitatively: the estimates remain insignificant and are, respectively, 0.024 and 0.017. This offers little evidence that natives' mobility offset potentially more adverse claimant unemployment effects, in line with our earlier descriptive analysis (see Sections 2 and 3).

In addition to assessing the extent of any natives' mobility omitted variable bias by explicitly controlling for lagged working age population growth and native netflow rate in rows 5 and 6, we also assess whether natives are district-bound by aggregating the data at broader levels in panels B and C. If natives' mobility is not

– which reduces concerns of a potential correlation between the weight and the dependent variable affecting the results. (Also, as discussed in Footnote 13, we run robustness checks where our unemployment and migration variables were not standardized and found qualitatively similar results.) Our estimates were also robust to using, in turn, April 2004 working age population and April 2004 total population as time-invariant weight (Card 2001 and 2005; Borjas 2006).

exacerbated by the migration inflow, estimates at the three different levels of aggregation should not differ much (see Section 3). Panels B and C show that the estimates turn negative, though they are only significant at the broadest level of aggregation in panel C. This again suggests little evidence of adverse claimant unemployment effects.

The estimates are larger the broader the aggregation level, offering, perhaps tentatively, some weak evidence that natives' mobility in response to migrants' inflow has a favourable (not adverse) effect on unemployment. Nonetheless care should be taken here, as although larger estimates might be expected at wider aggregation levels as a result of theoretical predictions regarding natives' mobility (Borjas 2003 and 2006), they might also be expected as a result of modelling choices (Borjas 2006; Peri and Sparber 2008). One example is that three area dummies do not control for as many area specific shocks as 22 area dummies do, which may result in a larger β^n estimate in panel C than in panel A (or B). Moreover, serial correlation is more of a concern in more aggregate data, which again could result in a larger β^n estimate at the broadest level of aggregation in panel C (despite appropriate GLS corrections at each level). Another example is that implicit district weights differ across aggregation levels. For instance, at the most disaggregate level in panel A, different districts in South Wales receive different weights, and each district has a small weight; in contrast, at the most aggregate level in panel C, the whole of South Wales is treated as one single labour market (see Section 3). This could result in a larger β^n estimate in panel C, weighed towards South Wales.

In sum, our main conclusion is that there is little evidence that an increase in the WRS migration rate adversely affected the claimant unemployment rate in Wales between 2004 and 2006. Our results are in line with the international literature, where adverse employment effects are small (Altonji and Card 1991; LaLonde and Topel 1991; Friedberg 2001; Card 1990 and 2001; Carrasco et al. 2008). They are also in line with the very limited evidence for the UK: Lemos and Portes (2008) reported insignificant claimant unemployment effects when estimating comparable models for the UK using the same sample data (also see row 6a of Table 2). Dustmann et al. (2005) reported insignificant employment and unemployment

effects using LFS data for the 1980s and 1990s.¹⁷

5.2 Robustness Checks

We now further check the robustness of our estimates by restricting our sample to specific demographic groups. The motivation here is that our earlier estimates are for the entire pool of unemployed workers, which might be diluting more adverse effects for low wage workers (LaLonde and Topel 1991; Altonji and Card 1991). We thus re-estimate Equation 1 for three groups, in turn: low-skilled (those in elementary occupations), young (those between 18 and 24 years of age) and women. These are workers likely to be competing directly with WRS migrants (see Section 2.2).

Table 3 shows the associated GLS β^n estimates. Row 1 shows a significant -0.011 estimate for low-skilled workers at the district level (compare with the insignificant 0.012 estimate in row 4 of Panel A of Table 2). This suggests, if anything, a less adverse effect for the low-skilled at the district level. The estimate is less negative, but insignificant, when allowing low-skilled workers to search for jobs at broader aggregation levels. Row 2 shows that for young workers, the estimates are again most negative at the broadest aggregation level, but it is never significant. The same is true for female workers. This offers little evidence that migrants are substitutes for low-skilled, young or female natives. Thus, our main conclusion from before is broadly maintained.

¹⁷ We argue that for the particular phenomenon we study here, endogeneity is not too severe, and thus any remaining endogeneity bias is not very large. Firstly, endogeneity would be a concern if both migrants and unemployed natives made simultaneous decisions to join the labour market based on observed job opportunities. As we argued in Sections 2.2 and 3, the WRS migration inflow was a large, rapid, concentrated and relatively exogenous supply shock resulting mainly from political events. Secondly, endogeneity would be a concern if variables driving both the migration and unemployment rates were omitted. Two such omitted variables are of particular concern: migrants' self-selection and natives' mobility. As we argue in Section 3, migrants' location choices are primarily driven by clusters and not by particularly favourable labour market conditions; and the correlation between the migration inflow and natives' netflow does not appear to be very large in our data (compare row 4 with rows 5 and 6 in Table 2). Furthermore, we use fairly stringent specifications, where we control for these (and other) omitted variables to some extent through district and month-year fixed effects, supply and demand shifters, lagged working age population growth and native netflow rate. Also, any natives' mobility bias correction arising from broadening the level of aggregation suggests, if anything, bias towards less (not more) adverse effects (compare panels A, B and C of Table 2). Moreover, our results at the national-occupation level in Section 5.2, where natives are no longer district-bound, do not show more adverse effects (see Table 4). Thirdly, endogeneity would be a concern in the presence of non-random measurement error. As discussed in Section 2.1, there is no *a priori* reason to expect non-random non-registration or outflow across districts in our data. Finally, Lemos and Portes (2008) reported insignificant claimant unemployment effects when exploiting a number of carefully defined instruments using the same sample data on comparable models for the UK.

Finally, we check the robustness of our estimates by aggregating the data across occupations. The motivation here is that, as discussed in Section 3, stratification across occupations – as opposed to stratification across districts – is fruitful because migrants and natives compete more directly across occupations and because bias arising from natives' mobility and migrants' self-selection is less of a concern across occupations. We therefore re-estimate Equation 1 replacing i with $j = 1, \dots, 9$ to mean occupations (see Section 2.2)¹⁸ and re-defining X_{jt} , due to data limitations, to include the lagged proportion of WRS migrants who are women, young and parents (along with average number of children); their lagged average hours worked; the lagged proportion of unemployed who are women and young; and the lagged average claim duration.

Table 4 shows the associated GLS β^n estimates. Rows 1 to 4 show positive but insignificant estimates. Row 4a shows a negative, though insignificant estimate, when excluding machine operative occupations, where self-selection bias may be a concern (see Section 3).

This again offers little evidence that an increase in the WRS migration rate adversely affected the claimant unemployment rate in Wales between 2004 and 2006. Thus, our main conclusion from before is yet again maintained. This is in contrast with Borjas (2006), where more adverse effects were found at wider aggregation levels. Although our results were also successively larger the broader the aggregation level in Table 2, they are smaller at the national level – and they are, if anything, less (not more) adverse at the broadest aggregation level (see Section 5.1).

5.3 Wage Effects

Using a reduced form equation grounded on standard theory (Borjas 1999; Card 2001; Dustmann et al. 2005), we now estimate the effect of the WRS migration inflow on wages in Wales:

$$\Delta W_{iy} = \beta^w \Delta M_{iy} + \lambda^w \Delta X_{iy} + f_y^w + \Delta \varepsilon_{iy}^w \quad (2)$$

where ΔW_{iy} and ΔM_{iy} are our wage and migration variables, defined in Section 3,

¹⁸ Results using sought occupation, which better captures labour market effects, were also robust to using usual occupation instead.

in district $i = 1, \dots, 22$ and year $y = 1, \dots, 3$; f_y^w is time fixed effects; ε_{iy}^w is the error term; and X_{iy} are labour supply and demand shifters that include the proportion of the total population who are women, young, ethnic minorities and migrants from outside the A8 countries; the lagged proportion of WRS migrants who are women, young and parents (along with average number of children). As before, we estimate Equation 2 in first-difference using GLS and thus district fixed effects were differenced out; time fixed effects are now modelled using year dummies. The interpretation of our coefficient of interest is that a one percentage point increase in the migration rate changes wages by β^w %.

Table 5 shows our results across percentiles of the wage distribution. The UK results in Row 4a are again borrowed from Lemos and Portes (2008) and are provided for comparison and completeness, but the main analysis here focuses on the results for Wales. Row 1 of the right-most panel shows a significant 4.214 (unweighted OLS) β^w estimate, which corresponds to the raw data in Figure 10. Controlling for district fixed effects produces a 2.745 significant (GLS) estimate, and further controlling for time fixed effects produces a 3.140 significant estimate. Finally, controlling for other supply and demand shocks produces a 3.378 significant estimate. This suggests that an increase of one percentage point in the migration rate raises average wages by 3.4%.

Table 5 shows that the estimates are mostly insignificant below the 50th percentile (see row 4). The estimates for the 60th and 70th percentile are significant in the most complete and preferred specifications in row 4. They suggest that an increase of one percentage point in the migration rate raises wages in the 60th (70th) percentile by 3.9% (5.2%).

As WRS migrants overwhelmingly concentrate around the 5th and 10th percentiles of the wage distribution, we expected to find more adverse (or less favourable) effects there. Our estimates were indeed smaller at the very bottom than higher up the distribution, but they were insignificant. An important point here is that the minimum wage was in force and increasing throughout the period we study, possibly mitigating or offsetting more adverse wage effects for lower paid workers (see Figures 4 and 6).¹⁹

¹⁹ Other usual explanations in the literature for insignificant wage and employment effects include factor equalisation as well as industry structure and output mix adjustments. Although neither offers

In sum, our main conclusion is that there is little evidence that an increase in the WRS migration rate adversely affected wages in Wales between 2004 and 2006. Our estimates are in line with some evidence in the international literature, where adverse wage effects are small (Grossman 1982; Friedberg 2001; Card 1990, 2001, 2005 and 2007; Carrasco et al. 2008), though in contrast with other evidence of more adverse wage effects (Borjas 1999, 2003 and 2006; Angrist and Kugler 2003; Orrenius and Zavodny 2007). They are also in line with the limited evidence available for the UK: Lemos and Portes (2008) reported insignificant wage effects when estimating comparable models for the UK using the same sample data (also see row 4a of Table 4). Using LFS data for the 1980s and 1990s, Dustmann et al. (2005) found no evidence of adverse wage effects and hinted that this may be in part because migrants' skill distribution resembles that of natives. However, Manacorda et al. (2006) argue that the associated relative labour supply change ought to have induced wage effects. Using LFS and BHPS data between the 1970s and 2000s they also found no adverse wage effects and argue that this is because natives and migrants are imperfect substitutes (Card 1990; Friedberg 2001). They then detected some adverse wage effects for earlier migrants (LaLonde and Topel 1991; Altonji and Card 1991). This is in line with findings in Dustmann et al. (2007) of negative wage effects at the bottom of the distribution – where migrants are more concentrated – and positive effects higher up the distribution, when using LFS data for the 1990s and 2000s.

6. Conclusion

The enlargement of the EU in May 2004 triggered a rapid, concentrated and relatively large migration inflow into Wales. We described and evaluated the impact of this inflow on the Welsh labour market. Accession migrants were overwhelmingly concentrated in low pay low-skilled jobs in elementary occupations and machine operative occupations in the manufacturing and catering sectors. They concentrated mainly in cities bordering England – which have been

a full explanation (Card 1990, 2005 and 2007; Borjas 1999 and 2006; Friedberg 2001; Lewis 2003; Dustmann et al. 2005; Hatton and Tani 2005; Ottaviano and Peri 2006), a fruitful avenue for future research is more UK based evidence on both fronts. That would help to understand how the internal flows of goods, capital and labour across markets respond to migration inflows and how firms alter their production function and production mix in response to the relative labour supply shift.

historically more associated with migration – such as Newport, Cardiff, Wrexham and Flintshire.

We found little evidence that the inflow of accession migrants contributed to a fall in wages or a rise in claimant unemployment in Wales between 2004 and 2006. In particular, we found no evidence of an adverse impact on young, female or low-skilled claimant unemployment and no evidence of an adverse impact on the wages of the low-paid. If anything, we found a positive effect on the wages of higher paid workers and some weak evidence of a potentially favourable impact on claimant unemployment. Our results are robust and are in line with other results in the literature. They are also in line with standard theory.

Our unemployment effect estimates were small and in the main insignificant. These estimates were reassuringly robust to a number of specification checks and estimation methods as well as to several different stratifications of the labour market and to different sub-samples of workers.

Our wage effect estimates were positive, small and insignificant at the very bottom of the wage distribution, and were larger higher up, though still insignificant below the median. Estimates for higher paid workers were significant. An increase of one percentage point in the migration rate raises wages of workers in the 60th (70th) percentile of the distribution by 3.9% (5.2%), while it raises average wages by 3.4%.

These results are in line with standard theory, which predicts adverse wages and/or employment effects following a migration inflow that is unbalanced across area or skill. As the accession migration inflow was large, rapid and not balanced across districts or occupations, we expected downward pressure on wages and employment in low-paid low-skilled jobs in occupations and cities where migrants concentrated. In particular, we expected the wage structure to be affected: competing (complement) workers should have lower (higher) wage increases.

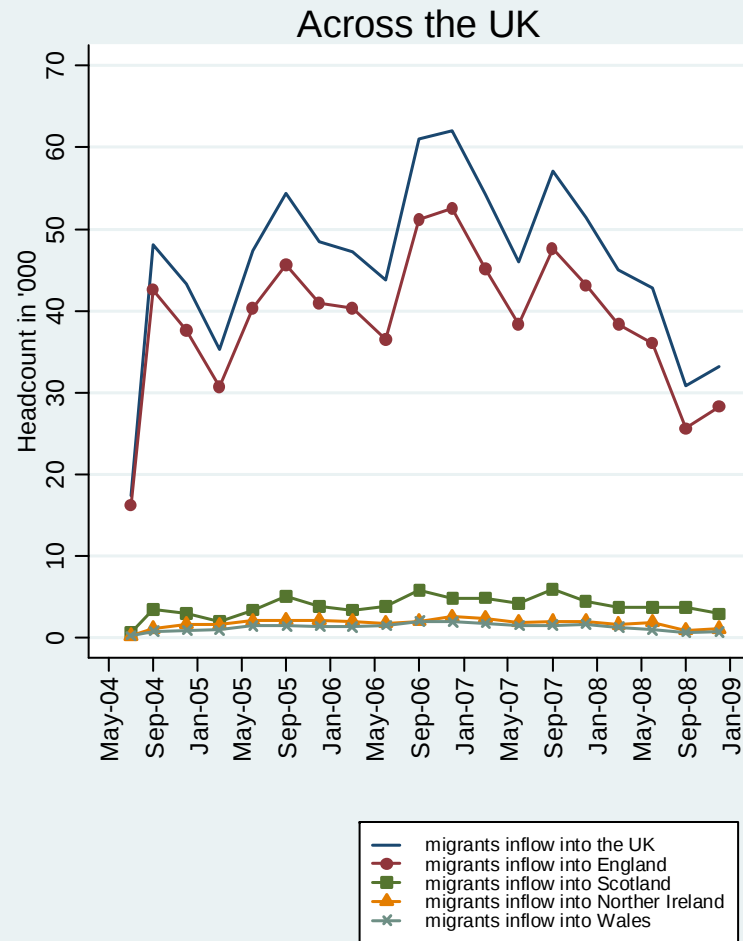
We found evidence that higher paid (complement) workers had larger (positive and significant) wage increases, whereas lower paid (competing) workers had smaller (and insignificantly different from zero) wage increases. One interpretation here is that, relative to higher paid workers, lower paid workers had less favourable (though not adverse) wage increases. Incidentally, more adverse wage effects for lower paid (competing) workers may have been potentially mitigated or offset because they were protected by a concurrently increasing minimum wage.

References

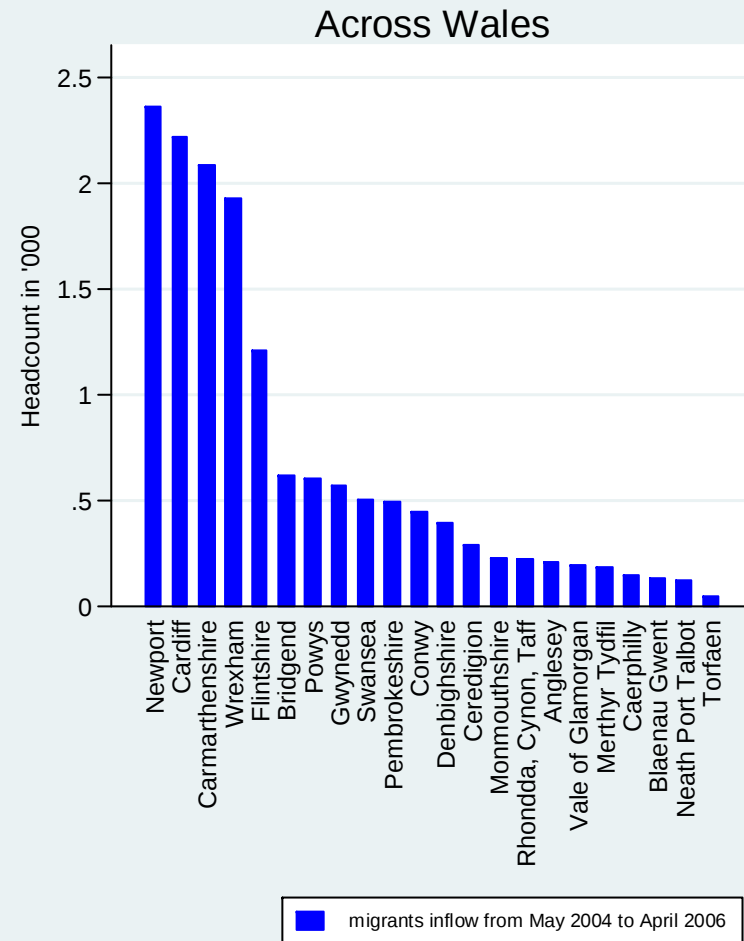
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Figure 1 - Migration Inflow



Source: UK Border Agency data

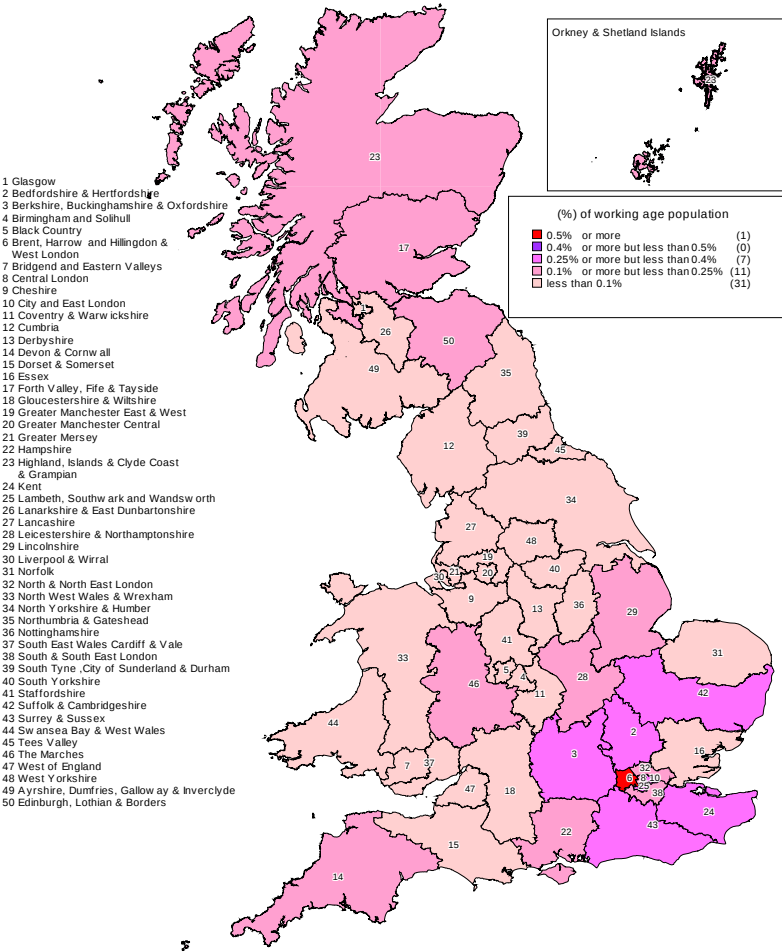


Source: Worker Registration Scheme data

Source: Worker Registration Scheme data and UK Border Agency data

Figure 2 – Migration Inflow Rate by Regions

2004



2006

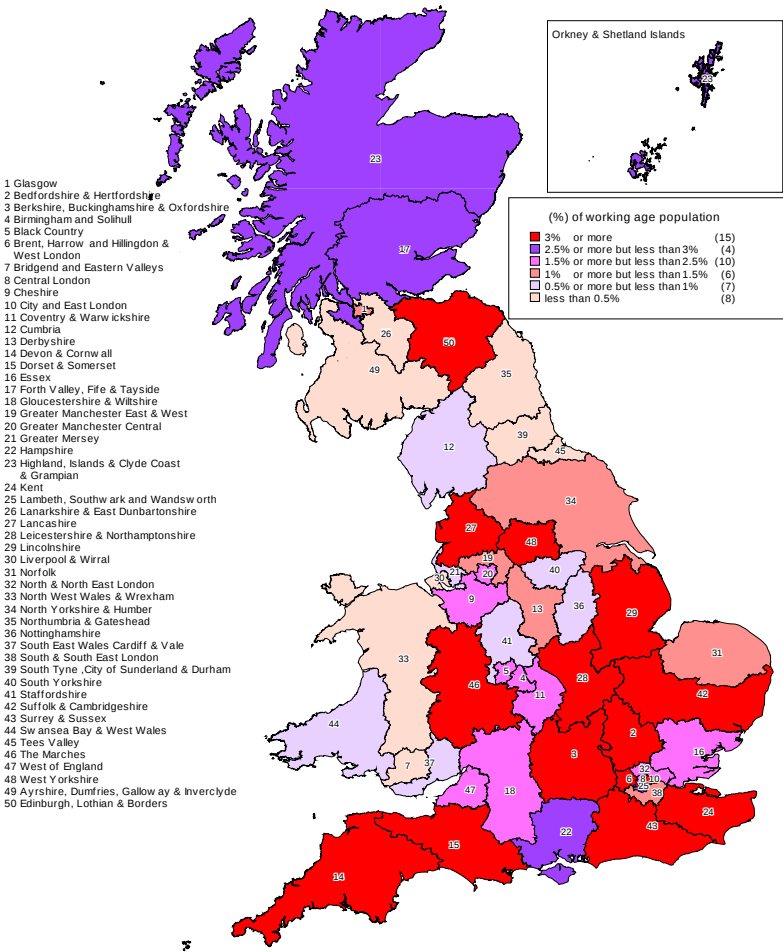
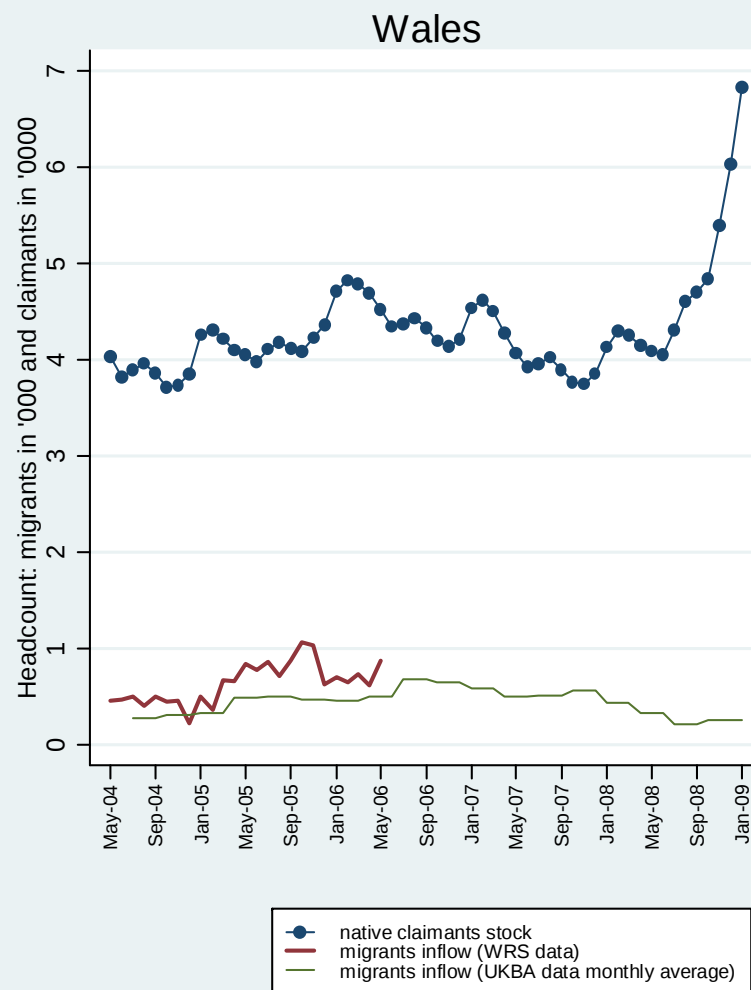
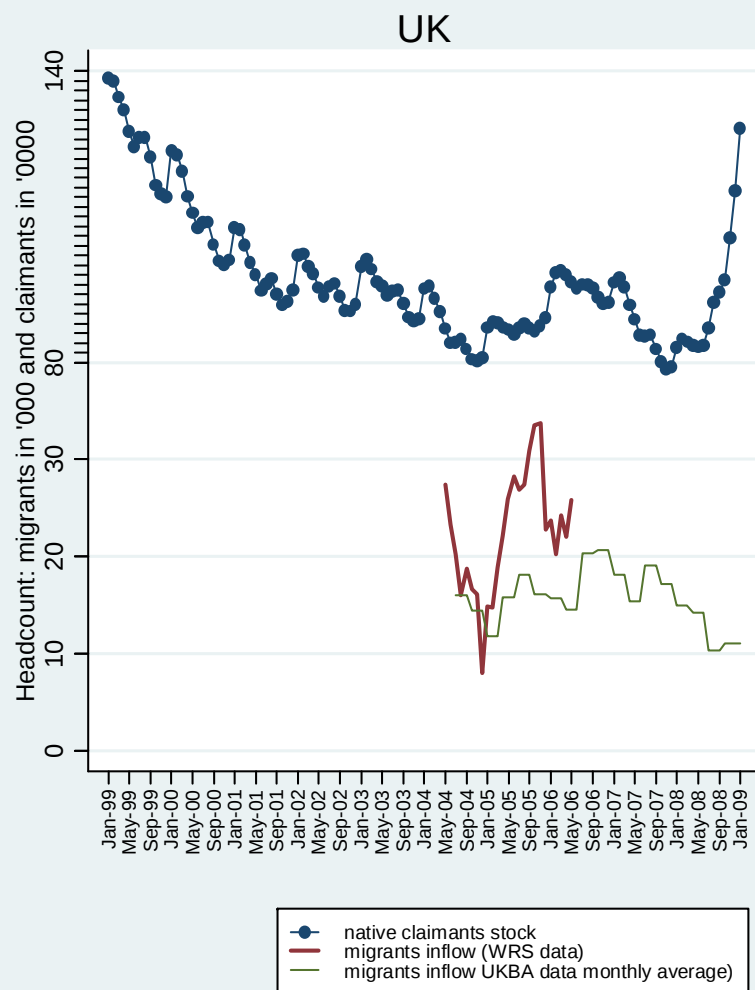


Figure 3 - Migration Inflow and Claimant Unemployment

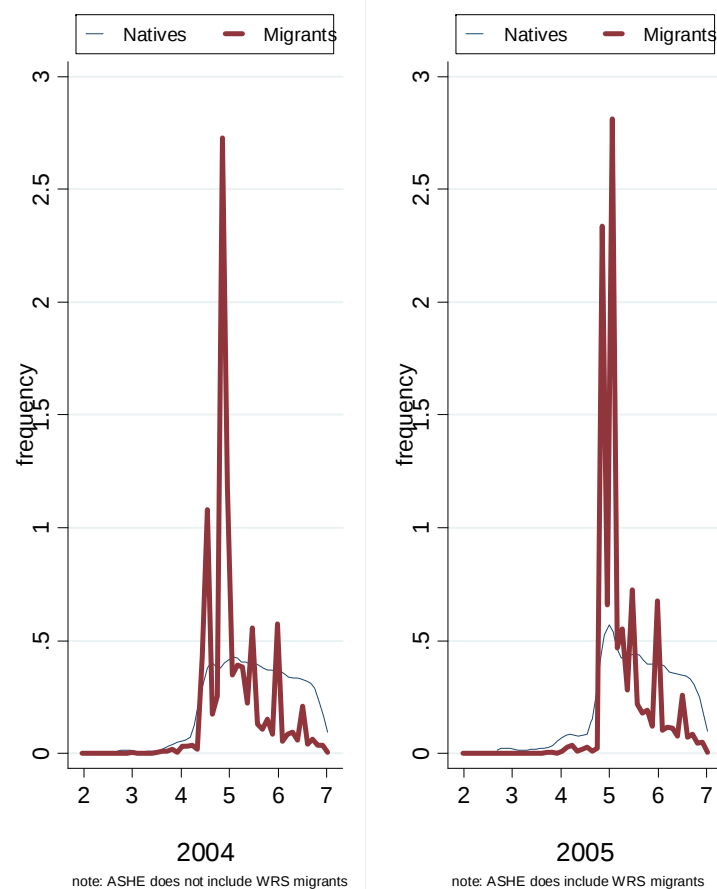


Source: Worker Registration Scheme data, UK Border Agency data and Jobseeker's Allowance data

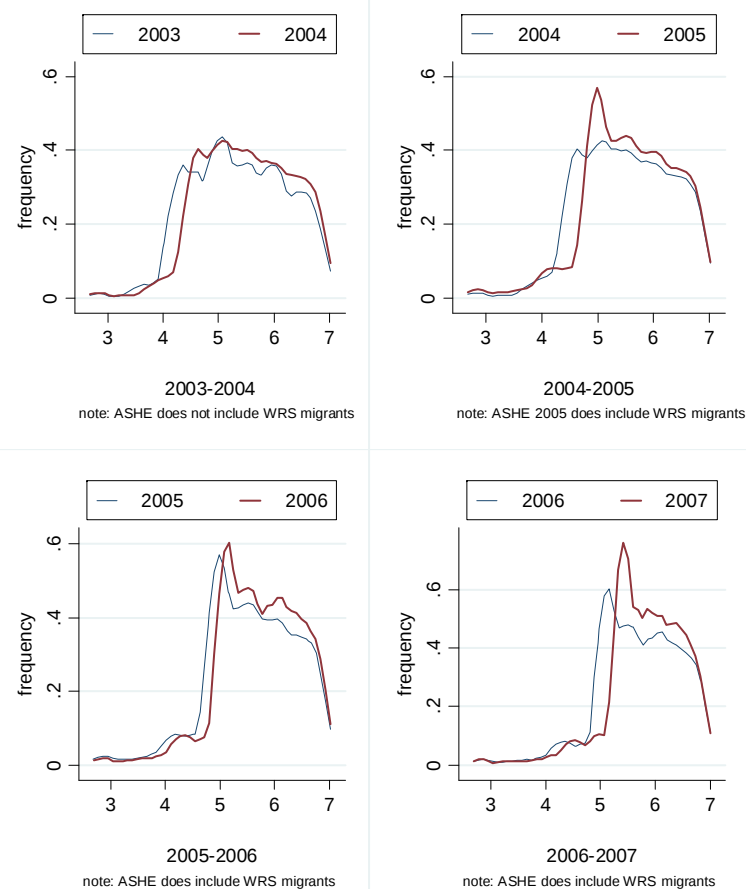
Figure 4 - UK Hourly Wage Distributions

Migrants and Natives at or below £7

comprises 90% of WRS migrants and 30% of ASHE native workers

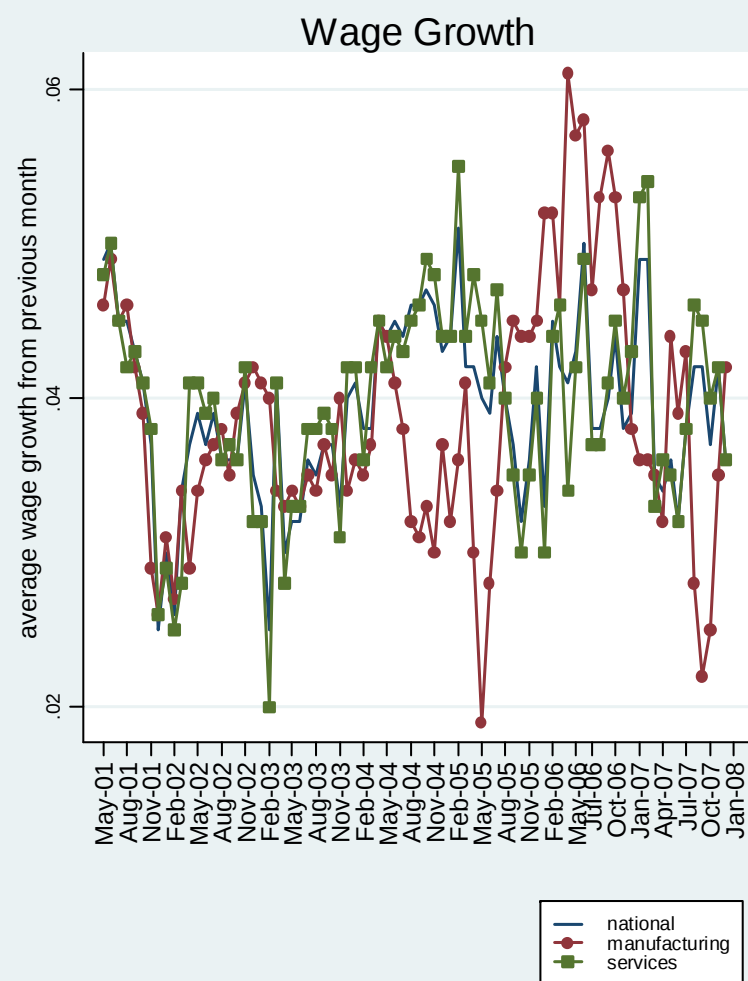
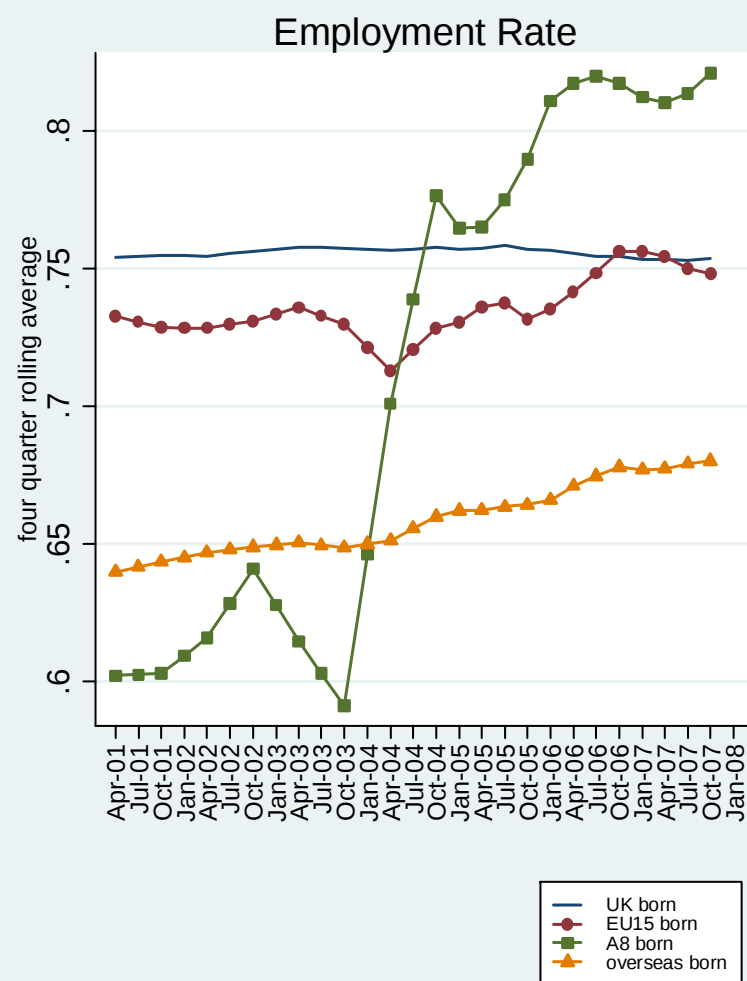


Natives at or below £7



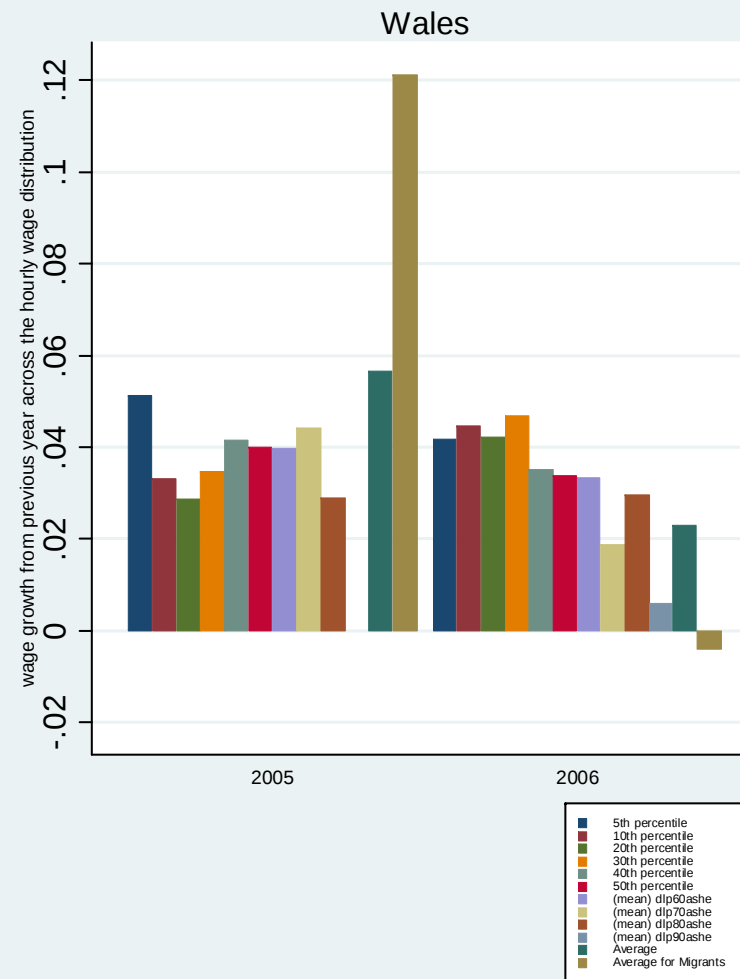
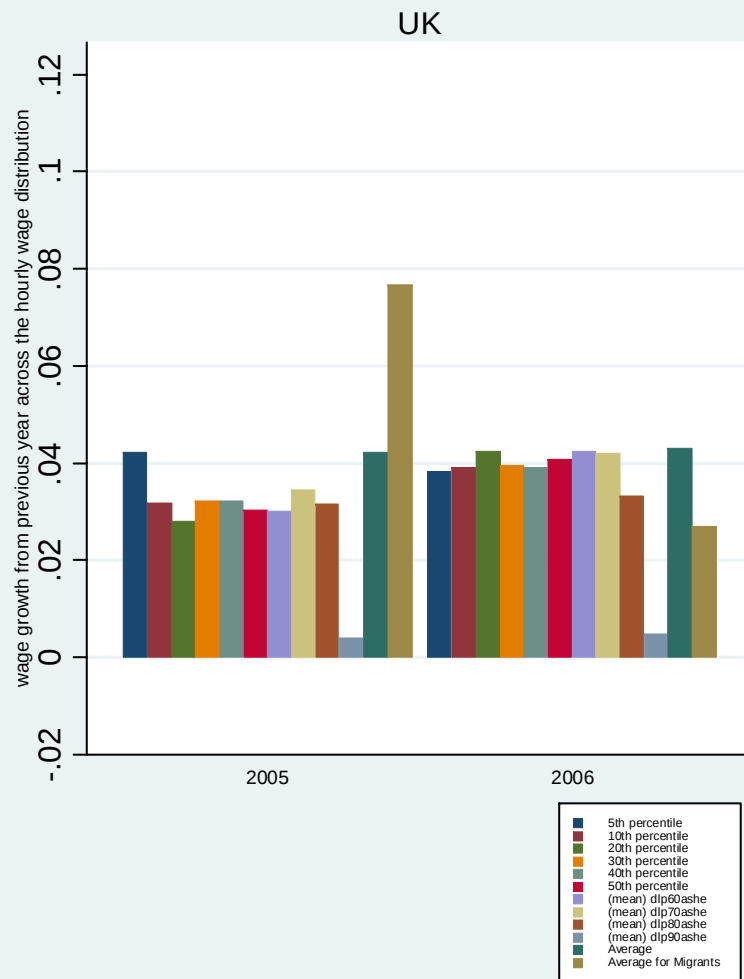
Source: Worker Registration Scheme data and Annual Survey of Hours and Earnings data

Figure 5 - Employment and Wage



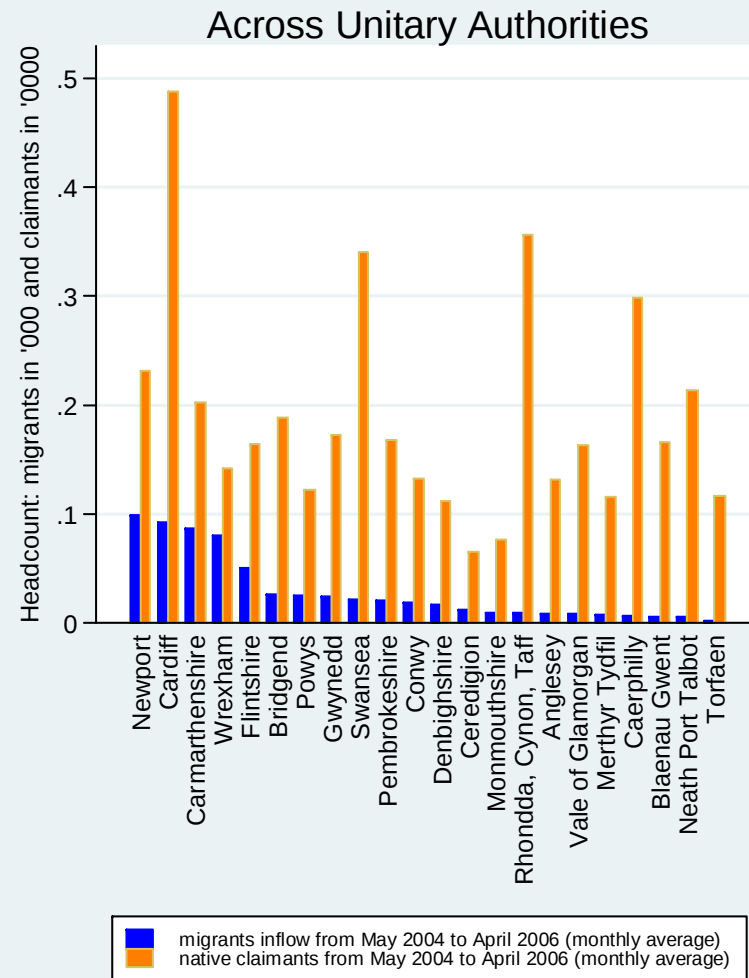
Source: Labour Force Survey and Average Earnings Index data (seasonally adjusted)

Figure 6 - Wage Growth

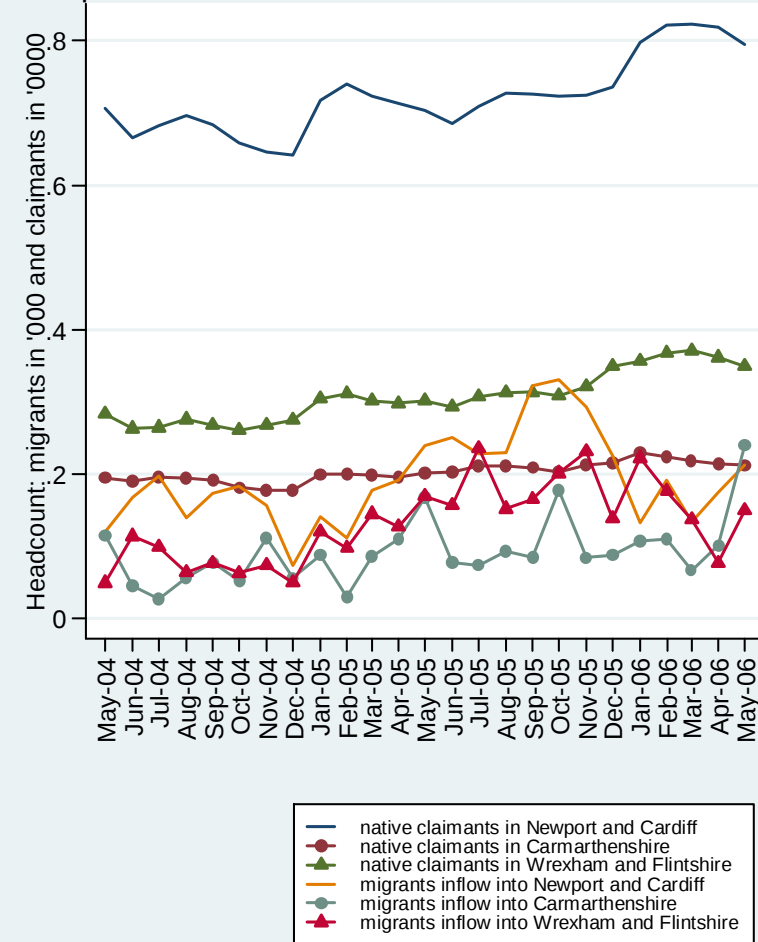


Source: Worker Registration Scheme data

Figure 7 - Migration Inflow and Claimant Unemployment

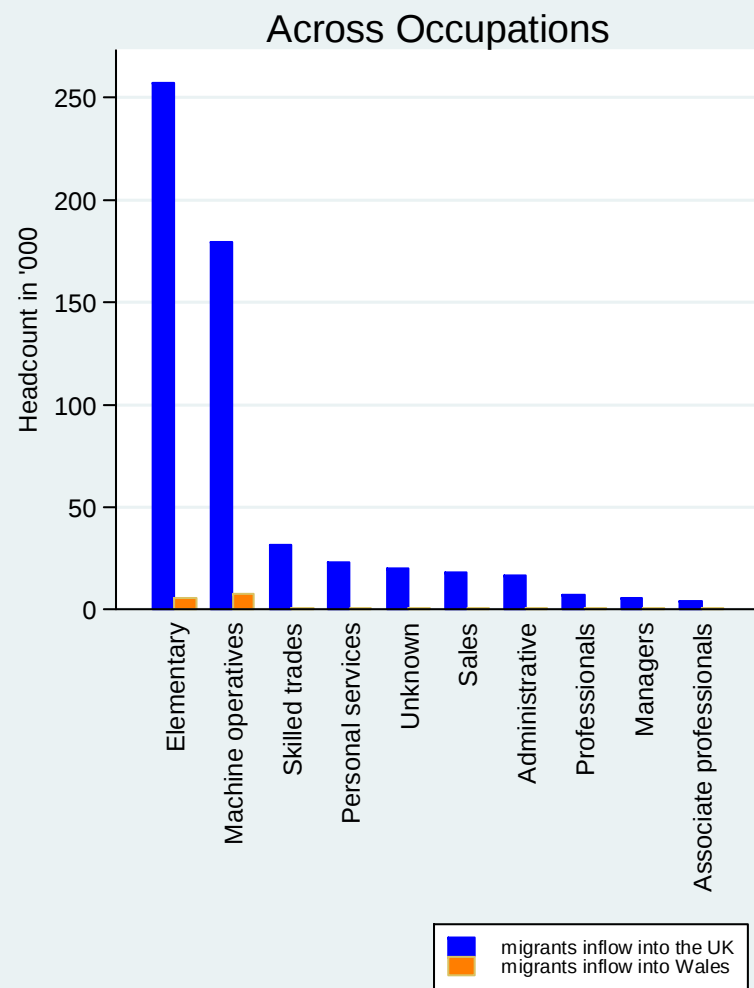


Newport, Cardiff, Carmarthenshire, Wrexham and Flintshire

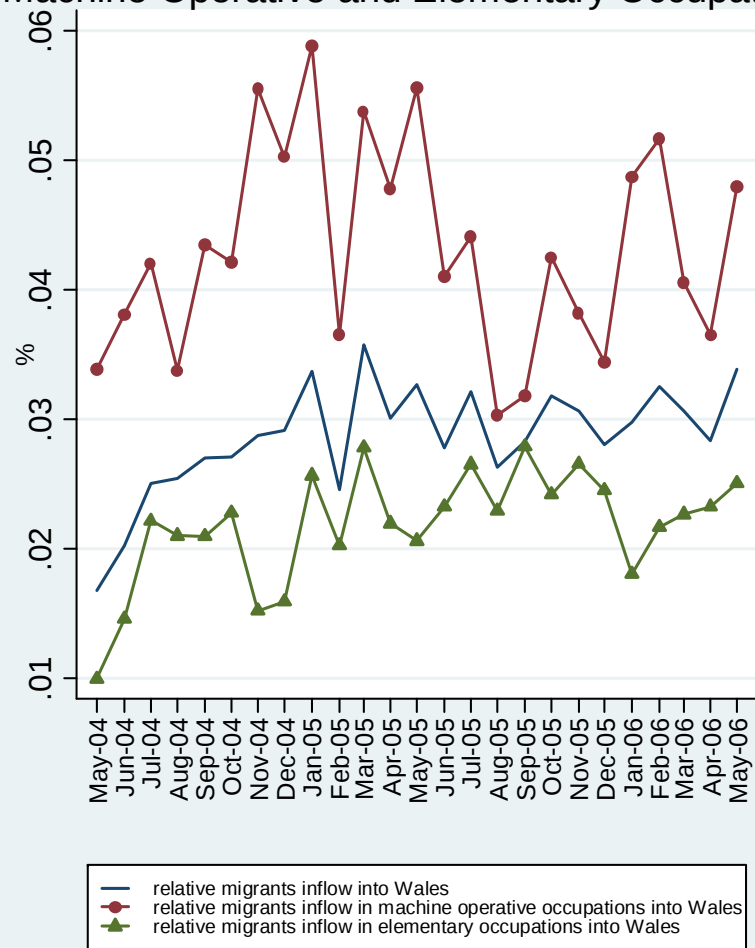


Source: Worker Registration Scheme data and Jobseeker's Allowance data

Figure 8 - Migration Inflow

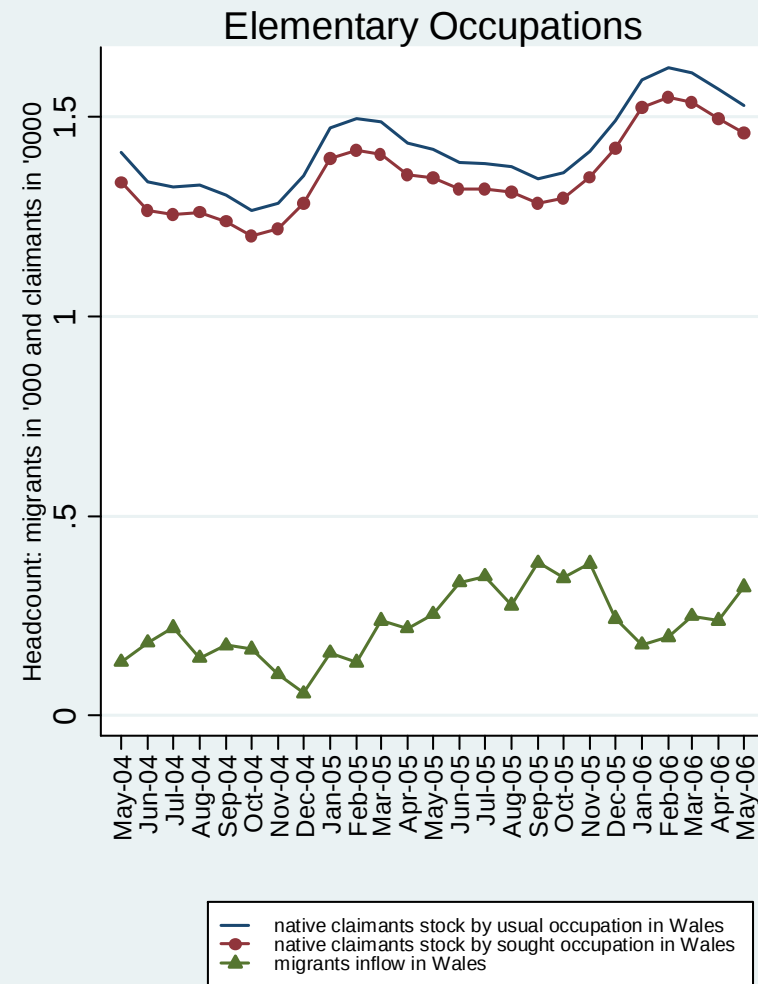
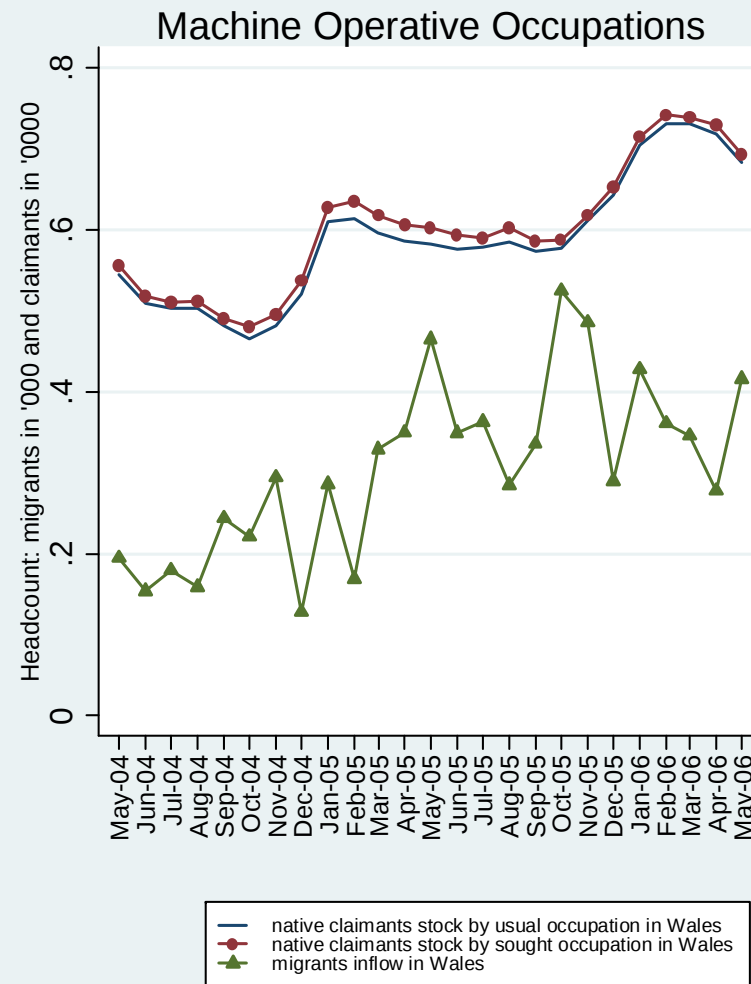


Machine Operative and Elementary Occupations



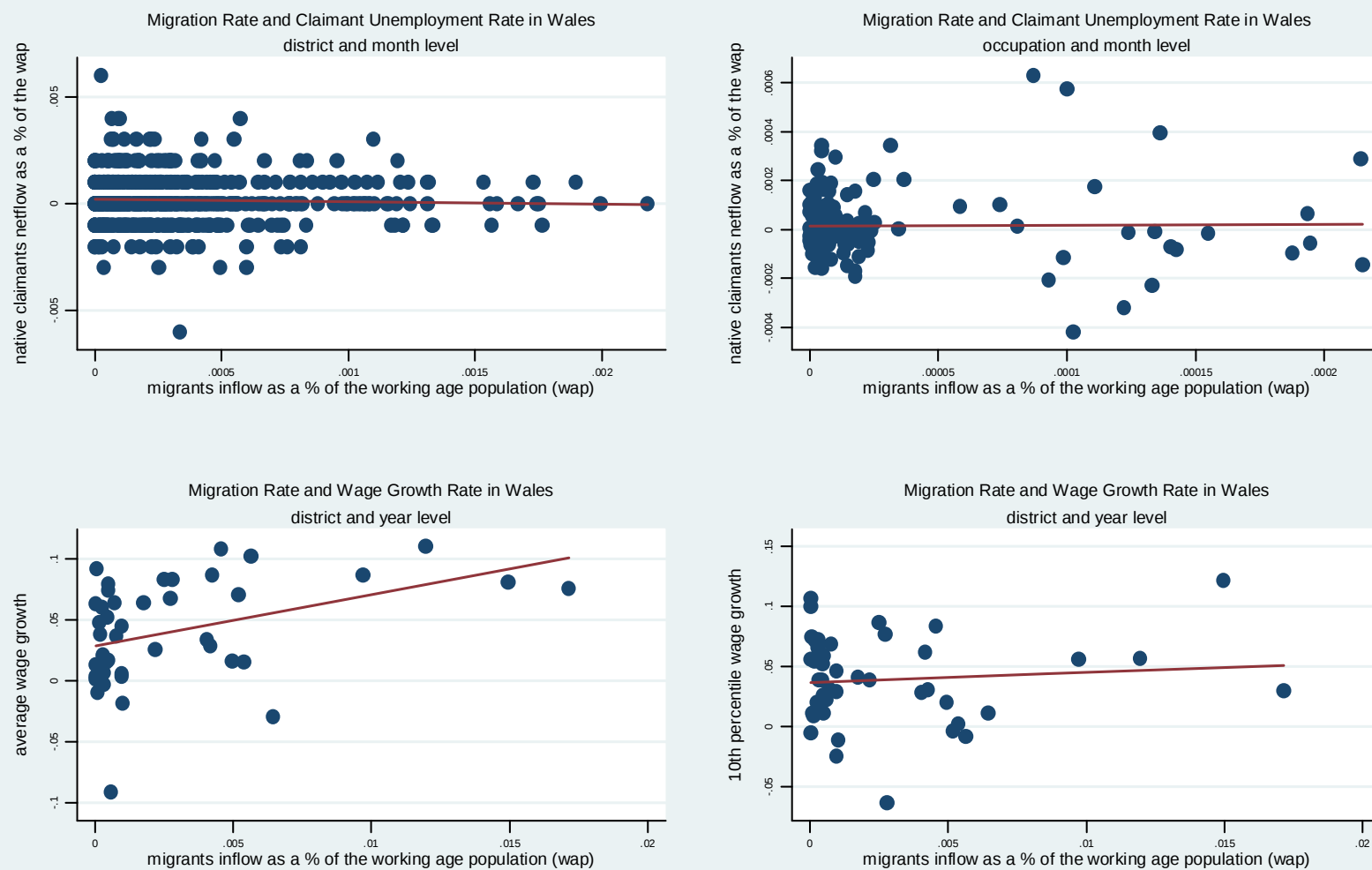
Source: Worker Registration Scheme data

Figure 9 - Migration Inflow and Claimant Unemployment



Source: Worker Registration Scheme data and Jobseeker's Allowance data

Figure 10 - Migration Rate, Claimant Unemployment Rate and Wage Growth



Source: Worker Registration Scheme data, Jobseeker's Allowance data and Annual Survey of Hours and Earnings data

Table 1 - DESCRIPTIVE STATISTICS

VARIABLES	WRS		JSA		ASHE		LFS	
	May 2004 - May 2006		May 2004 - May 2006		May 2004 - May 2006		April 2004 - June 2006	
	migrants		claimants		workers		UK born	Overseas born
I - POPULATION VARIABLES - % of those who are:	UK	Wales	UK	Wales				
Aged:								
under 16 years old	0.00	0.00	-	-	na	na	0.21	0.08
16 to 24 years old	0.37	0.37	0.30	0.35	na	na	0.12	0.11
25 to 34 years old	0.45	0.43	0.24	0.23	na	na	0.12	0.24
35 to 64 years old	0.18	0.21	0.45	0.41	na	na	0.40	0.44
over 65 years old	0.00	0.00	0.00	0.00	na	na	0.16	0.13
Women	0.43	0.38	0.74	0.76	na	na	0.51	0.52
Parents (with dependent children)	0.06	0.06	na	na	na	na	0.27	0.32
Blacks	-	-	na	na	na	na	0.01	0.12
Asians	-	-	na	na	na	na	0.02	0.25
Nationality:								
Polish	0.61	0.67	na	na	na	na	-	0.02
Lithuanian	0.12	0.08	na	na	na	na	-	0.01
Slovakian	0.10	0.13	na	na	na	na	-	0.00
Latvian	0.07	0.03	na	na	na	na	-	0.00
Located in:								
London	0.17	-	0.19	-	na	na	0.09	0.41
South East	0.14	-	0.08	-	na	na	0.14	0.13
East of England	0.12	-	0.07	-	na	na	0.09	0.08
East Midlands	0.09	-	0.06	-	na	na	0.07	0.05
Yorkshire and the Humber	0.08	-	0.09	-	na	na	0.09	0.06
West Midlands	0.08	-	0.11	-	na	na	0.09	0.07
North West	0.08	-	0.12	-	na	na	0.12	0.07
South West	0.08	-	0.05	-	na	na	0.09	0.05
Scotland	0.08	-	0.10	-	na	na	0.09	0.04
Northern Ireland	0.04	-	0.03	-	na	na	0.03	0.01
Wales	0.03	-	0.05	-	na	na	0.05	0.02
North East	0.01	-	0.05	-	na	na	0.05	0.02
II - LABOUR MARKET VARIABLES - % of those who are in:								
Occupations:								
elementary occupations	0.46	0.36	0.35	0.34	na	na	0.11	0.14
machine operatives occupations	0.32	0.49	0.10	0.14	na	na	0.08	0.07
skilled trades occupations	0.06	0.05	0.11	0.12	na	na	0.12	0.08
personal services occupations	0.04	0.04	0.05	0.05	na	na	0.08	0.08
unknown occupation	0.04	0.00	0.01	0.01	na	na	0.00	0.00
sales and customer service occupations	0.03	0.02	0.13	0.12	na	na	0.08	0.07
administrative occupations	0.03	0.02	0.10	0.10	na	na	0.13	0.09
professional occupations	0.01	0.01	0.04	0.00	na	na	0.12	0.17
managers and senior officials	0.01	0.01	0.04	0.03	na	na	0.15	0.15
technical occupations	0.01	0.01	0.06	0.06	na	na	0.14	0.15
Sectors:								
manufacturing	0.31	0.48	na	na	na	na	0.13	0.11
distribution, hotels & restaurants	0.27	0.23	na	na	na	na	0.19	0.21
transport & communication	0.09	0.07	na	na	na	na	0.07	0.08
agriculture and fishing	0.08	0.02	na	na	na	na	0.01	0.01
banking, finance & insurance etc	0.08	0.06	na	na	na	na	0.15	0.19
public admin, educ & health	0.06	0.06	na	na	na	na	0.28	0.28
construction	0.04	0.03	na	na	na	na	0.08	0.05
other services	0.02	0.02	na	na	na	na	0.06	0.06
energy and water	0.00	0.00	na	na	na	na	0.01	0.01
Part time	0.08	0.05	na	na	na	na	0.26	0.22
Employment rate	-	-	-	-	na	na	0.76	0.67
Unemployment rate	-	-	-	-	na	na	0.05	0.07
Average claim duration	-	-	31.32	29.83	na	na	-	-
Looking for a job in their usual occupation	-	-	0.84	0.87	na	na	-	-
Average hours worked	37.83	38.77	-	-	na	na	36.87	38.37
					2004	2006	April 2004 - March 2006	
5th percentile hourly wage distribution	4.50	4.50	-	-	4.77	5.16	4.50	4.61
10th percentile hourly wage distribution	4.65	4.69	-	-	5.14	5.55	5.30	5.18
20th percentile hourly wage distribution	4.85	4.85	-	-	5.99	6.45	6.32	6.25
30th percentile hourly wage distribution	4.87	4.85	-	-	6.92	7.45	7.27	7.45
40th percentile hourly wage distribution	5.00	5.00	-	-	7.95	8.55	8.26	8.61
50th percentile hourly wage distribution	5.05	5.05	-	-	9.18	9.89	9.40	9.89
60th percentile hourly wage distribution	5.20	5.05	-	-	10.75	11.63	10.87	11.54
70th percentile hourly wage distribution	5.50	5.20	-	-	12.80	13.89	12.66	13.57
80th percentile hourly wage distribution	6.00	5.50	-	-	15.56	16.92	15.18	16.56
90th percentile hourly wage distribution	6.73	6.20	-	-	20.47	22.29	19.24	21.63
Average hourly wage distribution	5.56	5.32	-	-	12.04	13.09	11.31	12.18
Standard deviation hourly wage distribution	2.03	1.66	-	-	na	na	6.96	8.10
Adult minimum wage	4.80	4.80	-	-	4.50	5.05	4.80	4.80
number of observations	562930	16137	22016120	1039123	21915	23725	201294305	21169990

Source: Worker Registration Scheme data; Juseko's Advance data; Annual Survey of Hours and Earnings; and Labour Force Survey

(1) Variables not available or not defined in a particular dataset are indicated by "na" or "-". For example, the employment and unemployment rates are not defined for the WRSASHE or JSA, where all individuals are working/unemployed.

The proportion of parents from the LFS is for 2006 Q2, where the household weights used is based on 2003 population estimates as re-weighted household datasets are yet unavailable (the other figures are based on 2007 population estimates).

(2) As ASHE is not available at the micro level, we are unable to compute percentiles for the period 2004-2006; we instead report percentiles for 2004 and 2006 directly from the "ASHE tables" available from the ONS. Similarly, standard deviation is not available.

(3) As detailed in the text (see Section 2), the WRS measures inflows, whereas the JSA and LFS measure stocks. Therefore, the WRS figures are cumulative.

(4) National minimum wage (adult rate) is: £4.50 between 1 October 2003 and 30 September 2004; £4.85 between 1 October 2004 and 30 September 2005; £5.05 between 1 October 2005 and 30 September 2006.

Table 2 - UNEMPLOYMENT EFFECTS OF MIGRATION

Models	coefficient	s. errors
A - Twenty-Two-Way District Aggregation		
(1) Raw coefficient	-0.115	0.140
(2) Baseline specification	0.024	0.035
(3) Adding time effects	0.006	0.028
(4) Adding demand and supply controls	0.012	0.033
(5) Adding working age population growth	0.024	0.032
(6) Adding native netflow rate	0.017	0.032
(6a) UK	0.003	0.078
B - Seven-Way District Aggregation		
(1) Raw coefficient	-0.052	0.261
(2) Baseline specification	-0.038	0.173
(3) Adding time effects	0.010	0.104
(4) Adding demand and supply controls	-0.068	0.168
(5) Adding working age population growth	-0.137	0.214
(6) Adding native netflow rate	-0.143	0.219
(6a) UK	0.057	0.086
C - Three-Way District Aggregation		
(1) Raw coefficient	-0.227	0.558
(2) Baseline specification	-0.465	0.490
(3) Adding time effects	-0.539	0.465
(4) Adding demand and supply controls	-1.522	0.739
(5) Adding working age population growth	-1.522	0.731
(6) Adding native netflow rate	-1.439	0.721
(6a) UK	0.115	0.106

(a) These are GLS estimates weighted by the sample size used to calculate the dependent variable (except in row 1, where OLS unweighted estimates are shown).

(b) The dependent variable is the claimant unemployment rate and the independent variable of interest is the WRS migration rate (see Sections 3 and 4).

(c) Time fixed effects are modeled with month dummies; area fixed effects are differenced out. See Section 4 for discussion on demand and supply controls.

(d) The interpretation of the coefficient is that a 1 percentage point increase in the WRS migration rate changes the claimant unemployment rate by b percentage points.

(e) The estimates for the UK in row 6a of each panel are borrowed from Lemos and Portes (2008). The number of districts for the UK in panel A row 6a is 409, the number of counties for the UK in panel B row 6a is 49 and the number of government regions for the UK in panel C row 6a is 12 (one of which is Wales). Thus, the estimates for Wales in rows 1-6 and the estimates for the UK in row 6a of each panel are not directly comparable, though they follow the same pattern of ever broader aggregation.

Table 3 - UNEMPLOYMENT EFFECTS OF MIGRATION (robustness checks)

Models	coefficient	s errors
A - Twenty-Two-Way District Aggregation		
(1) Low Skilled	-0.011	0.005
(2) Young	-0.024	0.016
(3) Female	-0.010	0.008
B - Seven-Way District Aggregation		
(1) Low Skilled	-0.003	0.056
(2) Young	0.020	0.088
(3) Female	-0.023	0.061
C - Three-Way District Aggregation		
(1) Low Skilled	-0.413	0.256
(2) Young	-0.476	0.328
(3) Female	-0.398	0.298

(a) Notes as in Table 2.

(b) All estimates here to be compared with estimates in row (4) of each respective panel of Table 2.

Table 4 - UNEMPLOYMENT EFFECTS OF MIGRATION (by occupation)

Models	coefficient	s. errors
(1) Raw coefficient	0.141	0.139
(2) Baseline specification	0.097	0.114
(3) Adding time effects	0.024	0.120
(4) Adding demand and supply controls	0.035	0.064
(4a) Excluding machine operative occupations	-0.327	0.189
(4b) <i>UK Excluding machine operative occupations</i>	-0.049	0.089

(a) Notes as in Table 2. As before, time fixed effects are modeled with month dummies. Area and/or occupation fixed effects (and their interaction) are differenced out

Table 5 - WAGE EFFECTS OF MIGRATION

Models	5th percentile		10th percentile		20th percentile		30th percentile		40th percentile	
	coefficient	s. errors	coefficient	s. errors	coefficient	s. errors	coefficient	s. errors	coefficient	s. errors
Twenty-Two-Way District Aggregation										
(1) Raw coefficient	1.271	1.796	0.851	1.419	0.533	1.446	0.850	1.529	2.608	1.713
(2) Baseline specification	1.053	1.226	0.247	1.550	-0.259	1.852	0.261	1.864	1.540	1.989
(3) Adding time effects	1.032	1.467	2.619	2.018	2.382	2.044	3.213	2.011	3.983	2.060
(4) Adding demand and supply controls	1.360	1.429	2.845	2.190	2.410	2.294	3.079	2.181	4.175	2.343
(4a) UK	0.212	0.190	0.110	0.220	0.162	0.305	0.365	0.239	0.453	0.250

Models	50th percentile		60th percentile		70th percentile		80th percentile		90th percentile		Average wage	
	coefficient	s. errors	coefficient	s. errors	coefficient	s. errors	coefficient	s. errors	coefficient	s. errors	coefficient	s. errors
(1) Raw coefficient	3.254	1.702	2.437	1.690	4.715	2.059	-	-	-	-	4.214	1.481
(2) Baseline specification	2.128	2.216	1.099	1.881	3.777	1.763	-	-	-	-	2.745	1.463
(3) Adding time effects	4.973	2.602	3.957	1.312	5.486	1.908	-	-	-	-	3.140	1.210
(4) Adding demand and supply controls	5.004	2.735	3.874	1.497	5.222	2.316	-	-	-	-	3.378	1.254
(4a) UK	0.438	0.307	0.455	0.309	0.460	0.336	0.586	0.410	0.869	1.743	0.246	0.276

(a) Notes as in Table 2, except that the dependent variable is now the average and various percentiles of the wage distribution across years and districts.

(b) Estimates not available are indicated by "-". This is due to small sample size and/or non-reliability or non-availability of data points, as explained in detail in the "ASHE tables" available from the ONS. Even though where estimates for

Wales are missing corresponding estimates for the UK are reported, care should be taken as these suffer the same limitation: they are based on substantially smaller sample size (missing data points) and are here reported for completeness only.

(c) The estimates for the UK in row 4a of each panel are borrowed from Lemos and Portes (2008), where the number of districts is 409.