Abstract

In this paper we apply earnings equations for UK regions over 1982-1997. We find strong evidence of rapid convergence across regions regarding the determinants of individual wages (*ie* regional fixed-effects, gender gaps and returns to education and experience). Data on *average* regional earnings, by contrast, point at a worsening of UK regional inequalities and a rise in the North-South gap. Education accounts for most of the discrepancy between aggregate divergence and disaggregated convergence. First, London gained because its workforce became relatively more educated over the period. Second, returns to education increased nation-wide, which favoured the most educated regions (*ie* London). Third, returns to education were initially lower in London but they (partially) caught up with the rest of the country. Had returns to education and their distribution across UK regions remained stable over the period, the UK North-South divide would have decreased.

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Mind the Gaps:
The Evolution of Regional Inequalities in the UK 1982-1997

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1. Introduction

Inequalities across regions are a matter of great interest to policy makers and politicians as well as members of the general public. In the United Kingdom (UK), regional inequalities are widely acknowledged to be large and to have grown larger over the last two decades (Cabinet Office, 1999; *The Economist*, 1999). According to aggregate figures given by the Office for National Statistics (ONS), average earnings in London and the South East were respectively 121 percent and 103 percent of the national average in 1982. By 1997, earnings in London and the South East had risen to respectively 137 percent and 109 percent of the national average (Figure 1a). The coefficient of variation for average regional earnings, which nearly trebled over 1982-1997, gives further evidence of this growing gap (Figure 1b). Broadening the analysis to regional GDP per capita instead of average earnings does not make much difference.[1] Comparable inequalities across UK regions are also found for unemployment, educational attainments and even mortality. This has led many to speak of a "North-South Divide", opposing a prosperous South to an increasingly impoverished North (see in particular Cabinet Office, 1999).

This paper argues that these aggregate figures are not very informative and potentially very misleading about the extent and the evolution of regional inequalities in the UK. Using micro data, we show that, once the distribution of human capital is controlled for, the *regional returns* of all key labour market characteristics (education, experience and sex) and regional fixed-effects converged during the 1980s and 1990s. This is documented by Figures 2a-b, which consider the (fitted) nominal wage of a hypothetical 25 year-old with secondary education in full-time employment.[2]

The main explanations we offer to reconcile the apparent contradictions between Figures 1a-b and 2a-b are threefold. First, London had initially lower returns to education. The catch-up in returns to education implied large gains in average wages in London. In other words, disaggregated convergence caused aggregated divergence. Second, during the 1980s and 1990s, a rise in personal inequalities took place in all UK regions. This rise in wage inequalities is well reported in the literature. See Gosling *et al* (1996) or Machin (1996, 1998) for reviews of the evidence. Rising inequalities between skilled and unskilled, in combination with the uneven spatial distribution of human capital in this country, also contributed to magnify *aggregate* regional inequalities. Third, rising average educational attainment in London and the South East relative to the rest of the country also played a role in explaining the aggravation of regional inequalities.

These findings have potentially important implications to the extent that the fortunes of UK regions are primarily determined by their skill composition and that similar individuals

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[1] Cameron and Mullbauer (2000) argue that aggregate differences between UK regions are even larger than the ONS figures report.

[2] Similar trends are observed when considering different hypothetical individuals. This hypothetical individual is nonetheless of particular relevance as it may illustrate the case of a typical migrant.

make increasingly similar wages across UK regions. Before these issues are discussed further in the concluding section of the paper, the following section reviews the previous literature. Section 3 presents our methodology, Section 4 presents the details of our results, Section 5 discusses their robustness, and Section 6 concludes.

2. Analysing Regional Evolutions: Aggregate and Disaggregated Approaches

Analyses of regional evolutions can fall into two broad groups. Aggregate approaches tend to focus on a single aggregate variable at the level of each geographical unit and study its evolution over time. Disaggregated approaches, by contrast, use the individual or the firm as the unit of observation. This type of analysis relates individual outcomes to individual characteristics – location being one of them – in order to isolate common trends.

Following Barro and Sala-i-Martin (1992 and 1995), aggregate approaches have come to dominate the analysis of regional dynamics. In their pioneering work they popularised three new tools – absolute β-convergence, conditional β-convergence and σ-convergence – all inspired by the neo-classical growth model (Solow, 1956). In a world of closed economies with identical preferences, identical technologies, and after controlling for structural differences (*eg* natural resources or human capital), poor economies should grow faster than rich economies. In other words, this model predicts conditional β-convergence. Alternative tools have been developed and applied at the (European) regional level by Quah (1996). He highlights that β- and σ-convergence analyses are not able to capture subtle evolutions like the formation of convergence clusters. The approach he develops considers the full distribution of income across economies so that both the changes of the distribution and the changes within the distribution can be tackled. Panel data approaches to studying the evolution of aggregate incomes have also been developed (see de la Fuente, 2000, for a recent survey on these issues).

Subsequently, these tools have been applied for regional analysis in virtually every country where sufficient data was available. So far the evidence for the UK is not very conclusive. For UK regions, Dewhurst (1998) finds some convergence during slumps (*ie* the early 1990s) and divergence during periods of expansion in accordance with Figure 1b. Evans and Pentecost (1998), consistent with Figure 1a, find very limited evidence of σ-convergence and no evidence of declining regional inequalities.

Unfortunately, aggregate approaches barely say anything about the "how" and even less about the "why" of regional inequalities.[3] To *explain* regional inequalities, one would ideally want first to *account* for them and their evolution. By contrast, typical analyses only *describe* the evolution of aggregate incomes (and *condition* it on other variables).

This type of exercise calls for disaggregated approaches and the use of micro-data. In a broad sense, a very large amount of literature may fit in this group. Many studies using micro-data introduce regional dummies. But this is often without commenting on them in any significant way. Very often, regional dummies are only used as controls. Among the different threads of empirical work in regional analysis, the literature on regional labour markets is the most closely related to our work. However, the main purpose of this type of investigation is usually not to understand inequalities across regions and their evolution but to use cross-region variations to address issues mostly relevant to labour economics. For instance, Blanchflower and Oswald (1994) decompose earnings in UK regions and try to

[3] A related critique can be found in Martin and Sunley (1998).

correlate them with regional unemployment rates to investigate wage formation and the impact of unemployment on earnings.[4]

Closer to our focus, Blackaby and Murphy (1991) compute regional earnings equations in the UK to isolate regional and industry fixed-effects. Then they regress these fixed-effects on a set of aggregate regional characteristics. Blackaby and Murphy (1995) investigate more specifically the UK North-South divide in 1983 using regional earnings equations with a large number of controls.[5] They conclude that the North-South divide is mostly due to differences in individual characteristics between Northerners and Southerners.

These studies are relevant for our purpose but none of them investigates the dynamics of regional inequalities in the UK, our primary focus. Besides, in their investigation of the North-South divide, Blackaby and Murphy (1995) lump London and the South East together with the South West, East Anglia and the East Midlands as the "South". This may artificially rig the exercise against the existence of a North-South divide since their last three regions are not particularly "rich" according to the aggregate earnings. In their regressions, they also include variables like job tenure, ownership of a car and telephone, type of neighbourhood, *etc*. These variables are most likely to be determined simultaneously with the labour market outcome. This can lead to strongly underestimating the true regional inequalities.[6] Industry characteristics are also suspect in this regard. Location theory, trade theory and economic geography all argue that the industrial structure is endogenous. Moreover, for a typical year in the UK, less than 2 percent of the work force change region (McCormick, 1997), whereas around 10 percent of plants open or close down (Konings, 1995).

3. Data and Methodology

The questions we ask are the following:

- Do "similar" individuals have the same wage across UK regions?
- How have the differences, if any, evolved in the last 20 years?

Like Blanchflower and Oswald (1994) we treat regions as mini-economies. As shown below, this assumption is warranted by our results. We investigate regional inequalities and their evolution by examining regional labour market earnings. Our reasons for doing so are the following. First, in the absence of good disaggregated data for capital, it may be wiser to start the analysis of regional inequalities with labour income where good data is available. Second, under the reasonable assumption that capital is more mobile than labour, the marginal product of capital will be equalised across regions. Regional inequalities are thus more likely to have an impact on the labour side.[7] Third, from a policy perspective, regional earnings are likely to reflect differences in welfare more directly and accurately than regional products. For 1995-1998, the income derived from investments, annuities and pensions represented only 12 percent of the average gross weekly income in the UK with little variation across

[4] A good survey of this literature can be found in Blanchflower and Oswald (1994, chap. 2).

[5] Blackaby and Manning (1990) also investigate the UK North-South divide using earnings equation but their focus is more in the labour economics tradition.

[6] For instance, assume there are backward regions where workers earn less because of their location. These workers will have poor neighbours and will be unable to buy a car. If these last two variables are used in the earnings regression, the measured regional fixed-effects will strongly under-estimate differences in their true values.

[7] The measured differences in average returns to capital, as captured in the regional products, are then likely to reflect mostly differences in capital intensity across unevenly spread industries.

regions. Non-capital income represents for most households a very large fraction of their earnings.

The data we use is from the Family Expenditure Survey (FES) and from the General Household Survey (GHS). Both data sets record individuals at the level of administrative regions for the UK.[8] The data is described further in the appendix. Both data sets have their merits and their drawbacks. We give the FES priority because it contains data for all twelve UK administrative regions, whereas the GHS does not cover Northern Ireland, the country's poorest region. Besides, the recording of education in the FES makes it easier to decompose regional inequalities. The GHS is used to check the robustness of our findings. In particular, the information it contains about past mobility and housing tenure is useful to deal with spatial selection biases. Since no information is available about education prior to 1982 in the FES, we start our analysis at this date. Our final year is 1997, the last full year of FES data presently available. The period 1982-1997 is characterised by successive episodes of expansion, a sharp recession in the early 1990s and expansion thereafter.

We proceed in two steps. In our basic regressions, we follow Mincer (1974) and regress individual wages for full-time employees on sex, education, experience and its square. Each regression is run using a full set of regional dummy variables. As far as the estimated coefficients are concerned, this is equivalent to running separate regressions for each region. As individuals cannot be identified and followed over time, a separate cross-section is run for each available year of observation. This allows for each coefficient to vary across regions and across time. Thus for each region-year we obtain a constant (called hereafter the regional fixed effect), a gender gap and some returns to education and experience. Such a regression can be formally written as follows:

$$LW_i(j,t) = \beta_0(j,t) + \beta_1(j,t)SEX_i + \beta_2(j,t)EDU_i + \beta_3(j,t)EXP_i + \beta_4(j,t)SQEXP_i + \varepsilon_i(j,t) \quad (1)$$

where $LW_i(j,t)$ is the log of weekly earnings in year t for full-time employee i who lives in region j.[9] We interpret this variable as the nominal wage. The sex variable, SEX_i is coded 1 for females. EDU_i is the number of years in full-time continuous education. Labour market experience is not recorded but it can be proxied by potential experience, EXP_i, calculated as the age minus the age of completion of full-time education, which is traditionally measured as the number of years in full-time education plus 5. Finally $SQEXP_i$ is the square of the previous term.

Data on regional prices allow us to calculate $LRW_i(j,t) = Log(W_i(t)/PRICE(j,t))$, the logarithm of the real weekly earnings. Equation (1) can thus be re-written:

$$LRW_i(j,t) = \beta_0^R(j,t) + \beta_1(j,t)SEX_i + \beta_2(j,t)EDU_i + \beta_3(j,t)EXP_i + \beta_4(j,t)SQEXP_i + \varepsilon_i(j,t) \quad (2)$$

where the real regional fixed-effect, $\beta_0^R(j,t)$, is equal to the nominal regional fixed-effect

[8] The New Earnings Survey, which is the other main source of data available in the UK for labour market analysis at the individual level, cannot be used here as it lacks information about education.

[9] The FES does not report hours consistently. Unfortunately, the GHS suffers from similar problems. The earnings are "normal weekly earnings" whereas the hours refer to total number of hours in the previous week. To get round this problem, we consider only individuals who categorize themselves as full-time workers in this first analysis. Unemployed and part-timers are dealt with in Section 5. To avoid selection issues related to self-employed we restrict our analysis to employees.

minus the log of regional prices: $\beta_0^R(j,t) \equiv \beta_0(j,t) - LPRICE(j,t)$. Thus the same analysis can be performed for real wages without any further regression. The coefficients on sex, education and experience are not affected. The real regional fixed effect of a given region-year can be calculated directly as the difference between the corresponding nominal fixed and log regional prices.

In this parsimonious specification (hereafter basic regressions), we do not introduce any industry variable nor further controls to avoid the endogeneity problems highlighted above.[10] The variables we use are assumed to be exogenous to the labour market outcome of individuals. This is obviously a problem for a variable like education, as the measured returns to education will also include an unobserved ability component. Since our goal here is not to estimate the "true" returns to education, this does not matter here provided there is no spatial bias in the distribution of unobserved abilities. This selection bias can take three main forms.

Consider first a situation with immobile individuals. Unobserved regional fixed-effects could lead to different educational choices for youngsters of similar abilities (or different participation choices for females). For instance, a region-specific, high-return activity that does not require much educational credentials may lead some bright youngsters to leave school early in this region. For the UK over the 1980s and 1990s, this seems unlikely.

A second type of selection bias could be due to migration patterns leading to an uneven spatial distribution of unobserved abilities. For instance, it seems *a priori* very plausible that London attracts individuals with higher unobserved abilities commanding higher wages. Although this type of bias is important in the literature dealing with smaller geographical units like neighbourhoods or cities, it is far from being a prominent concern in the regional literature. To deal with this potential selection bias, we run some enriched regressions where we introduce some occupational dummies (unskilled, skilled and professional). These occupational dummies will capture an unobserved ability component and thus correct partly for spatial selection biases. Using the GHS we also control for past mobility and home ownership.[11]

Third, unobserved individual abilities may also affect the probability of being in full-time employment. The distribution of unobserved characteristics in the overall population across regions may be the same. However, if the probability of finding a full-time job differs across regions, the distribution of unobserved characteristics for individuals at work across regions will be different. This may potentially bias our estimates. Beyond this, differences in the probabilities of being unemployed (or being employed only part-time) may constitute an important facet of regional inequalities. These differences are also interesting *per se*. To investigate them, we perform simple probit/logit regressions to estimate the likelihood of being unemployed and working part-time as a function of sex, education and experience. We also run a two-step estimation of our hedonic wage equation to correct for the selectivity bias induced by unemployment.

Turning to the second step of the analysis, note that for each variable in our regressions, a different coefficient is obtained for each year and each region. While still possible, it is difficult to plot the evolution of a given variable for all 12 regions in the same figure and get a clear picture. To analyse our results, we use four main devices.

First, for each variable, we compare the range for the coefficients at the beginning and

[10] Besides, it seems that industries can account for only a very small fraction of regional inequalities as shown by Esteban (2000) in the European case.

[11] Since the most likely spatial selection bias is probably about higher unobserved abilities in London, any failure to correct for this when London stands out as being "richer" may lead to overestimates of the true regional inequalities. In such a case, our analysis may only give upper bounds for UK regional inequalities.

the end of the period. This informs us about the evolution of maximum dispersion in the distribution. A reduction in the range is a first indication of a decrease in disparities.

Second, the coefficient of variation is calculated for each variable and for each year of observation and a simple time-series plot is constructed. This measures the evolution of average relative dispersion in the distribution. It is akin to the usual concept of σ-convergence. The major difference is that the coefficient of variation is used instead of the variance. The reason is that some variables may follow a national upward or downward trend. Such a trend will mechanically affect the cross-region variance of the coefficients.

Third, we calculate a trend in time-series for each variable and each region with a simple OLS. The intercept for 1982 for each region is also calculated. Then we plot the 1982-97 trend (on the Y-axis) and the 1982-intercept (on the X-axis) of any given variable for all regions on the same figure. This plot, along with a fitted regression line, is referred to as the "trend and intercept figure" (or T-I figure). Mean-reversal is observed when the trends for 1982-1997 are inversely correlated with the 1982 intercepts. By contrast a positive correlation between the intercepts and the trends indicates divergence. This third measure is especially important as it tells us how individual regions move within the distribution. Further, the inverse of the slope of the OLS in the T-I figure can be interpreted as a "convergence period".

This concept bears some resemblance with the more traditional concept of β-convergence. The first difference is that β-convergence relies only on the first and last year of data. In our case, the coefficients are estimated and not directly observed. It is thus more reasonable to use the information for all years and smooth it by calculating a trend.[12] Secondly, the trend is taken to be linear and not log-linear as with β-convergence. The main reason for this choice is that there is no reason to suspect an exponential evolution for variables such as the sex dummy or the returns to education.[13] Like β-convergence, T-I analysis may hide more subtle evolutions like the formation of convergence clusters. This is true when the number of regions is large. However, for the UK – with only 12 points – detecting more subtle evolutions is possible simply by looking carefully at the T-I figure. It is also easy to see if mean-reversal or its absence is driven by some particular outlier(s).

Finally, we decompose the aggregate changes across regions between the beginning of the period (1982-83) and the end (1996-97). To do this, we use the temporal generalisation of the Oxaca (1973) decomposition proposed by Wellington (1993). This decomposition allows us to account precisely for the evolution of regional inequalities. To keep this decomposition simple, however we will compare only London with the "nine regions" (other UK regions minus Northern Ireland and the South East), a grouping justified by the results obtained with the other three devices.

4. Results

4.1 General issues with the basic regressions

With four variables and a constant in 12 regions over 16 years, we estimate 960 coefficients

[12] It is all the more important to use every available year as the errors on the trend are negatively correlated with those on the intercepts. This bias decreases as more points are considered. In our case, we need not worry too much about this problem since our coefficients are in most cases precisely estimated (see below).

[13] We do not attempt to correct for business cycles either. Our period is characterised by two long periods of expansions separated by a sharp recession. Since this recession occurred in the middle of our period, the bias on the linear trend is probably very limited.

(see tables A1-A2 in appendix). More than 95 percent of them are highly significant (0.1 percent threshold). Only 10 fail to be significant at the 5 percent level. The female dummy is insignificant for five years in Northern Ireland, probably because of its small sample sizes. In various regions, four other insignificant coefficients on squared experience and one on education are obtained in 1987 and 1988 - years for which the FES sample was much smaller.

The mean R-squared over the 12 regions for the whole period is 38.6 percent. Such good results are standard for this type of exercise. The extreme bounds are 53.9 percent in the East Midlands in 1987 and 20.4 percent in London in 1996.[14] There is a tendency for R-squared to decline on average by about one percentage point every two years. This decline is consistent with previous findings and can be interpreted as a rise of within-group inequalities (see Gosling *et al*, 1996, or Machin, 1996, 1998) for surveys on wage inequalities in the UK).

Before turning to regional differences, it is helpful to look at the evolution of the un-weighted mean of the coefficients on each variable over the 12 regions (reported in table A3 in appendix).[15] The trends are very clear and our results are close to those obtained by running a national regression without any regional variables. We observe (i) a slight decline in the fixed-effects, which corresponds to the basic wage of a hypothetical uneducated male with no experience; (ii) a strong decrease of around one fourth in the gender gap; (iii) a strong increase of around one fifth in the returns to education, (iv) an increase of around one sixth in the returns to experience and (v) a faster depreciation of experience (the returns to experience peak about three years earlier in the mid 90s than in the early 80s). These results are very much in line with previous findings regarding the evolution of wage inequalities in the UK.

When testing the equality of the coefficient across regions, it is found that the null hypothesis of equality across regions must be rejected. Wald tests indicate that in 40 percent of the cases, the coefficients are different across regions. Equality is rejected at least for some years for all five coefficients we estimate. These results strongly support our decision to treat regions as mini-economies. Despite regions generally having different regional fixed-effects, gender gaps and returns to experience and education, most regions followed a similar path. The results for the basic regressions (equation 1 or 2) are reported in tables A1-A2. The trend for the real regional fixed-effects is negative or very close to zero in all regions but Northern Ireland. The gender gap decreases everywhere. Returns to education and to experience increase everywhere except Northern Ireland (and the negative coefficient on squared experience decreases everywhere but in Northern Ireland). Our conclusion at this stage is that, despite being different, UK regions tend to follow a national trend.[16]

The coefficients are also found to exhibit some time-series volatility. Even when coefficients are constrained to be equal across regions (national regression), they remain volatile, albeit slightly less so. For instance in our basic regressions, the mean variance of the regional fixed-effects over 1982-1997 is 0.0752. The variance of the national constant in a national regression over the same period is 0.0655 – that is 85 percent as high as previously. Small sample size is probably the second main reason for this volatility since the highest volatilities are observed for the two smallest regional samples: Northern Ireland and Wales.

4.2 Regional convergence in the price of characteristics

The most important feature emerging from our results is the strong tendency for the coefficients on all characteristics to converge across regions. This can be evidenced by the

[14] Note that the mean R-square for London is only 28.5 percent. This gap between London and the rest of the country is discussed below.

[15] Weighting the average by regional population or regional sample size does not modify these trends.

[16] The presence of national effects seems fairly prevalent in Europe - see Rodríguez-Pose (1998).

comparison of the ranges at the beginning and the end of the period, the T-I figures and the evolution of the coefficients of variation.

The range in the real regional fixed-effects at the beginning of the period (average for 1982 and 1983) was very large at 0.90 (from 3.35 in Northern Ireland followed by the North West with 3.77 to 4.25 in London at the other extreme). For the end of the period (average for 1996 and 1997), the range is much smaller at 0.41 (minimum for Northern Ireland at 3.72 and a maximum for London at 4.13). The T-I Figure (3a) gives further support to convergence in real regional fixed-effects. The convergence period can be easily computed at 22 years. Although the concept of convergence used here is different from β-convergence, it is much higher than the usual finding in the literature of 2 percent per year - corresponding to 50 percent of the gap being closed every 35 years. This high rate of convergence is not driven only by Northern Ireland being unusually poor but catching up. Ignoring this extreme case yields only slightly weaker results (convergence period 35 years). The finding is corroborated by the evolution of the coefficients of variation (Figure 3b) whose trend indicates a reduction of around one fourth over the period.

Before going any further in the analysis, the effects of cross-region price differences must be discussed. The regional price index we use is a "required incomes" price index, which includes housing.[17] Since this index implicitly assumes no substitution across goods, it probably over-estimates cross-region differences in price levels. This index shows some divergence (see the T-I Figure 4a). The coefficient of variation increases between 1982 and 1989. It then strongly decreases until 1993 and remains constant over 1993-97 (see Figure 4b).

Adding log prices to real regional fixed-effects yields nominal regional fixed-effects.[18] The latter also experience mean-reversal, albeit at a slower pace than the real fixed-effects. The convergence period is 44 years (instead of 22). This suggests that regional equalisation is occurring in real terms and not in nominal terms. Further supporting evidence for this can be gathered from national regressions. In a national regression with regional dummies (the coefficients on all variables are constrained to be equal – only the constants are allowed to vary across regions), the latter are much more significant and also much larger when the real wage is used as the dependant variable instead of the nominal wage.

Turning to the gender gap (*ie* the wage penalty associated with being a woman on the labour market), the initial range was also very large at 19 percent (from 43 percent in South East to 26 percent in Northern Ireland and 24 percent in London). By the end of the period, the range for the gender gap had fallen to 14 percent (19 percent in London and 33 percent in East Anglia). Further evidence of convergence can be gathered from the T-I Figure (5a). The convergence period is 26 years. Even when the two regions with the lowest gender gaps are ignored, mean-reversal is still found. The gender gap, however, shows no decrease in its coefficient of variation over 1982-1997 (Figure 5b). There was an increase between 1982 and 1986 and then a sharp decline until 1990 and since then a slight increase. Relative dispersion increased because, on average, the gender gap fell by 9 points over the period. This decline has been faster than convergence in absolute terms. Consequently, differences in relative terms (as captured by the coefficient of variation) have risen slightly.

For education, the annual returns were initially ranging from 6.0 percent in London to 9.6 percent in the North West and 10.5 percent in Northern Ireland. At the end of the period the extremes remained: London at 7.4 percent at the bottom end and Northern Ireland at 10.4 percent, followed by Yorkshire at 10.3 percent at the top end. Thus the range fell by more

[17] See the appendix for more information about this index.

[18] As remarked above, due to the log-linear specification, regional prices do not directly play any role in the evolution of the other variables.

than one third from 4.5 percent to 2.9 percent. The T-I Figure (6a) for the returns to education indicates mean-reversal. It is robust to the exclusion of Northern Ireland. The convergence period, at 35 years, is slower than for the other variables. This is partly due to London, which has persistently lower returns to education and converges only slowly with the rest of the country. Convergence is also found in the evolution of the coefficients of variation (Figure 6b).[19]

For experience and squared experience, convergence is very strong. The lowest returns were initially in the North with 4.8 percent whereas the highest were in Northern Ireland with 7.9 percent. By the end of the period, the range had fallen from 3.1 percent to 1.4 percent with the extremes being the South West with 5.5 percent and East Anglia with 6.9 percent. The T-I Figures (7a and 8a) also show remarkable mean-reversal for both variables. The convergence periods are respectively 12 years for experience and 9 years for squared experience. For both variables, the coefficients of variation nearly halve during the period (Figures 7b and 8b).

Overall, the prices of labour market characteristics, alongside regional fixed-effects, have converged across UK regions over 1982-1997. Convergence is very strong for the coefficients on experience and squared experience. It is also significant, albeit less dramatic, for education, the gender gap and regional fixed-effects. Convergence in every single dimension stands in sharp contrast with the rising wage gaps observed in the aggregated figures. This discrepancy can only be resolved by looking at regional structures.

4.3 Regional differences in regional structures

The first interesting variable to look at is female participation. There has been a large increase in female participation in the UK of around 7 points and this increase has been strongest in regions where the gender gap was initially highest. In the beginning of the period, the range was 9 percent (26 percent in the East Midlands and 35 percent in London). By the end of the period, it was at 6 percent (34 percent in East Anglia and 40 percent in London). Convergence can also be evidenced by the T-I Figure (9a) documenting women participation in the full-time workforce in UK regions.

Regarding experience, the pattern is more complex. Overall, mild structural divergence is observed. The initial range was around two years (19.8 years in London and 21.8 in the North) whereas the final range is about four years (18.3 in London and 22.3 in Wales). The T-I Figure (9b) for the evolution of the distribution of experience across regions also implies some divergence. A closer look at the picture reveals two groups of regions (convergence clubs). On the one hand, the workforce in London and Northern Ireland, which was less experienced at the beginning of the period, became relatively even less experienced by the end of the period. On the other hand, all the other regions converged within a convergence club.

For education, divergence is also evident. The initial range was 1.3 years (10.6 years in the North and 11.9 in London). The final range was slightly larger at 1.4 years (12.0 in the North and 13.4 in London). Divergence appears is more apparent in the T-I Figure (9c) regarding the level of education of the workforce by region.

4.4 Decomposing the evolution of regional inequalities

Further insights can be gained by decomposing the evolution of regional inequalities. For

[19] Convergence in the returns to education is consistent with the greater expansion of higher education in the regions where the returns to education where initially higher.

simplicity, we consider only the evolution of regional inequalities between London and the nine regions between 1982-83 and 1996-97 (the South East and Northern Ireland were shown to have a fairly different behaviour).

From the estimation of equation (1), the (geometric) mean wage for each region-year is given by $LW(j,t)=\beta(j,t)X(j,t)$ where β is the vector of coefficients $(\beta_0,\beta_1,\beta_2,\beta_3,\beta_4)$ and X is the vector of the mean of all characteristics (location, sex, education, experience, and its square). In particular, we can calculate $LW(L,1)=\beta(L,1)X(L,1)$ and $LW(L,2)=\beta(L,2)X(L,2)$ for London for 1982-83 and 1996-97 respectively (un-weighted mean between the two years). By taking the weighted mean across the nine regions for 1982 and 1983 as well as 1996 and 1997, we can also obtain $LW(N,1)=\beta(N,1)X(N,1)$ and $LW(N,2)=\beta(N,2)X(N,2)$. It is easy to show that the rise in aggregate inequalities $(LW(L,2)-LW(N,2))-(LW(L,1)-LW(N,1))$ between London and the nine regions can be decomposed as follows:

$$(LW(L,2)-LW(N,2))-(LW(L,1)-LW(N,1))=C_1+C_2+C_3+C_4 \qquad (3)$$

with
$$C_1=(\mathrm{X}(L,1)-\mathrm{X}(L,2))(\beta(N,2)-\beta(L,2))$$
$$C_2=\beta(N,2)((\mathrm{X}(L,2)-\mathrm{X}(N,2))-(\mathrm{X}(L,1)-\mathrm{X}(N,1)))$$
$$C_3=(\mathrm{X}(N,1)-\mathrm{X}(L,1))(\beta(L,1)-\beta(L,2))$$
$$C_4=\mathrm{X}(N,1)((\beta(L,1)-\beta(N,1))-(\beta(L,2)-\beta(N,2)))$$

There are four main components to this decomposition. The first component, C_1, is the part due to changing characteristics (taking London as a base) valued at the difference in β at the end of the period. The second component, C_2, is the part due to changes in cross-region differences in the characteristics (valued for the β in the nine regions at the end of the period). The third component, C_3, is the part due to changing prices (taking London as a base) for the initial differences in characteristics. The final term, C_4, is the part due to changes in cross-region price differences (valued for the β in the nine regions for the initial period). Other decompositions are certainly possible but they all point at the same phenomena. The results are detailed in Table 1.

Table 1
Decomposition of the increase in regional inequalities between London and the nine regions

Increase in regional inequalities 1982-1997		
	0.05538	100.0%
Component 1: part due to changes in characteristics		
Gender	0.00535	9.7%
Education	-0.02827	**-51.0%**
Experience	0.00535	9.7%
Component 2: part due to the changes in cross-region differences in characteristics		
Gender	0.00886	16.0%
Education	0.03255	**58.8%**
Experience	-0.01980	**-35.8%**
Component 3: part due to changes in prices		
Gender	0.00348	6.3%
Education	0.01327	**23.9%**
Experience	-0.00354	-6.4%
Component 4: part due to changes in cross differences in returns		
Fixed-effects	-0.01770	**-32.0%**
Gender	-0.01215	-21.9%
Education	0.06364	**114.9%**
Experience	0.00435	7.9%
Total	0.05538	100.0%

Note first that the evolution of the nominal fixed-effects led to greater regional equalisation. The decline of the London premium for the regional fixed-effects accounts for 32 percent of the rise in regional inequalities between London and the nine regions (component 4). Gender variables account overall for 10 percent of the increase in regional inequalities. This small aggregate effect is the result of conflicting price and composition effects. The national increase in female participation implied an increase in regional inequalities due to the lower gender gap in London (component 1). The relatively stronger increase in female participation in the nine regions reinforced this push towards greater inequalities (component 2). The national decline in the gender gap also led to greater inequalities due to the higher female participation rate in London (component 3). However the stronger relative decline in gender gap in the nine regions pushed towards equality (component 4). Regarding experience, the overall effect is one of cross-region equalisation (-24.6 percent). It can be broken down into four different components of different signs. The most important of them is the increase in the experience gap between London and the nine regions (component 2). The relative decline in experience in London pushed towards greater equalisation.

The total effect of the regional fixed-effects, gender and experience variables is negative and accounts for -47 percent of the rise in inequalities. In other words, if it were not for the last variable (*ie* education), regional inequalities between London and the nine regions would have decreased significantly.[20] Overall education accounts for 147 percent of the increase in regional inequalities. However when the contribution of education is broken down into four components, they do not all go in the same direction. The national rise in educational attainment of the workforce reduced regional inequalities fairly significantly

[20] On FES data, mean wages in London rose from 116 percent in 1982-83 to 120 percent of the UK average in 1996-97. Without anything occurring on the education front, mean wages in London would only be 111 percent of the UK average in 1996-97.

because of lower returns to education in London (-51 percent, component 1). However the stronger increase in the education of the London workforce (component 2) accounts for 59 percent of the overall increase in inequalities. The national rise in returns to education also favoured London at the expense of the nine regions and accounts for 24 percent of the rise (component 3). The most important term is however the part due to the returns to education in London catching-up with those in the rest of the country. This term alone explains 115 percent of the increase in regional inequalities.

It is interesting to note that across all variables, the fourth component, which is the part due to convergence, accounts for 69 percent of the rise in inequalities. This highlights the importance of taking a disaggregated approach to regional inequalities. In the UK between 1982 and 1997, the most important cause of the increase in aggregate inequalities is convergence in the returns to labour market characteristics (experience and education).

It is possible to go a little further in the analysis by noting that the evolution of regional prices for goods and housing on the one hand and that of the returns to labour market characteristics on the other are unrelated. There is, however, a positive link between the evolution of regional prices and that of the population in UK regions. Over the period, the population of London and the South East increased by 6.5 percent against 3.3 percent for the nine regions. There is thus an agglomeration movement of the population towards London and the South East. This agglomeration movement may have been triggered by the initially more favourable sectoral composition of this area (business services, high tech, *etc*). This rise in demand for labour attracted more workers, which in turn caused a rise in the demand for other types of workers (personal services, *etc*). This may be a case of cumulative and circular causation leading to more agglomeration in the South East of England. This created some stress on regional prices and in particular land prices with large increases in London and the South East. These prices effects may be so important as to make these two regions unaffordable for the least skilled workers – many of whom end up leaving these two regions (Jackman and Savouri, 1992; Hughes and McCormick, 1994). This may explain the increasingly uneven distribution of skills observed in the country.[21]

Our approach to regional convergence/divergence is different from that of the literature that tends to focus only on the study of the cross-sectional evolution of one aggregate variable. Our disaggregated approach allows us to go much deeper by decomposing earnings in each region as the product of a set of labour market characteristics by a vector of returns to these characteristics. With equation (1), mean log wage in a region is the sum of a regional fixed effect plus the proportion of women multiplied by the gender gap plus the average education multiplied by the returns to education, *etc*.

Potentially, the evolution of regional inequalities can be accounted for by four processes. First, some characteristics may increase in all regions (*eg* female participation) but since the returns to these characteristics differ, this will impact on regional incomes differently. Second, some characteristics may increase more in a region than in the others (*eg* education in London). This also modifies regional differentials. Third, returns to some characteristics may increase in all regions. This will also impact on regions unevenly when these characteristics are not evenly distributed. Finally, the returns to some characteristics may evolve differently across regions, again changing relative regional incomes.

For the UK between 1982 and 1997, we found that strong cross-region convergence in the returns to labour market characteristics took place. However, there was also divergence regarding the skill composition of the workforce across regions. Interestingly, it is convergence in the returns to labour market characteristics that accounts for most of the cross-

[21] An alternative explanation would point at different performances of the local education systems in a context of very low labour mobility. This explanation must be ruled out since the educational attainments of young Londoners are below the national average.

region divergence because of the uneven composition of the labour force across UK regions.

5. Robustness, Unemployment and Part-Time

5.1 Adding professional dummies

Turning to the robustness of the results obtained with the basic regressions, we first use information contained in the FES about occupations. Professions, as recorded by the FES, were categorised into three groups - unskilled, skilled and professional - in order to limit the number of new variables (see the appendix for the details of the groupings). In part, these variables will capture unobserved individual effects. Therefore, this regression is a useful first step in the analysis of spatial selection.[22] However, access to jobs may also be determined by the state of the regional labour market. Indeed, opportunities to get professional or skilled positions also depend upon location and, more specifically, well-functioning local labour markets. In other words, regional inequalities may be largely about differences in the availability of "good jobs" that yield higher wages. Hence, it may be argued that these dummies may be suspected of a simultaneity bias, although we do not know how important this bias is. Some caution is therefore in order when interpreting the results. The equation we estimate is:

$$LW_i(j,t) = LPRICE(j,t) + \beta_0^R(j,t) + \beta_1(j,t)SEX_i + \beta_2(j,t)EDU_i + \beta_3(j,t)EXP_i + \beta_4(j,t)SQEXP_i + \beta_5(j,t)PROF_i(j,t) + \beta_6(j,t)SKIL_i(j,t) + \varepsilon_i(j,t) \quad (4)$$

where the dummy *PROF* takes a value 1 when individual *i* is a "professional" and the dummy *SKIL* takes a value 1 when individual *i* is in a "skilled" occupation. For most regions in most years, our results still indicate that the regional fixed-effects and the coefficients on sex, education, experience and squared experience remain significant. Notwithstanding Northern Ireland, where 14 coefficients are not significant at the 5 percent level (mostly sex and squared experience), only four coefficients fail to be significant at 5 percent for our initial variables in the other 11 UK regions. The professional dummy is significant at 5 percent in 90 percent of the cases and even 95 percent when excluding Northern Ireland. The performance of the skilled dummy is not as good but it manages to be significant at 5 percent in around two thirds of the cases. (Our results for these last two variables are reported in table A4 of the appendix - for the other variables, they are available upon request.)

The mean R-squared over the 12 regions rises by 6.5 points overall but by 10 points in London. With the addition of these two dummies, one third of the gap in R-squared between London and the rest of the country disappears. In addition, the tendency for R-squared to decline over time is now much weaker: one percentage point every five years (instead of every two years previously). From this we conclude that, to the extent that these two dummies capture unobserved abilities, these are unevenly spread across regions.

A detailed analysis of the coefficients is also useful. As in the previous estimation, the regional fixed-effects have a downward trend. T-I analysis still shows a strong tendency for mean reversal. The trends are less dispersed than before (slower convergence) but in the same time the intercepts are also less dispersed. Overall, the convergence period increases

[22] Note that our analysis with the basic regressions focuses on changes across regions so that the impact of individual fixed effects at the regional level are implicitly differenced out when people do not move across regions. But given the changes in the skill composition of the workforce across regions, we feel this hypothesis is not fully warranted here.

slightly by three years to 25 years (but it decreases when Northern Ireland is excluded). The evolution of the coefficients of variation yield results similar to those obtained previously. The gender gap decreases faster than before. Hence, for similar jobs, women get increasingly similar wages but for the same education and at the same age, they tend to reach jobs in high paying occupations less often than males. Convergence is still evident in the T-I analysis but it is slower than before (46 years instead of 26).

The returns to education and experience are lowered fairly significantly (by around one fourth) with the inclusion of these two new variables. This was to be expected since these professional dummies are partly collinear with education and experience. However the two T-I analyses are barely modified. Convergence is slightly faster for experience and slightly slower for education, with London remaining an outlier with abnormally low returns to education and slow signs of convergence. Because of small changes in the initial dispersions, the convergence periods are only slightly modified: 26 years instead of 35 for education and 15 years instead of 12 for experience. The evolution of the coefficients of variation is similar to that obtained before. The results for squared experience are unchanged.

Turning to the two occupational dummies, they both exhibit clear trends: strongly upward for the professional dummy and slightly upward for the skilled dummy. This shows that the rise in returns to education is not a rise in "pure returns to education and abilities" but a rise in the returns to working in skilled and highly-skilled occupations for which education and experience are important determinants. The T-I Figures (10a and 10b) for these two variables show a clear tendency towards mean-reversal. The convergence periods are 16 years for the professional dummy and 19 for the skilled dummy. For both variables, the coefficients of variations decrease by more than 50 percent over the period.

In conclusion, note that introducing professional dummies indicates that the cross-region distribution of unobserved abilities is not even since the performance of the regressions is not improved equally across regions. The effect is most noticeable in London. This region had a much lower R-squared with the basic regressions, whereas the enriched regressions performed relatively better. However, our results for the variables included in the basic regression are robust to the introduction of these new controls. Convergence in the returns to labour market characteristics is still present. Moreover, to the extent that these occupational dummies proxy for unobserved abilities, the returns to the latter also converge quickly across regions.

5.2 Migration/Mobility

A second way to check the robustness of our results is to look more directly at the migration process and check whether migrants are different from non-migrants after controlling for other observable personal characteristics. For instance it may be reasonable to assume that migrants, all else equal, may have higher abilities. Then in our basic regressions, regional fixed-effects will be biased upwards in the regions with positive migration balance and downwards in the others. Taking migration/mobility into account cannot be done directly with the FES data. The GHS, by contrast, contains three interesting pieces of information about each individual regarding potential and past mobility. It states whether someone is renting his or her accommodation, how many years this person has lived in the property he or she currently occupies and how many times this person has moved in the last five years. These three variables may proxy for migration and mobility in different ways.[23] We ran the following regressions for various years (1990 and 1995):

[23] However, these variables are very imperfect proxies for our purpose since they do not distinguish between movements within regions and mobility across regions.

$$LW_i(j,t) = LPRICE(j,t) + \beta_0^R(j,t) + \beta_1(j,t)SEX_i + \beta_2(j,t)EDU_i + \beta_3(j,t)EXP_i + \beta_4(j,t)SQEXP_i + \beta_7(j,t)MIG_i(j,t) + \varepsilon_i(j,t) \quad (5)$$

where the migration variable *MIG* was successively proxied by the rent dummy *RENT*, the length-of-stay dummy *LENGTH* and the number of moves in the last five years, *MOVES*. The results are reported in table A5 in appendix.

The rent dummy in 1995 is significant at 5 percent in eight regions out of eleven. For the regions where it is significant, the average value of its coefficient is –23 percent. There is no correlation between this variable and the mean levels of earnings in the regions. London and the South East for instance are very close to the average. For 1990, the coefficients of the rent dummy are significant in all regions and they are closer to the bottom for London and the South East. Potentially mobile people do not command a higher wage in London and the South East compared to the other regions.[24] The length-of-stay variable is significant in only four regions and does not seem to have much explanatory power in 1995. For 1990, results are better with the variable being significant in eight regions. But again, moving frequently in London seems to have the same kind of impact on the wage as in the other regions. Finally, the number of moves is significant in only three regions in 1995 and seven in 1990.

Overall, there does not seem to be significant differences between labour-market migrants and non-migrants in London and the South East versus the rest of the country after controlling for observable characteristics. To some extent, these results may be due to the poor quality of our variables. However, using a different data source, in their thorough investigation of this issue, Hughes and McCormick (1985) could not evidence any difference in individual fixed-effects for workers who change region.

5.3 Unemployment/Part time probits

As noted above, cross-region differences in the functioning of the labour market may induce a selection bias in the population at work. Regions with badly functioning labour markets may go undetected in our basic analysis. Since they will employ only the most able workers, they may even experience regional fixed effects above the national average. To control for this, we first run a probit regression (estimating the likelihood of being employed full-time versus unemployed) with a full set of regional dummies (*ie* different estimates for each region-year) using the same explanatory variables as in our basic regressions. The fit with this estimation is very weak. Less than half of the coefficients are significant at 10 percent. For regional fixed-effects, the performance is even worse than for other variables: less than one third of the coefficients are significant at 10 percent. The pseudo R-squared is in general very low, at around 4 percent. A variety of different models (full-time *versus* part-time, full-time and part-time versus unemployed, *etc*) with probit and logit estimations could not improve the results significantly (results can be made available upon request).

Grouping the "nine regions" together and estimating separately the likelihood of being unemployed as a function of a fixed-effect, sex, education, experience and its square in London, the South East and the nine regions with a logit is also possible. In this case, only education is significant for most years. See Figure 11 for a comparison of the coefficients obtained for the nine regions, London and the South East. The coefficients, although they follow similar trends, are in general higher by around 2 percent in London - more highly educated people have a lower chance of being unemployed in London. This finding is

[24] In the results presented here, our data do not distinguish between private sector renters from public sector renters whose mobility patterns are known to be different (see McCormick, 1997, for a review).

consistent with two main explanations. First, workers in London have higher abilities and thus are less likely to become unemployed. This would be consistent with the evidence provided by the enriched regressions. Second, this difference could also be the counterpart to lower returns to education in London. The larger market for skilled workers in London may thus follow a sort of Marshallian pattern whereby a larger market implies a lower probability of being unemployed and lower returns in exchange for this insurance.

A national regression with regional dummies interacted with education (no other regional dummies are found to be consistently significant) can also be run. The results are reported in table A6. The T-I Figure (12) for these coefficients shows strong mean reversal again. The convergence period can be calculated at 16 years.

5.4 Unemployment with selectivity bias

Finally, a two-stage estimation of the wage, which corrects for selectivity bias following Heckman's (1976) method, can be performed. In the first stage, a probit model is estimated with a full set of regional dummies. The likelihood of being in full-time employment (versus being unemployed) is made dependent on a regional fixed-effect, education, experience and its square. In the second stage, using the inverse Mills-ratio calculated in the first stage, we do a simple OLS to estimate the wage as a function of the same variables. Although this method theoretically allows correction for biases in the composition of the sub-sample of full-time employees, its implementation is not without problems. See Baker *et al* (1995) for a summary of the criticisms in a case analogous to ours. Also, note that the poor performance of the probit estimation in the first stage further limits its applicability here.

Regarding the second stage, the quality of the results differs widely (see table A7). For experience 95 percent of the coefficients are significant at 5 percent and the regional fixed-effects, the figure is even 99 percent.[25] For the gender gap, at the other extreme, two-thirds of the coefficients are insignificant. Results regarding education and squared experience are also difficult to interpret due to more than 10 percent of the coefficients being insignificant.[26]

For the returns to experience and the regional fixed-effects, which are highly significant, we find results similar to those obtained before. T-I analysis points towards convergence again. The convergence period for returns to the basic regression findings at 11 years (or 15 years when excluding Northern Ireland) instead of 12. For the regional fixed effects, the convergence period at 11 years is shorter than with the basic regressions (44 years). The results obtained regarding the evolution of the range of the coefficients and the coefficients of variation are slightly less favourable due to a strong increase in between 1995 and 1997.

Overall, these robustness tests confirm and reinforce the results of our basic regressions. They also point at the issue of the distribution of abilities across regions although further analysis is needed on this point.

6. Concluding Remarks

This paper documents a strong movement of wage equalisation across UK regions between 1982 and 1997 in both regional fixed-effects and in the returns to key labour market

[25] For the regional-fixed effects, 187 coefficients out of 192 are significant at 0.1 percent.

[26] Note, however, that our results regarding convergence for these three variables are reinforced. For instance, the convergence period is between 9 and 14 years.

characteristics such as experience, education and sex. By contrast, the cross-region distribution of education is increasingly uneven. In conjunction with the national trend of rising and converging returns to education, this has generated an increase in aggregate regional inequalities over 1982-1997. These conclusions hold in both real and nominal terms and they do not change when regional selection bias is controlled for. For instance, they are robust to the introduction of occupational and mobility variables. They also hold when unemployed and part-time earners are considered. When the evolution of the North-South divide is decomposed, aggregate divergence owes itself to disaggregated convergence.

Our results suggest that there is no large labour market unfairness across UK regions. This does not mean however that policy changes cannot lead to efficiency gains. In particular, the strong institutional restrictions on the supply of land in London and the South-East may explain the increasingly uneven distribution of skills across regions.[27] It may be tempting to argue for some liberalisation on this side. Further work is needed, however, as a greater concentration of population in London and the South East may have a significant environmental/congestion impact. Furthermore, such reforms are also likely to have distributive effects through potentially large changes in house prices everywhere in the country.

Nevertheless, it would be wrong to claim that "place" does not matter on the basis of our findings. The educational attainment of the workforce is as endogenous in a regional economy as is industrial composition, productivity, returns to human capital characteristics and labour market outcomes. The analysis undertaken in this paper suggests that regional policy should direct more of its attention on education and its determinants at a regional level. Maybe, such a change of focus should divert policy from more traditional areas, related to unemployment, industrial and redistribution policies?

One potential bias in our conclusions should be noted. The analysis presented here refers to only one particular geographical scale: the region. Admittedly, the 1980s and 1990s have also seen a marked pattern of rising inequalities across UK counties.[28] Whether our argument applies for UK counties remains to be investigated. Even at the regional level, what may be true for wages may not be true for other important issues like health or the educational attainment of youngsters. Thus our findings regarding the labour market need to be replicated for other forms of economic and social inequalities across UK regions.

[27] See Cameron and Mullbauer (1998) or Cheshire and Sheppard (2000) for more arguments regarding the role of planning regulations in explaining housing price differences.

[28] The geographical patterns of poverty for counties and districts are very different from those of regions. In particular, 22 of the 100 most deprived districts in England are in London, the richest UK region.

Figures

Fig 1a. Average regional earnings in the UK 1982-97 (UK average = 100%)

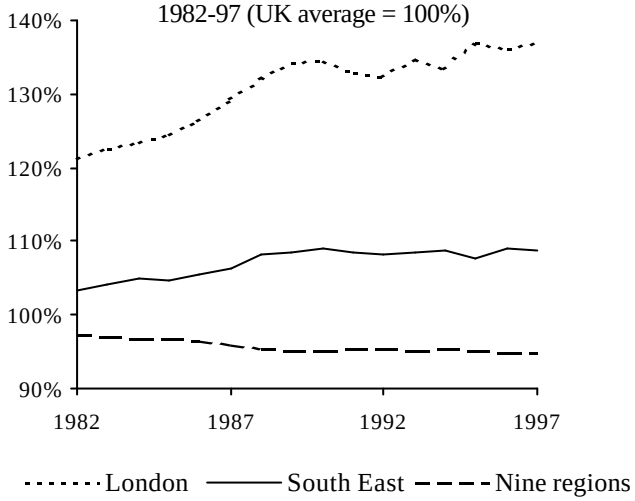


Fig 1b. Coefficient of variation for regional earnings in the UK 1982-97

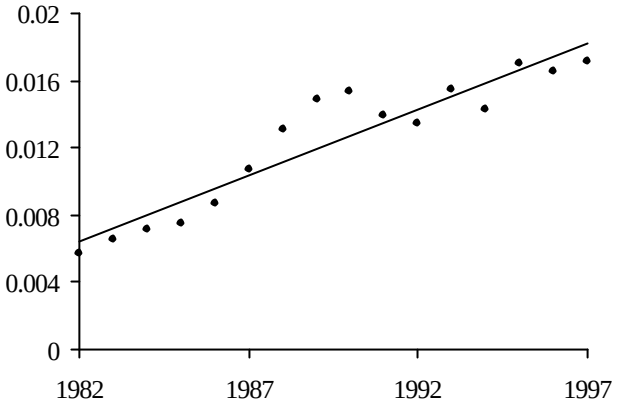


Fig 2a. Nominal regional earnings for a 25 year old with 15 years of education employed full-time (UK average = 100%)

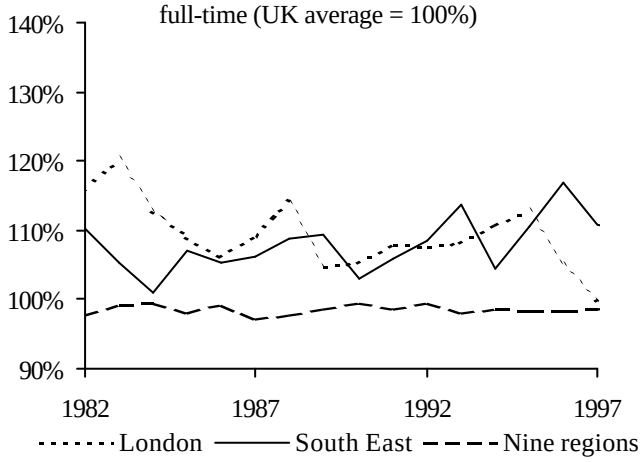


Fig 2b. Coefficient of variation of the nominal regional earnings for a 25 year old with 15 years of education employed full-time

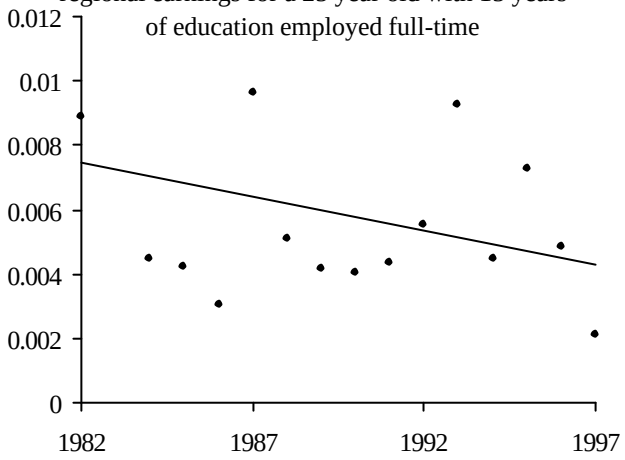


Fig 3a. Trends and intercepts for the real regional fixed-effects

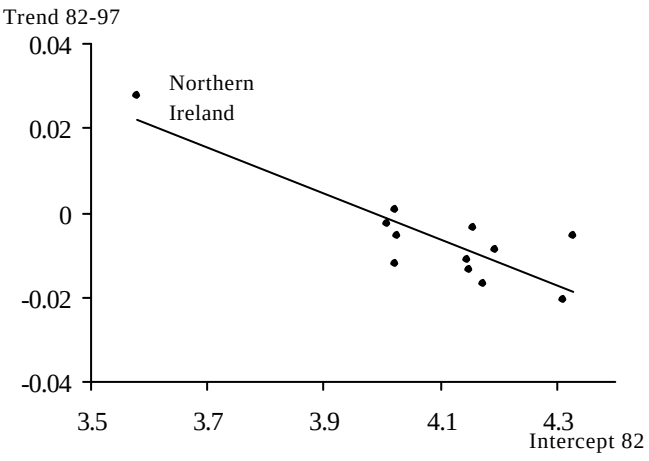


Fig 3b. Coefficients of variation for the real regional fixed-effects

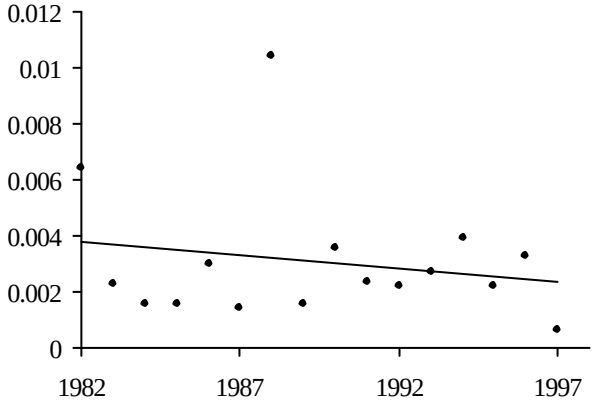


Fig 4a. Trends and intercepts for regional log prices (incl. housing)

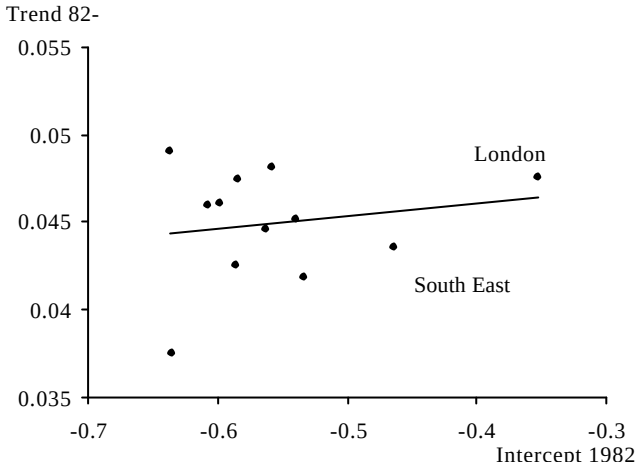


Fig 4b. Coefficient of variation for regional prices (incl. housing)

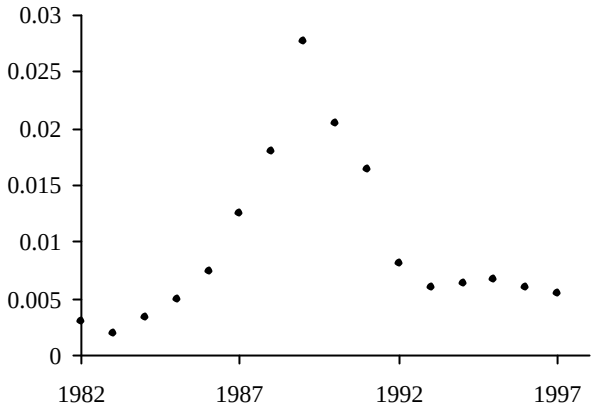


Fig 5a. Trends and intercepts for the regional gender gaps

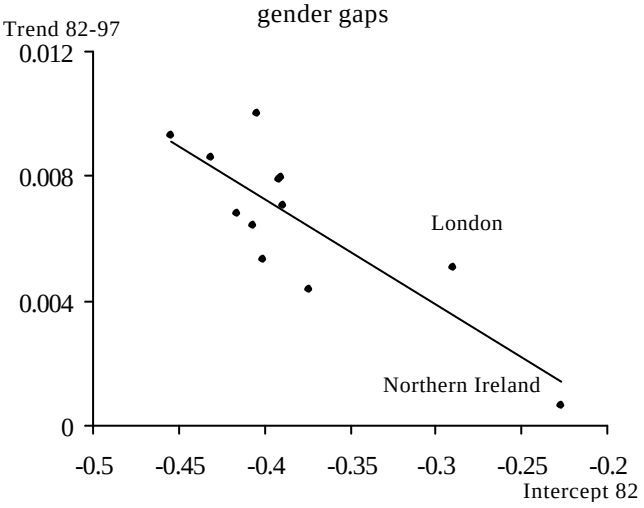


Fig 5b. Coefficients of variation for the regional gender gaps

Fig 6a. Trends and intercepts for the regional returns to education

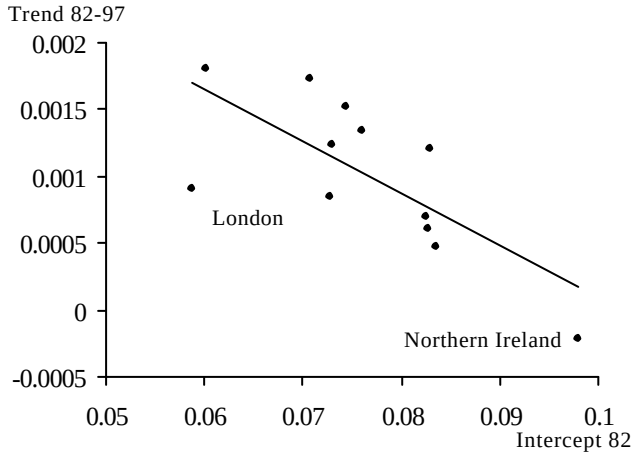


Fig 6b. Coefficients of variation for the regional returns to education

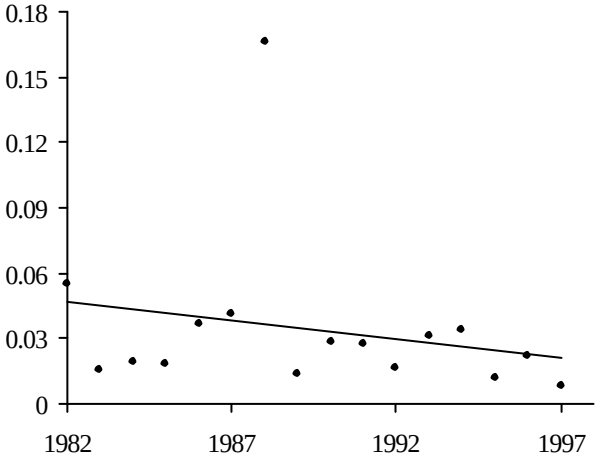


Fig 7a. Trends and intercepts for the regional returns to experience

Fig 7b. Coefficients of variation for the regional returns to experience

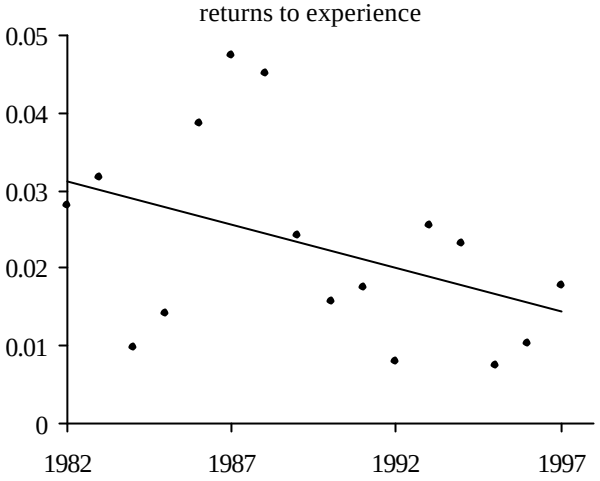


Fig 8a. Trends and intercepts for the regional coefficient on squared experience

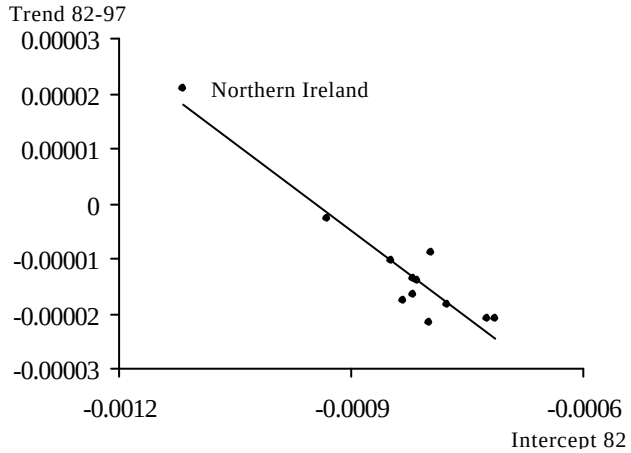


Fig 8b. Coefficients of variation for the regional coefficient on squared experience

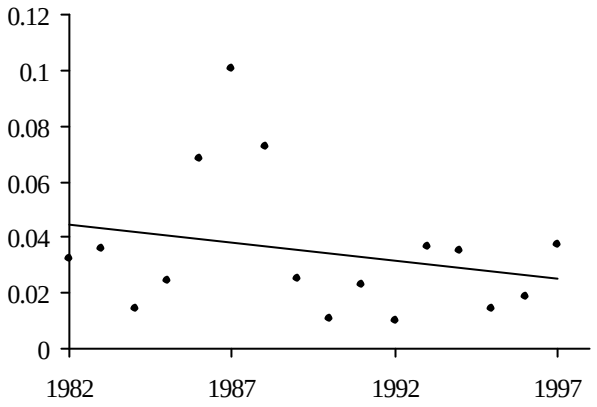


Fig 9a. Trends and intercepts for regional female participation

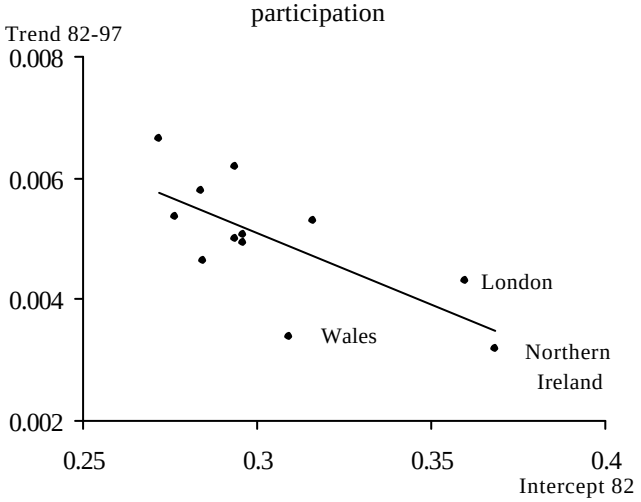


Fig 9b. Trends and intercepts for regional experience levels

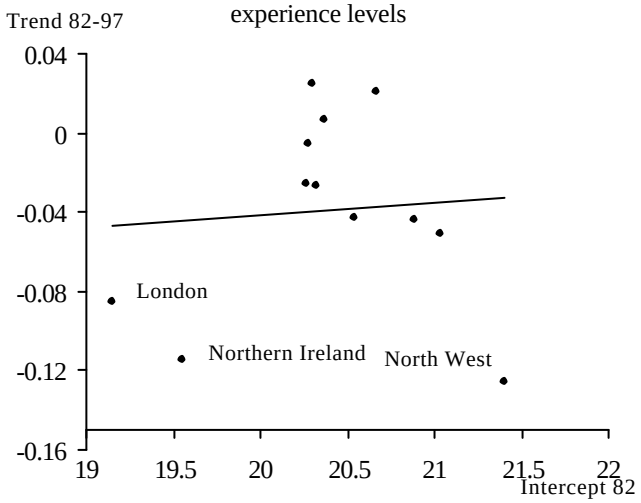


Fig 9c. Trends and intercepts for regional educational levels

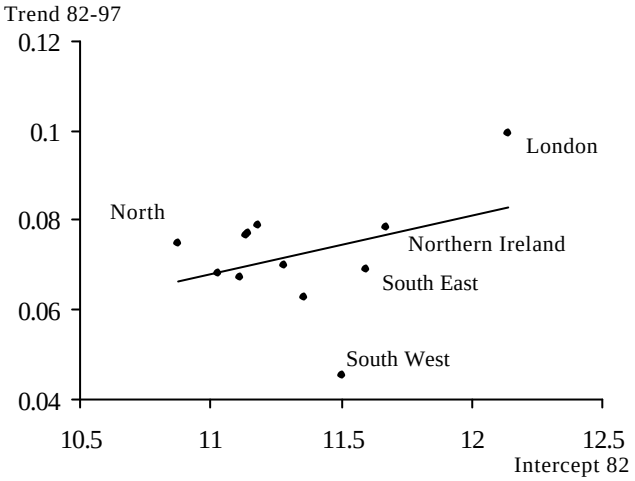


Fig 10a. Trends and intercepts for the professional dummy

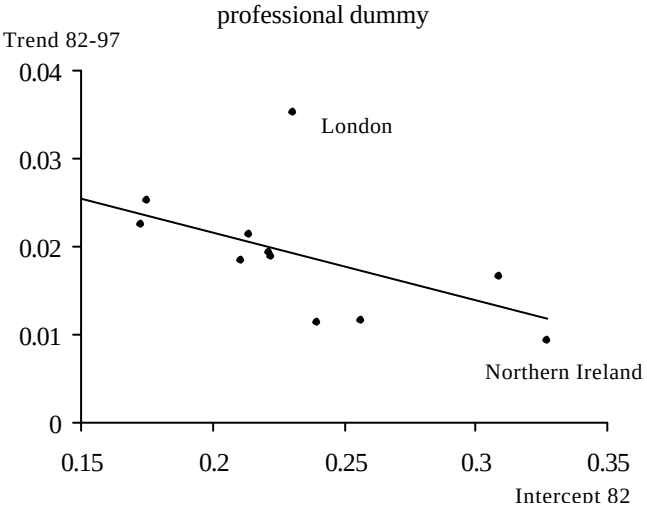


Fig 10b. Trends and intercepts for the skilled dummy

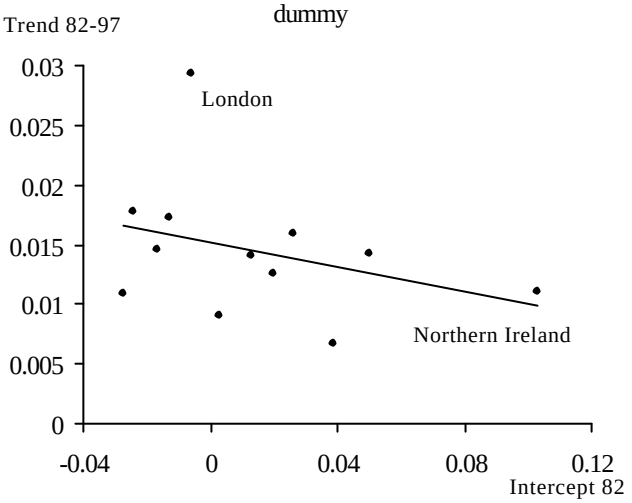


Fig 11. Coefficient on education for the logit estimation (full-time vs unemployed)

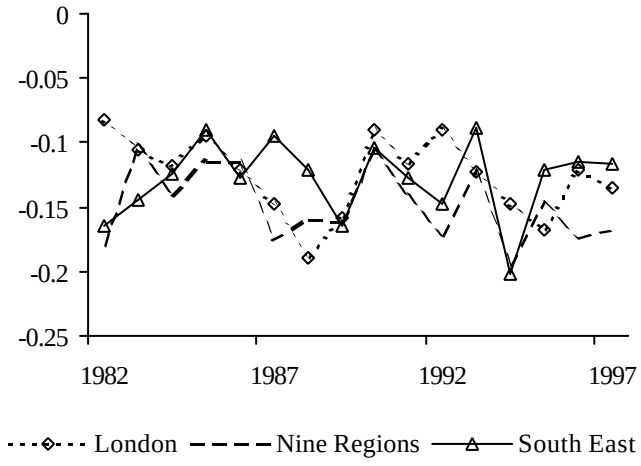
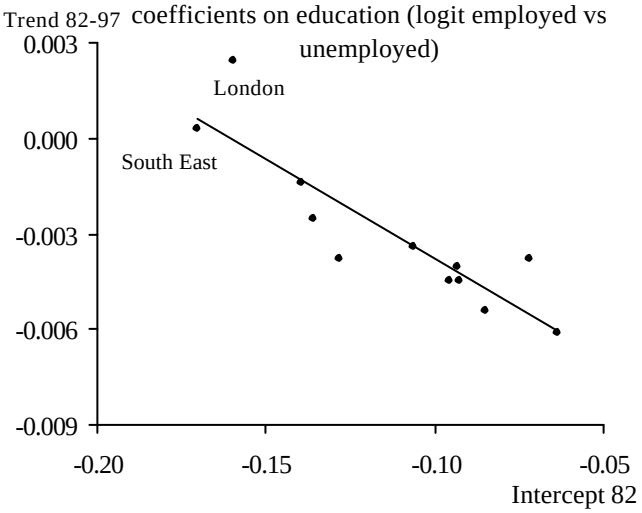


Fig 12. Trends and intercepts for the regional coefficients on education (logit employed vs unemployed)



Data Appendix

The analysis presented in Sections 4 and 5 uses the Family Expenditure Survey (FES) and the General Household Survey (GHS), both from the Office for National Statistics (ONS). The FES is a continuous random sample survey of private households in the United Kingdom. It collects information about incomes as well as detailed information on expenditure. All members of the household aged 16 or more keep individual diaries of all spending for a period of two weeks. Results from the main UK sample are weighted for non-response. Data for Northern Ireland are calculated from an enhanced sample and are un-weighted. Income data are for adults only. When considering only full-time employees, our total sample size varies between 4357 observations in 1996 and 5992 in 1992. For most regions and most years, more than 300 observations per year are available. For Northern Ireland however, only 85 observations are available for the typical year.

Like the FES, the GHS is an annual national survey. It is a multi-purpose survey, providing information on aspects of housing, employment, education, health and social services, transport, population and social security. It is a continuous survey based on an achieved sample of about 9,000 households. The data is collected by face-to-face interview. It encompasses all English regions, Wales and Scotland but not Northern Ireland.

For both FES and GHS data, the sample that we actually used in our wage equations consists of males and females between 16 and 65 years of age who reported to be in full-time employment. Because of known problems about self-reporting on employment status (Poterba and Summers, 1995), we excluded cases that reported less than 30 hours a week. We also excluded cases for people earning hourly wages outside a "reasonable" range (£1-£200 in 1990 UK prices), to avoid extreme cases and apparent data-input mistakes. As data on years of education and labour market experience were not readily available, we calculated these variables as follows:

Education = (Age left continuous full time education) - 5
Experience = (Age) - (Age left continuous full time education)

For the unemployment logits and the Heckman two-step estimations we used the same full-time employees sample plus the observations reported to be unemployed at the survey week.

For the skill dummies ("professional", "skilled" and "unskilled") we grouped together some more detailed categories of occupational status. The following table presents our classification together with the two occupational status frames used in the FES.

Table A0: classification of occupations.

Our classification	FES Coding Frame 9	FES Coding Frame 8
Professional	Professional	Professional workers – self employed
		Professional workers – employees
	Employers and managers	Employers – large establishments
		Managers – large establishments
		Employers – large establishments
		Managers – large establishments
		Farmers – employers and managers
Skilled	Intermediate non manual	Ancillary workers and artists
		Foremen and supervisors – non manual
	Junior non manual	Junior non manual workers
	Skilled manual and own account non professional	Foremen and supervisors – manual
		Skilled manual workers
		Own account workers (non professional)
		Farmers – own account
Unskilled	Semi-skilled manual and personal service	Personal service workers
		Semi-skilled manual workers
		Agricultural workers
	Unskilled manual	Unskilled manual workers
	Armed forces	Members of armed forces
Unoccupied	Retired	Retired
	Unoccupied	Unoccupied
	Inadequately described	Inadequately described and not stated

Data on regional prices are from Reward Group Ltd (http://www.reward-group.co.uk). The Reward Group collects regionally representative survey data on "required incomes" for seven typical households, both including and excluding housing costs. We constructed our two panel price indexes (with and without housing costs) weighting the typical households as suggested by the data source. However, we did not control for changes in household composition over time, as our initial exercises on this (using FES information) showed that the results were effectively unchanged (correlation coefficients were always higher than 0.9).

All other aggregate data used in this paper come from *Regional Trends 34* (1998 and 1997 editions) series published by the ONS. Most of it is freely available electronically at http://www.statistics.gov.uk/ (last accessed 29 May 2000).

Table A1: Results for the basic regressions for log weekly earnings of full-time employees

Variable	Region	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Real Fixed-effect	North	4.65	4.52	4.29	4.46	4.48	4.79	4.83	4.09	4.26	4.13	3.66	4.55	4.29	3.78	4.20	3.76
	York	4.39	4.32	4.47	4.49	4.26	4.62	4.45	4.02	3.97	4.26	4.10	3.95	4.06	4.18	3.80	3.82
	N.West	4.24	4.09	4.54	4.35	3.97	4.78	4.77	3.96	3.68	3.66	3.69	4.09	4.08	3.77	3.91	4.01
	E.Mids	4.49	4.23	4.62	4.34	4.46	4.44	4.93	4.03	4.28	3.77	4.15	4.20	4.29	4.15	3.86	4.10
	W.Mids	4.05	4.25	4.28	4.05	4.18	4.77	4.51	3.83	3.94	3.92	4.04	3.91	3.82	4.07	3.91	4.00
	E.Anglia	4.32	4.32	4.40	4.23	4.49	4.46	4.58	3.78	4.09	4.10	4.09	4.02	4.25	3.89	3.95	3.88
	G.London	4.67	4.58	4.37	4.44	4.30	4.56	4.85	3.87	4.00	4.25	3.95	4.29	4.31	4.22	4.23	3.79
	S.East	4.35	4.34	4.37	4.29	4.29	4.57	4.80	4.02	3.97	4.08	3.93	4.15	4.09	4.10	4.02	3.96
	S.West	4.30	4.24	4.25	4.31	4.37	4.47	4.45	3.87	3.69	4.00	3.85	4.23	4.18	3.99	4.00	4.02
	Wales	4.26	4.47	4.32	4.26	4.67	4.87	4.64	3.80	3.55	4.12	3.84	4.07	4.02	4.09	3.95	4.03
	Scotland	4.04	4.34	4.02	4.26	4.26	4.45	4.57	4.10	3.89	4.10	3.62	3.90	3.75	3.99	3.55	3.97
	N.Ireland	3.45	3.94	4.13	4.04	3.90	4.94	3.34	3.73	3.92	4.15	4.18	3.91	4.80	3.75	3.63	3.91
Sex dummy	North	-39%	-41%	-34%	-36%	-36%	-47%	-20%	-29%	-36%	-26%	-31%	-40%	-31%	-38%	-35%	-27%
	York	-40%	-43%	-45%	-43%	-34%	-40%	-32%	-40%	-39%	-42%	-32%	-29%	-36%	-26%	-31%	-33%
	N.West	-40%	-34%	-37%	-39%	-35%	-45%	-31%	-33%	-32%	-28%	-32%	-33%	-32%	-22%	-25%	-33%
	E.Mids	-41%	-40%	-39%	-39%	-44%	-30%	-35%	-35%	-39%	-30%	-37%	-43%	-25%	-31%	-30%	-33%
	W.Mids	-48%	-33%	-37%	-40%	-32%	-36%	-29%	-39%	-32%	-33%	-28%	-30%	-24%	-33%	-34%	-31%
	E.Anglia	-36%	-36%	-43%	-44%	-37%	-35%	-43%	-37%	-38%	-33%	-32%	-32%	-36%	-30%	-31%	-36%
	G.London	-23%	-25%	-26%	-29%	-30%	-32%	-30%	-29%	-26%	-26%	-22%	-22%	-21%	-25%	-18%	-20%
	S.East	-41%	-45%	-42%	-46%	-41%	-36%	-45%	-41%	-37%	-40%	-38%	-34%	-36%	-35%	-32%	-26%
	S.West	-42%	-43%	-28%	-44%	-40%	-45%	-41%	-35%	-30%	-41%	-41%	-30%	-25%	-33%	-30%	-35%
	Wales	-35%	-42%	-36%	-42%	-34%	-36%	-24%	-49%	-28%	-33%	-30%	-30%	-20%	-34%	-29%	-28%
	Scotland	-43%	-35%	-32%	-42%	-41%	-27%	-36%	-30%	-42%	-33%	-33%	-33%	-28%	-28%	-21%	-23%
	N.Ireland	-25%*	-27%	-18%	-22%	-9%*	-24%	-10%*	-26%	-36%	-23%	-29%	-35%	-35%	-3%*	-15%*	-18%
Education	North	5.1%	7.7%	9.2%	6.8%	6.2%	4.0%	4.1%*	8.3%	7.7%	7.5%	10.6%	6.2%	7.2%	9.4%	7.5%	10.2%
	York	7.8%	8.5%	7.8%	8.1%	8.6%	6.8%	7.9%	9.4%	9.1%	7.4%	8.2%	10.1%	10.2%	7.4%	10.2%	10.5%
	N.West	9.0%	10.2%	6.3%	7.6%	10.0%	6.0%	6.1%	9.9%	10.3%	10.7%	10.6%	8.0%	9.3%	8.9%	8.1%	8.3%
	E.Mids	7.7%	9.2%	6.0%	8.8%	7.2%	7.5%	4.6%	7.7%	6.6%	10.7%	9.6%	8.0%	7.0%	8.3%	9.8%	8.0%
	W.Mids	9.3%	7.7%	8.2%	10.0%	8.9%	7.2%	6.7%	9.7%	8.5%	7.8%	8.2%	10.2%	10.5%	9.0%	9.5%	8.9%
	E.Anglia	7.1%	8.5%	8.5%	7.7%	7.1%	7.6%	6.9%	9.3%	9.5%	8.5%	8.6%	11.4%	8.7%	9.5%	8.3%	10.1%
	G.London	5.3%	6.7%	7.4%	6.4%	6.5%	5.3%	3.7%	7.5%	6.7%	5.8%	8.2%	6.9%	6.9%	6.7%	6.6%	8.2%
	S.East	8.2%	8.3%	7.5%	8.4%	7.7%	6.2%	5.4%	8.3%	8.2%	8.1%	9.8%	9.3%	9.1%	8.5%	9.3%	9.3%
	S.West	8.4%	9.7%	7.9%	7.5%	8.0%	8.6%	7.1%	9.1%	9.8%	9.3%	10.1%	8.5%	8.1%	9.6%	8.6%	9.3%
	Wales	8.1%	7.1%	8.4%	9.2%	4.5%	5.1%	6.1%	10.3%	11.5%	7.6%	9.7%	9.6%	9.7%	8.1%	9.5%	9.4%
	Scotland	9.6%	7.6%	10.0%	8.7%	7.9%	7.2%	7.6%	9.4%	9.6%	8.8%	11.6%	10.0%	10.5%	8.7%	11.1%	9.1%
	N.Ireland	12.3%	8.7%	8.3%	9.9%	8.9%	5.4%	14.3%	11.2%	10.7%	9.1%	7.9%	11.1%	5.8%	9.8%	10.9%	10.1%

* Insignificant at 5%.

(to be continued)

Table A1 (continued)

Variable	Region	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Experience	North	5.3%	4.2%	4.4%	5.7%	5.8%	5.6%	6.4%	6.1%	4.9%	5.5%	6.0%	4.2%	4.9%	6.9%	6.3%	6.5%
	York	5.6%	5.8%	4.9%	4.6%	5.9%	5.3%	6.6%	6.0%	5.4%	4.8%	6.2%	5.7%	4.5%	6.3%	5.9%	5.6%
	N.West	5.3%	5.9%	5.3%	5.0%	5.8%	5.0%	4.0%	5.0%	6.0%	5.0%	5.7%	5.5%	4.4%	6.9%	6.9%	6.2%
	E.Mids	4.6%	5.3%	5.3%	4.8%	5.4%	5.6%	5.1%	5.8%	5.4%	5.5%	5.1%	6.3%	5.9%	6.1%	6.5%	6.4%
	W.Mids	4.8%	5.4%	5.4%	6.1%	5.3%	2.6%	5.5%	6.0%	5.4%	6.2%	5.6%	4.6%	5.6%	5.1%	5.6%	5.7%
	E.Anglia	6.2%	5.0%	4.3%	6.6%	4.6%	5.3%	5.4%	6.2%	3.8%	3.8%	5.2%	3.6%	5.6%	6.3%	6.8%	7.0%
	G.London	5.0%	5.4%	4.8%	5.3%	5.5%	4.8%	3.4%	4.1%	4.9%	4.2%	5.2%	5.5%	4.8%	5.6%	5.0%	7.7%
	S.East	5.1%	6.3%	5.6%	5.6%	5.3%	5.7%	4.1%	4.9%	5.2%	5.2%	5.8%	5.9%	5.8%	6.4%	6.0%	6.6%
	S.West	5.1%	4.4%	5.6%	5.8%	3.3%	3.1%	5.4%	5.6%	6.1%	4.8%	6.2%	4.8%	5.9%	5.7%	5.4%	5.5%
	Wales	5.0%	4.5%	4.4%	5.0%	5.6%	4.1%	4.0%	5.0%	5.9%	5.4%	6.4%	5.5%	5.2%	6.3%	6.7%	5.2%
	Scotland	5.8%	5.8%	5.3%	4.6%	5.4%	4.6%	4.2%	4.9%	6.2%	4.6%	6.5%	6.1%	6.5%	5.6%	7.0%	5.3%
	N.Ireland	8.1%	7.8%	5.6%	4.9%	8.1%	4.0%	6.1%	7.5%	5.7%	5.6%	6.6%	6.1%	3.7%	5.9%	6.6%	5.1%
Squared experience (*1000)	North	-0.90	-0.70	-0.73	-1.02	-0.98	-0.83	-1.09	-0.96	-0.86	-1.08	-0.97	-0.70	-0.81	-1.16	-1.17	-1.14
	York	-0.96	-1.00	-0.79	-0.75	-1.04	-0.84	-1.19	-1.02	-0.98	-0.84	-1.10	-1.00	-0.73	-1.16	-0.91	-0.92
	N.West	-0.87	-0.96	-0.94	-0.86	-0.95	-0.89	-0.56	-0.78	-0.99	-0.80	-0.92	-0.89	-0.73	-1.23	-1.21	-1.12
	E.Mids	-0.78	-0.89	-0.92	-0.76	-0.92	-0.94	-0.83	-0.94	-0.96	-0.94	-1.00	-1.07	-1.02	-1.06	-1.16	-1.15
	W.Mids	-0.76	-0.90	-0.86	-1.01	-0.83	-0.30*	-0.83	-1.00	-0.89	-1.08	-0.96	-0.64	-0.96	-0.87	-0.90	-1.01
	E.Anglia	-1.09	-0.84	-0.66	-1.12	-0.79	-0.90	-1.01	-1.11	-0.73	-0.60	-0.88	-0.59	-1.09	-1.05	-1.13	-1.25
	G.London	-0.86	-0.88	-0.77	-0.93	-0.99	-0.92	-0.62	-0.75	-0.88	-0.82	-0.94	-1.00	-0.92	-1.06	-0.82	-1.48
	S.East	-0.79	-1.03	-0.94	-0.95	-0.89	-0.99	-0.66	-0.88	-0.87	-0.91	-0.98	-1.06	-0.99	-1.16	-1.09	-1.21
	S.West	-0.86	-0.67	-0.93	-0.94	-0.43	-0.34*	-0.89	-1.00	-1.04	-0.88	-1.10	-0.84	-1.08	-1.03	-0.91	-1.01
	Wales	-0.84	-0.75	-0.69	-0.81	-1.00	-0.68	-0.56*	-0.68	-1.05	-0.95	-1.18	-0.90	-0.90	-1.03	-1.22	-0.84
	Scotland	-0.99	-1.02	-0.85	-0.72	-0.97	-0.68	-0.60	-0.79	-1.07	-0.76	-1.11	-1.02	-1.07	-0.92	-1.25	-0.94
	N.Ireland	-1.35	-1.30	-0.89	-0.67	-1.54	-0.55	-0.72*	-1.14	-0.91	-0.93	-1.18	-1.07	-0.55	-0.82	-1.08	-0.71

* Insignificant at 5%.

Table A2: Data for regional prices

Variable	Region	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Log Prices	North	-0.58	-0.57	-0.54	-0.49	-0.44	-0.40	-0.38	-0.26	-0.13	-0.03	-0.04	-0.09	-0.07	-0.02	-0.01	0.02
	York	-0.62	-0.62	-0.58	-0.54	-0.47	-0.42	-0.40	-0.24	-0.10	-0.05	-0.08	-0.11	-0.08	-0.02	0.01	0.01
	N.West	-0.53	-0.54	-0.50	-0.45	-0.39	-0.36	-0.34	-0.21	-0.05	0.03	0.01	-0.02	0.00	0.05	0.07	0.08
	E.Mids	-0.63	-0.62	-0.56	-0.51	-0.46	-0.39	-0.37	-0.14	-0.06	-0.05	-0.08	-0.13	-0.11	-0.05	-0.02	-0.01
	W.Mids	-0.57	-0.58	-0.54	-0.50	-0.43	-0.38	-0.35	-0.13	-0.04	0.00	-0.03	-0.09	-0.07	-0.01	0.03	0.05
	E.Anglia	-0.59	-0.60	-0.55	-0.48	-0.41	-0.35	-0.29	-0.06	-0.02	-0.02	-0.04	-0.09	-0.09	-0.04	-0.01	0.00
	G.London	-0.44	-0.47	-0.38	-0.30	-0.18	-0.03	0.06	0.25	0.28	0.27	0.17	0.08	0.13	0.20	0.21	0.22
	S.East	-0.52	-0.55	-0.46	-0.38	-0.30	-0.22	-0.15	0.05	0.09	0.09	0.02	-0.05	-0.02	0.05	0.07	0.08
	S.West	-0.58	-0.56	-0.51	-0.45	-0.37	-0.33	-0.28	-0.06	-0.01	0.03	-0.03	-0.08	-0.06	0.01	0.03	0.03
	Wales	-0.60	-0.60	-0.55	-0.50	-0.42	-0.40	-0.38	-0.16	-0.07	-0.06	-0.09	-0.15	-0.13	-0.07	-0.04	-0.04
	Scotland	-0.53	-0.54	-0.46	-0.41	-0.36	-0.32	-0.32	-0.25	-0.13	-0.07	-0.05	-0.09	-0.05	0.01	0.03	0.04
	N.Ireland	-0.62	-0.62	-0.57	-0.53	-0.48	-0.43	-0.41	-0.38	-0.33	-0.29	-0.22	-0.24	-0.20	-0.14	-0.12	-0.07

Table A3: Un-weighted means of the coefficients over 12 regions

Variable	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Fixed-effect	4.27	4.30	4.34	4.29	4.30	4.64	4.56	3.93	3.94	4.05	3.92	4.11	4.16	4.00	3.92	3.94
Gender gap	-38%	-37%	-35%	-39%	-34%	-36%	-31%	-35%	-34%	-32%	-32%	-33%	-29%	-28%	-28%	-29%
Education	8.2%	8.3%	8.0%	8.2%	7.6%	6.4%	6.7%	9.2%	9.0%	8.5%	9.4%	9.1%	8.6%	8.7%	9.1%	9.3%
Experience	5.5%	5.5%	5.1%	5.3%	5.5%	4.7%	5.0%	5.6%	5.4%	5.1%	5.9%	5.3%	5.2%	6.1%	6.2%	6.1%
Sq. Exp (*1000)	-0.92	-0.91	-0.83	-0.88	-0.94	-0.74	-0.80	-0.92	-0.94	-0.88	-1.03	-0.90	-0.90	-1.05	-1.07	-1.07

Table A4: Coefficients for the occupational dummies in equation (4)

Variable	Region	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Professional	North	34.7%	13.7%	32.9%	22.7%	26.0%	11.3%	14.4%*	40.5%	48.6%	41.7%	52.1%	40.5%	42.8%	55.0%	36.1%	43.8%
	York	22.3%	22.6%	30.1%	27.7%	31.3%	20.5%	38.4%	34.7%	25.7%	51.7%	47.2%	46.9%	45.1%	48.6%	40.2%	52.2%
	N.West	28.6%	20.3%	26.4%	23.4%	27.6%	26.3%	23.3%	41.1%	40.8%	46.4%	49.4%	52.8%	43.8%	43.0%	48.7%	41.4%
	E.Mids	16.0%	24.2%	33.2%	21.7%	16.6%*	9.1%	30.7%	51.0%	46.1%	55.1%	36.7%	44.3%	47.0%	39.8%	52.5%	59.2%
	W.Mids	20.8%	28.8%	21.1%	36.7%	29.0%	14.9%	23.4%	42.0%	41.7%	49.3%	49.9%	60.7%	30.3%	48.5%	45.4%	55.5%
	E.Anglia	31.5%	16.0%*	35.0%	24.6%	29.9%	6.3%	23.2%*	43.9%	44.7%	62.0%	52.3%	41.6%	52.6%	17.3%*	31.8%	38.5%
	G.London	26.1%	28.9%	28.1%	31.4%	44.7%	25.6%	16.2%	65.9%	62.5%	57.7%	69.3%	63.1%	66.8%	70.3%	64.6%	71.9%
	S.East	35.2%	33.5%	38.1%	27.9%	34.3%	26.9%	29.5%	55.9%	48.9%	47.5%	53.7%	58.7%	48.4%	60.9%	55.8%	38.5%
	S.West	22.6%	31.3%	24.9%	34.1%	26.3%	25.4%	12.1%*	27.3%	46.2%	42.3%	29.9%	47.0%	33.6%	47.8%	27.8%	42.7%
	Wales	8.5%*	20.1%	24.1%	27.4%	30.0%	6.9%*	17.0%	33.7%	42.8%	35.6%	41.4%	46.2%	52.6%	60.8%	39.4%	34.0%
	Scotland	19.8%	14.4%	22.2%	34.6%	27.1%	5.7%*	23.1%	42.0%	30.6%*	58.0%	42.7%	47.4%	45.0%	44.7%	39.7%	48.9%
	N.Ireland	47.0%*	50.5%	15.8*%	60.7%	13.6%*	12.3%*	9.8%*	51.0%	51.2%*	43.5%*	48.8%	47.3%	53.0%*	34.5%*	49.6%	46.3%
Skilled	North	11.4%	-4.1%*	-4.9%*	7.2%	5.4%*	-28.0%	16.3%	24.4%	17.7%	18.3%	25.8%	19.0%	18.3%	17.7%	18.5%	22.3%
	York	1.9%*	5.1%*	9.2%	4.6%*	3.8%*	-15.0%*	-9.8%*	9.3%	6.9%*	21.5%	20.0%	23.6%	16.8%	15.5%	8.7%*	25.7%
	N.West	7.9%	1.8%*	4.0%*	3.8%*	4.9%*	6.7%*	-9.2%*	15.7%	16.5%	17.0%	23.1%	23.0%	22.6%	16.6%	16.8%	12.3%
	E.Mids	2.5%*	11.3%	11.9%	10.4%	6.1%*	-19.6%	5.8%	27.6%	16.6%	29.5%	19.5%	18.5%	17.6%	25.5%	18.5%	31.3%
	W.Mids	10.5%	3.8%*	9.9%	13.6%	9.1%	-23.1%	-9.1%*	15.7%	14.6%	17.5%	22.1%	25.2%	12.5%	26.9%	18.4%	22.0%
	E.Anglia	7.9%*	11.6%	7.7%*	1.3%*	-6.3%*	-48.3%*	1.3%*	10.2%*	21.3%	36.1%	20.2%	10.3%*	27.8%	1.9%*	6.3%*	3.3%*
	G.London	8.4%	3.0%*	7.0%	2.2%*	17.9%	-4.9%*	-4.0%	35.1%	27.7%	30.7%	33.2%	32.3%	36.1%	40.1%	29.9%	47.9%
	S.East	9.8%	6.4%*	15.4%	1.2%*	11.2%	2.6%*	-4.5%*	27.9%	17.3%	21.7%	25.1%	25.0%	19.4%	27.2%	28.5%	16.9%
	S.West	12.7%	-0.6%*	6.1%*	7.6%*	5.7%*	-8.7%*	4.0%*	6.2%*	21.2%	13.5%	6.3%*	22.7%	12.8%	12.2%	5.5%*	14.3%
	Wales	2.8%*	3.3%*	5.1%*	2.8%*	1.3%*	-13.2%*	-34.7%*	7.5%*	12.2%	16.1%	18.1%	22.1%	17.3%	17.2%	15.8%	-6.9%*
	Scotland	-3.5%*	0.1%*	8.0%	12.3%	0.5%*	-0.4%*	-26.1%	21.8%	15.2%	23.4%	16.7%	25.0%	22.7%	20.8%	19.5%	17.7%
	N.Ireland	22.4%*	13.4%*	-1.0%*	22.9%	10.3%	16.4%*	-12.1%	22.4%	35.3%	21.8%*	11.1%*	20.5%	47.3%	21.0%*	19.7%	25.4%

* Insignificant at 5%.

Table A5: Coefficients for the migration proxies in equation (5) from GHS 1990 and 1995

Region	RENT 90	LENGTH 90	MOVES 90	RENT 95	LENGTH 95	MOVES 95
North	-0.2203	-0.0028*	0.0431*	-0.0762*	-0.0038*	0.0495
York	-0.2326	-0.0059	0.0451	-0.3046	-0.0045*	0.0097*
N.West	-0.2774	-0.0037*	0.0295*	-0.0995*	-0.0058*	0.0215*
E.Mids	-0.1958	-0.0058	0.0188	-0.3197	-0.0081	0.0320*
W.Mids	-0.1828	-0.0024*	0.0311*	-0.1740	-0.0063	0.0710
E.Anglia	-0.1816	-0.0111	0.0595	-0.1882	-0.0054*	-0.0215*
G.London	-0.2329	-0.0073	0.0447	-0.2209	-0.0044*	0.0072*
S.East	-0.2474	-0.0067	0.0339	-0.2099	-0.0055	0.0464
S.West	-0.2622	-0.0083	0.0479	-0.2583	-0.0040*	-0.0051*
Wales	-0.1487	-0.0093	0.0288*	-0.0602*	-0.0051*	0.0242*
Scotland	-0.2458	-0.0080	0.0726	-0.1705	-0.0070	0.0150*

* Insignificant at 5%.

Table A6: Logit employed vs unemployed

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Constant	1.10	0.52	0.93	0.51	0.45	1.00	0.89	0.82	-0.63	0.56	0.77	0.35*	1.37	0.57	0.84	0.41*
Sex dummy	0.07*	0.01*	-0.08*	0.05*	-0.01*	-0.02*	0.05*	-0.04*	0.16*	-0.29	-0.13*	-0.21	-0.06*	0.02*	-0.13*	0.16*
Education North	-0.11	-0.07	-0.07	-0.05	-0.07	-0.08	-0.11	-0.10	-0.07	-0.13	-0.15	-0.10	-0.16	-0.10	-0.10	-0.13
Education York	-0.14	-0.09	-0.12	-0.11	-0.10	-0.12	-0.14	-0.13	-0.10	-0.13	-0.17	-0.13	-0.19	-0.13	-0.15	-0.16
Education N. West	-0.14	-0.05	-0.11	-0.07	-0.10	-0.12	-0.14	-0.16	-0.09	-0.11	-0.13	-0.13	-0.20	-0.14	-0.17	-0.17
Education E.Mids	-0.22	-0.10	-0.14	-0.11	-0.10	-0.17	-0.19	-0.14	-0.11	-0.15	-0.19	-0.12	-0.21	-0.17	-0.16	-0.18
Education W.Mids	-0.14	-0.08	-0.10	-0.07	-0.10	-0.14	-0.13	-0.15	-0.12	-0.12	-0.16	-0.09	-0.18	-0.17	-0.16	-0.15
Education E.Anglia	-0.14	-0.11	-0.10	-0.12	-0.12	-0.17	-0.24	-0.18	-0.11	-0.18	-0.20	-0.10	-0.25	-0.16	-0.15	-0.16
Education G.London	-0.20	-0.12	-0.16	-0.12	-0.12	-0.19	-0.20	-0.17	-0.09	-0.11	-0.14	-0.10	-0.16	-0.13	-0.12	-0.13
Education S.East	-0.20	-0.13	-0.19	-0.14	-0.14	-0.20	-0.20	-0.21	-0.12	-0.16	-0.17	-0.12	-0.21	-0.15	-0.17	-0.17
Education S.West	-0.19	-0.09	-0.14	-0.13	-0.11	-0.17	-0.19	-0.17	-0.12	-0.14	-0.15	-0.14	-0.20	-0.14	-0.18	-0.14
Education Wales	-0.14	-0.07	-0.12	-0.10	-0.07	-0.12	-0.11	-0.13	-0.09	-0.15	-0.14	-0.12	-0.18	-0.17	-0.19	-0.12
Education Scotland	-0.14	-0.07	-0.10	-0.10	-0.09	-0.11	-0.12	-0.13	-0.10	-0.12	-0.16	-0.11	-0.17	-0.15	-0.14	-0.16
Education N.Ireland	-0.13	-0.03*	-0.10	-0.07	-0.05	-0.12	-0.13	-0.05	-0.04*	-0.14	-0.14	-0.13	-0.17	-0.16	-0.19	-0.12
Experience	-0.11	-0.12	-0.12	-0.12	-0.11	-0.10	-0.11	-0.11	-0.07	-0.10	-0.06	-0.06	-0.08	-0.09	-0.08	-0.08
Squared Experience	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

* Insignificant at 5%.

Table A7: Results for the two-stage estimation of log weekly earnings

Variable	Region	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Nominal Fixed-effect	North	4.31	4.52	4.49	4.79	4.89	5.33	4.98	4.90	5.54	4.60	3.05	4.54	5.30	4.58	5.23	4.48
	York	4.16	4.69	4.43	4.80	4.85	4.82	4.40	4.27	3.52	4.58	4.57	4.98	4.53	5.15	5.67	4.22
	N.West	3.88	4.01	4.88	5.03	4.63	4.55	4.41	4.36	4.33	4.37	5.16	5.14	4.37	3.85	3.82	4.76
	E.Mids	4.18	3.86	4.75	4.44	5.14	5.01	4.68	4.86	4.43	4.13	4.35	5.12	4.71	4.51	6.07	6.56
	W.Mids	4.30	4.85	4.83	4.17	4.58	4.55	4.71	4.57	4.04	2.59	3.88	5.22	4.50	5.25	4.52	3.30
	E.Anglia	4.43	5.25	3.54	3.80	3.80	4.09	5.04	3.02	3.80	3.90	4.37	3.71	5.19	4.59	4.75	4.55
	G.London	4.34	4.62	4.68	4.87	4.72	4.79	4.66	4.78	4.81	4.50	3.86	5.95	5.31	4.62	7.29	4.49
	S.East	4.25	4.38	4.47	4.79	5.10	4.27	3.92	4.71	3.83	4.34	4.05	4.30	4.30	4.45	4.10	4.94
	S.West	4.19	4.16	4.18	4.43	5.19	4.89	4.09	4.61	3.92	4.99	4.10	3.61	3.23	3.94	7.68	3.50
	Wales	3.79	4.53	4.62	4.86	4.36	5.11	5.14	4.22	4.37	4.78	3.02	4.76	4.84	5.91	5.03	7.43*
	Scotland	3.92	5.38	4.77	5.05	4.92	5.16	4.90	5.20	4.23	5.07	3.77	4.47	4.36	4.55	3.19	4.36
	N.Ireland	4.65	4.73	6.81*	4.48	4.07	2.96	3.84	5.09	3.15	4.58	4.39	5.75	5.65	3.99	3.22	5.14
Sex dummy	North	5%*	-21%*	-17%*	-23%	-9%*	-6%*	-8%*	2%*	35%*	-18%*	-57%	-32%	-5%*	-32%	-24%*	-10%*
	York	-18%*	-10%*	-32%	-14%*	10%*	-10%*	-10%*	-21%	-99%	-29%*	-20%*	5%*	-22%*	14%*	24%*	-11%*
	N.West	-23%	-37%	-15%*	-29%	-4%*	-27%	-21%	-11%*	-17%	-17%*	8%*	-4%*	-31%	-25%	-39%*	-22%*
	E.Mids	-17%*	-52%	-5%*	-38%	0%*	-9%*	-26%	21%*	-33%*	-28%*	-31%	0%*	-14%	-22%*	29%*	90%*
	W.Mids	-3%*	-16%*	-11%*	-23%	-17%*	-10%*	-26%	-12%*	-38%*	-98%	-55%	10%*	-11%*	4%*	-23%*	-59%*
	E.Anglia	10%*	99%*	-68%*	-73%*	-92%	-47%*	33%*	-79%	-73%*	-30%	-6%*	-70%	23%*	-17%*	14%*	-6%*
	G.London	-18%	-11%*	-8%*	-12%*	-9%*	-6%*	-10%*	-11%*	-5%*	-27%*	-31%	15%*	3%*	-20%*	48%*	0%*
	S.East	17%*	-28%	-10%*	-12%*	19%*	-23%	-87%	-20%	-54%	-36%	-45%	-39%	-31%	-28%	-45%*	9%*
	S.West	10%*	-80%	-16%*	-48%	16%*	33%*	-70%	-6%*	-27%*	19%*	-40%	-61%	-67%	-51%	93%*	-64%*
	Wales	-54%	-38%	-22%*	-8%*	-23%*	4%*	-12%*	-43%	0%*	-11%*	-71%	-17%*	-8%*	31%*	6%*	46%*
	Scotland	-17%*	48%*	0%*	-5%*	3%*	1%*	9%*	13%*	-30%*	-11%*	-35%	-25%	-16%*	-18%*	-44%	-22%
	N.Ireland	79%*	3%*	59%*	44%*	9%*	-32%	-12%*	23%*	-67%	-5%*	-30%	-3%*	-10%*	-1%*	-25%*	7%*

* Insignificant at 5%.

(to be continued)

Table A7 (continued)

Variable	Region	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Education	North	9.4%	6.6%	6.8%	3.5%	3.2%	1.7%*	3.0%	2.6%*	0.6%*	4.8%	12.8%	6.2%	2.5%*	5.2%	3.8%*	7.1%*
	York	7.6%	4.1%	6.4%	4.9%	4.3%	5.3%	7.6%	7.7%	10.1%	5.7%	5.8%	4.9%	7.8%	3.4%*	2.0%*	8.7%
	N.West	9.7%	7.9%	3.2%	2.0%	5.3%	6.1%	6.5%	7.1%	6.3%	6.8%	4.7%	3.5%	7.3%	8.6%	8.3%	5.0%*
	E.Mids	8.3%	9.3%	4.8%	5.7%	1.6%*	3.5%	5.2%	3.0%*	5.8%	8.0%	7.8%	3.6%*	5.0%	6.2%	1.2%*	-2.1%*
	W.Mids	8.0%	2.5%	4.0%	8.4%	4.7%	6.1%	4.9%	5.1%	7.2%	13.0%	8.2%	4.4%*	6.9%	3.2%*	5.9%	12.0%
	E.Anglia	5.5%	2.3%*	11.1%	8.3%	9.5%	8.9%	2.2%*	13.0%	9.8%	10.0%	7.3%	13.1%	3.1%*	6.5%	4.4%	8.1%*
	G.London	5.2%	4.4%	4.7%	3.7%	4.0%	4.0%	4.5%	3.8%	3.5%	5.4%	8.6%	0.8%*	3.1%*	5.7%	-3.3%*	6.1%
	S.East	7.5%	5.7%	5.2%	3.9%	2.0%*	7.0%	9.3%	4.3%	9.2%	7.2%	8.8%	7.9%	8.2%	7.3%	8.6%	5.5%
	S.West	7.3%	5.9%	7.3%	4.6%	2.5%*	5.2%	7.2%	4.6%	8.0%	4.7%*	8.4%	10.0%	11.0%	9.3%	-5.0%*	11.3%
	Wales	8.8%	4.8%	4.5%	5.2%	6.2%	2.6%	2.7%*	6.9%	6.7%	4.6%*	12.3%	5.2%	6.0%	0.0%*	4.3%*	-2.6%*
	Scotland	9.8%	1.7%*	4.7%	3.0%	3.7%	3.4%*	4.1%	2.9%	7.1%	3.2%	10.5%	6.9%	8.1%	5.8%	12.2%	6.9%
	N.Ireland	6.0%*	2.4%*	-5.4%*	5.5%*	7.2%	15.2%	10.8%	4.3%*	12.6%	6.6%	5.7%	2.9%*	1.6%*	8.5%*	12.3%	5.8%*
Experience	North	3.9%	3.6%	3.9%	4.5%	4.5%	3.5%	4.5%	5.2%	4.4%	5.1%	7.2%	4.1%	3.7%	6.0%	4.1%	5.4%
	York	5.8%	5.8%	4.7%	4.1%	5.3%	4.2%	5.9%	5.4%	5.6%	4.6%	4.9%	3.8%	3.6%	5.7%	4.9%	6.0%
	N.West	5.1%	5.7%	4.7%	3.8%	5.0%	4.4%	5.6%	4.9%	5.9%	5.4%	3.2%	3.6%	4.6%	6.8%	7.2%	5.6%
	E.Mids	4.7%	5.1%	4.7%	4.6%	4.9%	3.7%	4.0%	6.3%	4.9%	5.2%	5.1%	5.5%	5.3%	6.3%	3.3%*	4.1%*
	W.Mids	4.3%	4.6%	3.9%	5.6%	5.2%	4.7%	4.7%	5.3%	5.4%	8.5%	5.4%	3.2%	4.5%	4.5%	5.8%	6.2%
	E.Anglia	6.7%	6.6%	5.2%	5.8%	3.9%	4.3%	7.8%	6.2%	5.1%	3.6%	5.1%	2.1%*	6.4%	5.5%	7.0%	6.5%
	G.London	5.0%	5.3%	5.1%	4.7%	5.7%	4.6%	5.4%	4.8%	5.1%	4.0%	5.0%	5.3%	4.8%	5.2%	3.4%*	7.7%
	S.East	6.0%	6.5%	6.4%	6.0%	5.9%	6.1%	2.7%*	4.9%	4.6%	4.8%	5.7%	5.7%	5.4%	6.2%	5.6%	6.3%
	S.West	6.6%	4.0%	5.4%	5.5%	5.0%	4.7%	4.5%	5.5%	6.1%	5.5%	6.3%	6.0%	7.6%	5.9%	0.1%*	6.8%
	Wales	5.1%	4.7%	3.9%	4.0%	5.0%	4.9%	3.1%	4.8%	5.4%	4.1%	6.9%	4.2%	3.3%	6.1%	6.2%	-0.8%*
	Scotland	5.4%	3.8%	4.3%	3.7%	4.9%	3.2%	5.5%	4.2%	6.6%	4.4%	6.4%	4.7%	5.3%	5.1%	7.0%	5.5%
	N.Ireland	15.0%*	7.1%	8.4%*	10.2%	7.8%	5.2%	4.9%	7.2%	5.6%	5.6%	6.8%	2.7%*	3.4%	4.8%	7.0%	2.8%*
Squared experience (*1000)	North	-0.47	-0.55	-0.64	-0.74	-0.68	-0.42	-0.71	-0.72	-0.55	-0.98	-1.32	-0.60	-0.51	-0.98	-0.68*	-0.87*
	York	-0.97	-0.97	-0.73	-0.59	-0.79	-0.55	-0.99	-0.84	-1.20	-0.77	-0.76	-0.57	-0.47	-0.87	-0.59*	-0.91
	N.West	-0.78	-0.96	-0.81	-0.61	-0.73	-0.69	-0.86	-0.68	-0.95	-0.91	-0.38*	-0.32*	-0.79	-1.23	-1.36	-0.96*
	E.Mids	-0.72	-0.91	-0.73	-0.77	-0.72	-0.49	-0.57	-0.81	-0.83	-0.88	-0.97	-0.81	-0.87	-1.11	-0.24*	-0.13*
	W.Mids	-0.58	-0.76	-0.57	-0.86	-0.82	-0.67	-0.70	-0.75	-0.95	-1.74	-1.06	-0.09*	-0.72	-0.58	-0.99	-1.24
	E.Anglia	-1.12	-0.95	-0.89	-1.05	-0.84	-0.71	-1.10	-1.30	-1.12	-0.52	-0.76	-0.39*	-0.90	-0.82	-1.13	-0.86
	G.London	-0.86	-0.84	-0.81	-0.76	-0.92	-0.70	-0.94	-0.81	-0.85	-0.80	-0.94	-0.66	-0.80	-0.95	-0.14*	-1.27
	S.East	-0.87	-1.08	-1.03	-1.00	-0.86	-1.01	-0.34*	-0.84	-0.82	-0.82	-1.02	-1.06	-0.90	-1.08	-1.11	-1.03
	S.West	-1.05	-0.73	-0.86	-0.92	-0.64	-0.48	-0.86	-0.82	-1.04	-0.75	-1.12	-1.19	-1.62	-1.15	0.58*	-1.42
	Wales	-0.89	-0.83	-0.55	-0.48*	-0.83	-0.70	-0.37	-0.67	-0.77	-0.56*	-1.47	-0.65	-0.47*	-0.84	-0.90	0.56*
	Scotland	-0.88	-0.52	-0.66	-0.53	-0.72	-0.43	-0.84	-0.55	-1.11	-0.65	-1.13	-0.71	-0.81	-0.75	-1.41	-0.94
	N.Ireland	-2.16*	-1.14	-1.16*	-1.52	-1.42	-0.73	-0.53*	-0.90*	-1.22	-0.76	-1.28	-0.27*	-0.38*	-0.60*	-1.27	-0.10*

* Insignificant at 5%.

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