

**The National Minimum Wage and Labour Market  
Transitions**

**Report to the Low Pay Commission**

**Mark B. Stewart  
University of Warwick**

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# Contents

1. Introduction	1
2. Labour market transitions in the LFS	3
3. Changes in transition rates after the minimum wage	5
4. Accounting for missing wage data	7
5. Changes in re-weighted transition probabilities	8
6. Potential measurement error in wages	14
7. Heterogeneity in transition rates	17
8. Models for transitions by the unemployed	18
9. Models for transitions by the low paid	21
10. Models for transitions by the economically inactive	23
11. Conclusions	25
Tables	27
Appendices	60

## 1. Introduction

Labour market status and wage rates both show considerable inter-temporal persistence. Those who inhabit a particular labour market state or a particular wage group at time  $t$  are likely to still do so at time  $t+1$ . The dynamics of the two variables are also inter-related.<sup>1</sup> They exhibit this persistence both individually and jointly. This report examines what impact, if any, the introduction of the National Minimum Wage has had on these inter-related dynamics. What impact has its introduction had on the transition rates between these states?

Individuals are categorised in this report by a combination of labour market status and wage rate for employees. The focus is then on transition probabilities between these different “states”, e.g. the probability that an employee with a wage in a particular category at time  $t$  has moved into economic inactivity at time  $t+1$ , or the probability that someone unemployed at  $t$  has become an employee in a particular wage category at  $t+1$ .

The main question addressed is: how does this set of probabilities (collected in the transition matrix) differ after the introduction of the National Minimum Wage compared with before? Are there particular transition probabilities that show a marked change over the period analysed?

The data used for the report are from 20 successive quarters of the Labour Force Survey (LFS), covering a period from March 1997 to February 2002. March 1997 was the point at which earnings questions were first introduced into the questionnaire for the first (incoming) quarter of the survey – prior to that they had only been asked on the fifth (outgoing) quarter. February 2002 was the latest data available at the time the work was conducted.

Data from the British Household Panel Survey (BHPS) and the New Earnings Survey Panel Dataset (NESPD) were also examined, but have important disadvantages for the

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<sup>1</sup> See Stewart, Mark (2000), “The Inter-related Dynamics of Unemployment and Low Pay”, Working Paper, University of Warwick.

task at hand. The difficulty with the BHPS is the much smaller sample size provided. In particular for the period after the introduction of the minimum wage only the transitions between wave 9 (autumn 1999) and wave 10 (autumn 2000) can be used, producing rather small cell sizes for some probabilities, particularly when sub-groups are considered.

The drawback with the NESPD is completely different. It has very large sample sizes, but is a sample only of employees (and in fact only those with earnings above a certain threshold). Non-employment can be inferred by absence from the survey in a particular year (although probably with some error), but this would involve amalgamating four of the nine states considered below on the LFS. Registered unemployment can be split from the rest of the non-employee states if one links the NESPD data with that from JUVOS. This linked data was only available up to April 2000 at the time of the draft report, meaning that transitions originating in the April 1999 survey were the latest that could be considered. This was problematic for the analysis conducted below since doubts have been expressed as to whether such transitions should be considered as entirely after the introduction of the minimum wage (with the sample having been drawn in March 1999). In addition considerable technical difficulties have been experienced even with that version of the two datasets. A linked data file has now been constructed up to April 2001, but the technical difficulties have continued. In particular I have considerable doubts about the validity and accuracy of the matching process for the latest versions of the NESPD and JUVOS files. There are still a number of unresolved anomalies arising from preliminary analysis of the “matched” file which cause me to have insufficient confidence in the validity of the file to take its analysis further. (These are currently under discussion with ONS.) This report therefore focuses on results based on the LFS data.

Section 2 of the report lays out the framework used and presents the initial estimated transition matrix based on transitions between Labour Force Surveys. Section 3 then examines changes in transition probabilities between the periods before and after the introduction of the minimum wage. Employees with missing wage data play an important role in this and Section 4 considers how to account for such missing data. Re-weighted transition probability matrices to allow for this problem are considered

in Section 5. Issues of measurement error and heterogeneity are considered in Sections 6 and 7. Three groups of transition probabilities are identified as showing significant changes between the time periods. These are presented in Sections 8, 9 and 10 for the low paid, unemployed and economically inactive respectively. Conclusions are then presented in Section 11.

## 2. Labour market transitions in the LFS

The fundamental building block of the analysis in this report is the transition matrix. This matrix gives the transition rates or probabilities of movement from each labour market “state” at time  $t$  to each state at time  $t+1$ . States are defined on the basis of labour market status with employees further subdivided according to wage rate.

More formally, define  $p_{jk}$  as the probability that an individual in category  $j$  in period  $t$  moves into category  $k$  in period  $t+1$ . Then the matrix  $P$  with elements  $p_{jk}$  (such that  $\sum_k p_{jk} = 1$  for each  $j$ ) is the transition matrix.

The simplest model assumes (1) population homogeneity, i.e. that there is a single transition matrix applicable to all individuals; (2) time homogeneity, i.e. that the probabilities are constant over time; and (3) that the process is first-order Markov, i.e. that the probabilities are independent of past history. In this simple case, if we define  $f_k(t)$  to be the proportion of the population in category  $k$  at time  $t$ , then the transition matrix links these frequencies as follows:

$$f_k(t+1) = \sum_{j=1}^J f_j(t) p_{jk}$$

However this simple relationship breaks down if any of the three assumptions listed above is relaxed.

Initially a transition matrix for 9 states is considered. The labour market states are employee, self-employed, unemployed, inactive and would like work, inactive and does not want work. (The full set of labour market states recorded in the data is shown in Appendix A.) Employees are then divided into 4 wage categories with one additional group for those with missing wage information. The cut-offs used are the

lowest decile (£3.75), first quartile (£4.78) and median (£6.76) among those interviewed in April 1999. Wages at other dates are adjusted to April 1999 rates using the Average Earnings Index. The full set of states for the initial transition matrix are as follows:

- (1) employee with real wage < £3.75/hour
- (2) employee with real wage £3.75 - £4.78/hour
- (3) employee with real wage £4.78 - £6.76/hour
- (4) employee with real wage  $\geq$  £6.76/hour
- (5) employee with missing wage information
- (6) self-employed
- (7) unemployed
- (8) inactive and would like work
- (9) inactive and does not want work

The transition matrix based on LFS data from April 1997 onwards and with states defined in this way is given in Table 1. Sample sizes are given to the right of the transition matrix in the final column of the table. Probabilities are given expressed as percentages. For each row, the highest frequency is found on the diagonal. In other words, for each state at time  $t$ , remaining in the same state is the most likely observed outcome at time  $t+1$ . This is strongest for employees with above-median pay, for the self-employed and for the inactive who do not want work.

One useful way to look at these transitions is to consider transition probability ratios. Those relative to employees with a wage above the median are shown in Table 2. Those with a wage in the bottom decile at  $t$  are 35 times as likely to be in that wage group at time  $t+1$  as someone paid above the median at time  $t$ . Someone between the bottom decile and the first quartile is 13 times as likely as someone above the median and someone in the second quartile is 3 times as likely. Someone unemployed at  $t$  is about 8 times as likely to be in the bottom wage group at  $t+1$  as someone who was an employee paid above the median at  $t$  and about a quarter as likely as someone who was in the bottom wage group at  $t$ .

Someone in the bottom wage decile at  $t$  is 3 times as likely to be unemployed at  $t+1$  as someone who had been above the median wage, someone in the next category is twice as likely and someone in the second quartile one and half times as likely. But even

someone in the bottom wage group at  $t$  is less than one tenth as likely to be unemployed at  $t+1$  as someone already unemployed at  $t$ .

### **3. Changes in transition rates after the minimum wage**

The transition matrix in Table 1 assumes constant probabilities over time. The next step in the analysis considers three separate time phases in which the transition probabilities may differ: transitions entirely before the introduction of the minimum wage, transitions that span the introduction of the minimum wage, and transitions entirely after the introduction of the minimum wage. Transition probabilities equivalent to those in Table 1 for these three time phases are shown in Table 3.

The transition rates presented in Table 3 show some interesting trends that are worthy of comment. The probability of remaining in the lowest wage group ( $<£3.75/\text{hour}$  in April 1999 terms) declines through the three phases. 38.6% of the group are still there 12 months later in the pre-minimum phase, declining to 35.9% in the “spanning” phase, and 33.8% in the post-minimum phase. However it must be noted that part of this change is offset by the increase in the proportion of those in the lowest wage group at  $t$  who are in the missing wage group at  $t+1$ . Indeed all 5 of the employee groups show a rise in the proportion with missing wage information at time  $t+1$ . This issue is addressed in the next section.

Another feature of the table is that the transition rate from unemployment at time  $t$  to the lowest wage group at time  $t+1$  also shows a marked decline over the phases: 9.2% to 8.0% to 6.8% (although once again there is an offsetting movement with the probability of those who start out in the same group having missing wage information at  $t+1$  showing an increase of similar magnitude). Also noticeable is the increase in the proportion of those who are inactive and would like work who remain in the same state.

Tables 4 and 5 consider which of these changes in transition rates are statistically significant. The top half of Table 4 gives test statistics for tests of equality between

before and after transition probabilities (i.e. between the first and third blocks of Table 3). Those given in bold are significant at the 5% level. The statistics given in columns 1 to 9 are individual tests of equality between the corresponding pair of probabilities. They are distributed  $N(0,1)$  under the null hypothesis of equality. The final column gives the Pearson  $\chi^2$  test of the joint hypothesis that the corresponding entire rows of the two transition matrices are equal. (Remember that the probabilities in a row sum to 1.) These statistics are  $\chi^2(8)$  under the null of equality.

The lower half of Table 4 gives the corresponding p-values (expressed as percentages) for the test statistics given in the upper half of the table. These give the probability that we would get a value of the statistic at least as big (in absolute terms) as the corresponding value in the top half of the table if the null hypothesis of no change was true. Joint equality of the transition rates between the two phases is rejected for all rows at the 10% level and for all rows except the last at the 5% level. All rows show at least one change in transition rate that is significant at the 5% level. However a dominant role seems to be being played in this table of statistics by the missing wage information category. The pattern of individual significance will be considered further once this issue of missing wage information has been addressed.

Table 5 repeats the analysis presented in Table 4, but testing for equality between the “before” and “spanning” phases. The test statistics are typically much lower. Joint equality of the transition probabilities for a given initial state is only rejected for 3 of the 9 rows at either the 5% or 10% level, all three being employee states. The other thing to note is that an important role is played again by the missing wage information category. For all three rows where the joint hypothesis of equality is rejected, the largest individual test statistic is found in the column corresponding to missing wage information, i.e. for these three initial states it is the transition rates into having missing wage information at time  $t+1$  that exhibit most evidence of change between these two phases. This issue of individuals with missing wage information is turned to next.

## 4. Accounting for missing wage data

Employees who have missing wage data provide us with a problem. It is clear from the previous section that much of the observed change in transition rates may be driven by movements into the missing wage state at time  $t+1$ . This needs to be addressed and the transition matrices adjusted for missing wage information to get a better picture of the real underlying transition rates. However, one cannot simply exclude such cases, since this would skew things towards the non-employee states. Two strategies are examined here: one simple, one more sophisticated. Both re-weight employees with wage information to reflect the exclusion of employees with missing wage information (while leaving non-employee observations unchanged). Both use a form of response propensity weighting.<sup>2</sup>

The first, and simpler, method re-weights the non-missing wage employee columns in each row of the matrix (i.e. for each initial state) by the inverse of the proportion of employees in that row who have non-missing wage information at  $t+1$ . This method is in fact equivalent to a very simple version of response propensity weighting, in which a linear probability model is used for the “response” probability among employees (i.e. for the probability of the provision of wage information) and the response indicator is taken to be a function solely of a set of dummies for status at time  $t$ . The weight used in the transition matrix is then the inverse of the predicted probability of “response” for employees and 1 for non-employees.

The second method is also a response propensity weighting method, using a fuller model for the response probabilities. The model used for the probability of response (i.e. of having non-missing wage information) contains explanatory variables for gender, age, highest educational qualifications, length of education, marital status, ethnic origin, region, health status and month and year dummies, as well as the dummies for status at time  $t$  included in the simpler model. The weight is constructed for employees as the inverse of the predicted probability.

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<sup>2</sup> See Little, Roderick J. A. (1988), “Missing-data adjustments in large surveys”, *Journal of Business and Economic Statistics*, **6**, 287-296.

## 5. Changes in re-weighted transition probabilities

Tables 6 – 10 present the results from using the first, and simpler, response propensity weighting method for dealing with the observations with missing wage information at  $t+1$ . Tables 11 – 15 then present the equivalent based on the fuller response probability model. As would be expected the diagonal elements of the transition matrix for employees increase as a result of re-weighting for missing wage information. However there is almost no difference between the transition matrices based on the two alternative response propensity weightings (Tables 6 and 11).<sup>3</sup> Despite the differential reallocation to wage groups, the transition probability ratios (Tables 7 and 12) are altered little by the re-weighting.

The main changes in transition rates between the three phases pointed to in the discussion of Table 3 above remain after the re-weighting for missing wage information. However the transition probability equality tests (Tables 9 and 14) show slightly less evidence of general change, particularly after the full-model response propensity re-weighting (Table 14). Excluding the rows and columns for the missing wage information state (state 5), Table 4 shows 14 individual transition probabilities that exhibit significant change at the 5% level, while Table 14 shows 9.

Before looking more closely at the test statistics in Tables 14 and 15, it is worth considering the extent of change in overall mobility demonstrated in the three transition matrices in Table 13 and in finer disaggregations of the time period. The standard mobility index for transition matrices like those in Table 13 is the Shorrocks index.<sup>4</sup> In terms of the notation in Section 2 above, this is defined as:

$$M(P) = \frac{J - \text{trace}(P)}{J - 1} = \frac{J - \sum_{j=1}^J p_{jj}}{J - 1}$$

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<sup>3</sup> Note that the simpler of the two response propensity weighting methods re-weights separately for each state at time  $t$  and hence the effective sample size for each row remains the same. This is not the case when other explanatory variables are added to the response probability model and thus the effective row sample sizes change slightly.

<sup>4</sup> See Shorrocks, A. (1978), “The measurement of mobility”, *Econometrica*, **46**, 1013-1024.

Assuming the rows of  $P$ , i.e. the conditional distributions, to be independent, well-known properties of the multinomial distribution imply that the estimator of  $M(P)$  is asymptotically normally distributed with variance:<sup>5</sup>

$$\text{var}(M(P)) = \frac{1}{(J-1)^2} \sum_{j=1}^J \frac{p_{jj}(1-p_{jj})}{n_j}$$

Another popular mobility index in this context is the eigenvalue index:

$$M^*(P) = \frac{J - \sum_{j=1}^J |\lambda_j|}{J-1}$$

where  $\lambda_j$  denotes the  $j$ -th ordered eigenvalue of  $P$ . If, as is often the case for transition matrices of this type and in this context, the eigenvalues of  $P$  are all real and non-negative, the eigenvalue index coincides with the Shorrocks index.

The shorrocks mobility indices for the three phases based on the transition matrices in Table 13 are as follows:

Phase	Shorrocks mobility index	Standard error
1	0.47771	0.00297
2	0.47716	0.00319
3	0.47853	0.00245

The Shorrocks index is based solely on the diagonal elements of the transition matrix, i.e. the conditional probabilities of remaining in the same state. It is negatively related to the sum of these probabilities. The higher the value of the index, the more mobility the transition matrix exhibits. Relative to the standard errors in the final column, the Shorrocks index shows negligible change over the three phases, although it is slightly higher in the third phase (i.e. after the introduction of the minimum wage). The overall degree of mobility is very similar in each of the three phases. All eigenvalues

<sup>5</sup> See Schluter, Christian (1998), "Statistical inference with mobility indices", *Economics Letters*, **59**, 157-162.

from the transition matrices for each of the three phases are indeed real and positive (the smallest being 0.18), meaning that the eigenvalue mobility index for each phase is equal to the Shorrocks index given above.

If we look instead at separate quarters (i.e. 3-month periods corresponding to those of the LFS interviewing) and construct separate transition matrices for each quarter, the Shorrocks mobility indices (and their standard errors) for each quarter are as follows (quarter 1 is March – May, quarter 2 is June – August, quarter 3 is September – November, and quarter 4 is December – February of the following year):

Quarter	Shorrocks mobility index	Standard error
1997.1	0.47594	0.00622
1997.2	0.47803	0.00606
1997.3	0.48405	0.00602
1997.4	0.47496	0.00627
1998.1	0.47415	0.00638
1998.2	0.47799	0.00630
1998.3	0.46802	0.00639
1998.4	0.48275	0.00644
1999.1	0.46679	0.00661
1999.2	0.47036	0.00662
1999.3	0.48380	0.00665
1999.4	0.48059	0.00670
2000.1	0.47238	0.00684
2000.2	0.47685	0.00695
2000.3	0.48944	0.00699
2000.4	0.49191	0.00701

There is some evidence of an upward trend in the index towards the end of the period, but it is not very marked and the series shows considerable noise. If one calculates the index on a monthly basis for each of the 48 months in the period being used, there is again a lot of noise from month to month, but again some evidence of an upward trend in the second half of the period.

A regression of the index on a linear time trend for the second half of the period (March 1999 – February 2001) gives a slope coefficient (i.e. a per-period increase in the index) of .00086 with a t-ratio of 2.41, while for the first half of the period the

trend line is essentially flat: a slope coefficient of .00003 with a t-ratio of 0.07. Similarly if one takes just the period April 1999 to February 2001 (i.e. only transitions after the introduction of the minimum wage), the estimated slope coefficient is .00103 with a t-ratio of 2.73. Thus there is some evidence of an increase in overall mobility in the later stages of the period, but the evidence is not very strong.

Returning to the individual test statistics in Tables 14 and 15 and looking for a moment at the tests between the “before” and “spanning” phases, there was relatively little evidence of significant change before the re-weighting and the same is true after re-weighting. It needs to be kept in mind with these overview examinations of groups of test statistics that if considering test statistics at the 5% significance level, and if the tests were independent (which they are not here since row probabilities must sum to 1), then we would expect to reject the null hypothesis (of no change) when it is true about 1 time in 20. Roughly speaking if there were no changes in the transition probabilities we would expect to reject the null at the 5% significance level 3.6 times in Table 5 and 2.8 times in Tables 10 and 15. This corresponds pretty well with what we observe: 4 rejections at the 5% level in Table 5 and 3 in each of Tables 10 and 15.

Returning to the tests of equality between the “before” and “after” phases, the test statistics show more rejections of the null hypothesis of equality than would be expected. Table 14 indicates that 9 of the changes are significant at the 5% level when about 3 might have been expected.

These changes in transition probabilities fall into three groups. The first group involves changes within the wage distribution. Transitions from the bottom real wage group (below £3.75 per hour in April 1999 terms) to the next group up (£3.75 to £4.78 per hour in April 1999 terms) show a significant increase after the introduction of the minimum wage.<sup>6</sup> The probability of remaining in the bottom group shows a roughly matching decline. The remaining probabilities for that initial starting state show no significant change.

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<sup>6</sup> Adjustment of wages to April 1999 terms is done using the Average Earnings Index.

There are similar results for the 3rd. and 4th. real wage groups. Transitions from the 3rd. wage group (between £4.78 and £6.76 per hour in April 1999 terms) to the top group (above £6.76 per hour in April 1999 terms) show a significant increase after the introduction of the minimum wage and the probability of remaining in the 3rd. group shows a roughly matching decline. It seems unlikely that this could have a causal link with the introduction of the minimum wage. So this in turn perhaps casts some doubt on the causal nature of the change in the probability of rising out of the bottom group. However, the tests statistics involving the top two wage groups are both slightly lower in absolute value than those involving the first and second wage group transitions just discussed above, suggesting perhaps that part of the change in the latter transition might be due to the minimum wage. Note that if those previously paid below the minimum are then paid exactly at the minimum upon its introduction, this would not imply any movement out of the bottom wage group as defined here. (This is considered further below.)

The second group of transitions that exhibit significant changes between these phases are between unemployment (state 7) and employee wage groups. The transition probability from unemployment to the top employee real wage group (above £6.76 per hour in April 1999 terms) increases significantly and that into the bottom employee wage group (below £3.75 per hour in April 1999 terms) falls by a similar magnitude. Those entering employment from unemployment on average receive higher wages after the introduction of the minimum wage than before it. In the opposite direction the transition probability from real wage group 2 to unemployment falls significantly. However the size of this latter fall (in Table 13) does not seem out of line with that for the overall proportion classified as unemployed, and note that the transition probabilities from all states to unemployment fell between these two phases (so that all the statistics in that column of Table 14(a) are negative, although mostly insignificant).

In general terms there is evidence that the wages received at  $t+1$  by those entering employment from unemployment (at time  $t$ ) increased (relative to the rise in the Average Earnings Index) after the introduction of the minimum wage relative to before it. Notice that this is unlikely to be due to some type of sorting effect at the

bottom end, since the probability of entering employment from unemployment increased slightly between the first and third phases (from 38.5% to 39.7%).

The third group of transition probabilities that exhibit significant change are changes within the two economically inactive categories. The proportion of those who at time  $t$  are economically inactive but would like to work who remain in that group at  $t+1$  shows a significant rise, while the proportion who remain inactive at  $t+1$  but now say they do not want work shows a fall. So for this group, the probability of wanting work in the subsequent period conditional on remaining economically inactive rose from 55% in phase 1 (pre minimum wage) to 60% in phase 3 (after the introduction of the minimum wage).

These three groups of transition probabilities will form the starting point for modelling later in the report, but before that the sensitivity of the results to various factors is examined, followed by the heterogeneity of the transition rates between particular sub-groups.

First I look at sensitivity to where the thresholds between the wage groups for employees are set. Table 16 gives the transition matrices (equivalent to Table 11) for two alternative sets of wage thresholds. The first reduces these wage boundaries (all in April 1999 terms again) to £3.60 (i.e. the adult minimum wage rate), £4.50 and £6.50. The second increases them to £4, £5 and £7. Using the first of these alternative definitions reduces the proportion remaining in the same group for both of the lowest two groups. The second alternative definition increases the proportion doing so for the bottom real wage group, but reduces it for the next group up. Both changes of definition have less impact on the diagonal probabilities for the top two wage groups. Similar changes show up in the transition probability ratios in Table 17.

Table 18 then gives  $N(0,1)$  test statistics for the tests of equality of the transition probabilities between the “before” and “after” phases (comparable to Table 14(a)). Of the 9 transition probabilities for which the null hypothesis of equality between the two phases is rejected in Table 14, 8 also produce a rejection for each of the alternative definitions of the wage boundaries. Overall there is slightly more evidence of change

between the phases when the wage boundaries are lowered in definition 1 than when they are raised in definition 2.

For the proportion remaining in the lowest real wage group the rejection of the null due to a fall in this proportion strengthens when the wage boundaries are lowered in definition 1. The test statistic however falls in absolute value when the wage boundaries are raised in definition 2 giving a p-value of 12%. In contrast the change between phases in the transition probability from the second lowest wage group to unemployment weakens slightly when the wage boundaries are lowered in definition 1 (a p-value of 10.5%), but the statistic remains the same when the boundaries are raised in definition 2.

There are also some changes in transition probabilities that gain in significance. For example the probability of transition from inactivity to the bottom wage group falls significantly when using the first alternative definition, although it was just insignificant at the 5% level with the original boundary definitions and declines in significance with the second alternative definition. There is also more evidence of change in the probability of transition from the third to top wage group and of remaining in the top wage group when the first alternative boundary definitions are used.

## **6. Potential measurement error in wages**

Before taking the analysis further, some consideration must be given to the potential problem of measurement error in the wage variable used to construct the four employee status categories. This wage variable is constructed as gross pay in the most recent pay period, converted to a weekly basis and then divided by usual hours per week. This is the construction recommended by ONS for the LFS, but is potentially subject to measurement error.

Since 1999 quarter 1 (i.e. since March of that year) the LFS has also contained a direct question on the individual's hourly wage rate for some employees. Employees who are paid less than monthly are asked whether they are paid a fixed hourly rate,

and if so what it is. Since these questions were only introduced in 1999, it is not possible to conduct the analysis entirely in terms of the hourly wage rate variable. Instead an investigation is conducted in which the estimated transition matrices are adjusted using a matrix product method. This is done to check if the main changes between the phases are still apparent once one makes this adjustment for measurement error.

Using the notation of Section 2,

$$p_{jk} = \Pr[\text{state} = k \text{ at } t+1 \mid \text{state} = j \text{ at } t]$$

Looking at employees only, making this more explicit,

$$p_{jk} = \Pr[\text{AHE in range } k \text{ at } t+1 \mid \text{AHE in range } j \text{ at } t]$$

where AHE denotes average hourly earnings, constructed as the ratio described above. The method used here consists of constructing conversion matrices to enable estimation of:

$$p_{jk}^* = \Pr[\text{HWR in range } k \text{ at } t+1 \mid \text{HWR in range } j \text{ at } t]$$

where HWR denotes hourly wage rate from the direct question described above. These conversion matrices are estimated using data from March 1999 onwards only. Two sets of conversion probabilities are estimated. They are contained in a matrix  $Q_1$  containing the following conditional probabilities

$$q_{1jk} = \Pr[\text{AHE in range } k \mid \text{HWR in range } j]$$

and a matrix  $Q_2$  containing the following ones

$$q_{2jk} = \Pr[\text{HWR in range } k \mid \text{AHE in range } j]$$

The elements of the matrices  $Q_1$  and  $Q_2$  can only be estimated for the period from March 1999 onwards and only based on those who provide hourly wage rates. Under

the assumptions that (i) the conditional probabilities in the matrices  $Q_1$  and  $Q_2$  are stationary, and (ii) those providing an hourly wage rate are representative of the full sample, estimates of the transition matrix in terms of hourly wage rates rather than average hourly earnings can be derived. Given the above constructions, the adjusted probabilities are given by

$$p_{jk}^* = \sum_a \sum_b q_{1ja} P_{ab} q_{2bk}$$

Thus the adjusted transition matrix can be constructed as

$$P^* = Q_1^+ P Q_2^+$$

where

$$Q_i^+ = \begin{bmatrix} Q_i & 0 \\ 0 & I \end{bmatrix}$$

Transition matrices adjusted for measurement error in this way are given in Table B1 in Appendix B for each of the three phases (the adjusted equivalents of the three transition matrices in Table 13). As expected, diagonal elements are reduced in the top-left block of each of the transition matrices (i.e. the part of the matrix involving transitions within employment) and off-diagonal elements in the same block are increased.

However most of the qualitative conclusions from above still hold, although the changes involving wage categories are typically somewhat muted by the adjustments. The probability of remaining in the lowest wage group still shows a decline between phases 1 and 3 and the probability of moving into the next group up still shows an increase, although the magnitudes of both changes are reduced somewhat. The probability of moving from unemployment into the lowest wage group still shows a decline as does that of moving from the second wage group into unemployment. The significant changes involving the economically inactive states are of course unaffected by the adjustments. Overall the conclusion is that the changes in transition probabilities between the phases are not a statistical artifact resulting from measurement error in the wage variable.

## 7. Heterogeneity in transition rates

This section considers heterogeneity in transition rates with respect to gender, age and region. The next set of tables exhibit some interesting changes when the transition probabilities are split by gender. Table 19 gives the transition matrices, re-weighted for missing wage data, separately for men and women. Women are more likely to remain in the same state at  $t+1$  for the lower three wage categories and for the inactive and not wanting work group. Men have higher rates of remaining in the same state for the top wage group, for self-employment, for unemployment and the inactive but wanting work category. Women having a lower rate of remaining in the top half of the wage distribution results in them having lower transition probability ratios for example for entering or remaining in the bottom two wage categories (Table 20).

The tests of equality between the “before” and “after” transition probabilities (Table 21) also show gender differences. The pattern of significance for women is somewhat closer to that in the overall sample (Table 14) than is that for men. The significant overall changes in the probabilities of remaining in the £4.78 - £6.76 wage group and of transition from it into the top wage group seen in Table 14 are primarily driven by women. The corresponding test statistics for men are relatively low. Similarly the reduced probability of transition from unemployment into the bottom wage group is also mainly due to the significant effect for women.

The dangers of looking just at test statistics for the overall sample are also illustrated by looking at this pair of matrices of test statistics. For example Table 21 shows that the probability of transition from the bottom wage group at time  $t$  to the above the median category at  $t+1$  has shown a significant increase for women, but a significant decline for men. As a result the combined sample exhibits no change at all (see Tables 13 and 14). It is important to allow for heterogeneity in these transition rates.

There are also differences by age (Tables 22 – 24). The top age group (45-59) typically shows higher probabilities of remaining in a particular category (i.e. more stability). This is true in 6 of the 8 categories. The significant changes between the

“before” and “after” phases among the two inactive groups are driven primarily by the over 45s, as is that from employment to unemployment (most significantly from wage group 2). The significant changes at the bottom of the wage distribution are driven by the under 35s and over 45s and much less by the middle age group. The middle age group shows remarkably little change. Table 24 shows only two test statistics significant at the 5% level – roughly what one would expect under the null hypothesis of no change between the phases for this age group. There is much more evidence of change for the other two age groups, particularly the over 45s.

Typically the diagonal elements of the transition matrix (i.e. the probabilities of remaining in any given state) are larger for the rest of the UK than for London and the South East (Table 25). The one exception is the proportion of those in the top wage group who remain there. The significant changes between phases in the proportion moving from the bottom wage group to the next group up and in the proportion remaining in the bottom group are mainly due to changes in the rest of the UK outside London and the South East (Table 27). The same is also true of the changes in the proportion moving from inactive and wanting work to inactive and not wanting work and the proportion remaining in the first of these. Here too the changes are largely driven by those outside the South East. In contrast, the changes between phases in the probability of moving from unemployment at  $t$  to the bottom wage group at  $t+1$  and the probability of moving from the second wage group into unemployment are both largely due to changes in London and the South East. Again there is important heterogeneity.

## **8. Models for transitions by the unemployed**

This section and the next two sections now turn to simple models for particular transition probabilities in order to control for other factors that may influence them. The transition rate from unemployment to the bottom wage group is found in Tables 13 and 14 to have significantly fallen between the “before” and “after” phases. However other factors influence this transition rate, as has been seen in the previous section. This section addresses two main questions. Has this probability fallen after

controlling for other factors and second does the decline differ between identifiable sub-groups, in particular with respect to gender, age and region.

Simple linear probability models are estimated in this section for those who are unemployed (“state” 7) at time  $t$ . Three models are estimated: one for the probability of being low paid (i.e. being in the bottom wage group) at time  $t+1$ , one for the probability of being an employee in employment at time  $t+1$ , and one for the probability of being low paid at  $t+1$  conditional on being an employee.

The models are estimated on the pooled data for all three phases and contain dummy variables for phase 2 (spanning the introduction of the minimum wage) and for phase 3 (after the introduction of the minimum wage) together with a set of control variables. Phase 1 is the base for comparison. Controls are included for age, highest educational qualification, gender, marital status, ethnic origin, health status, region and month of interview (44 control variables in all).

Table 28 gives the estimated models for the three probabilities specified above. Looking first at the probability of being low paid at  $t+1$ , there are strong age, qualification, gender and marital status effects. There is also a significant difference between phase 3 (after the introduction of the minimum wage) and phase 1 (before the introduction). Other things equal, the probability of being low paid at  $t+1$  for this initial state group is 2.8 percentage points lower in phase 3 (after the introduction of the minimum wage) than in phase 1 (before its introduction), and this difference is significant at the 1% level. Thus the significant difference between the phases in the raw probability (Tables 13 and 14) is not diluted by the inclusion of control variables. The probability is lower in phase 2 (spanning the introduction of the minimum wage) than in phase 1, but the difference is not statistically significant.

The second column of Table 28 presents the estimated model for the probability of being an employee at time  $t+1$ . Again there are strong age, qualification, gender and marital status effects. The probability is slightly higher in phase 3 than phase 1, but the difference is not statistically significant. Neither is that between phase 2 and phase 1. The null hypothesis that, after controlling for the listed variables, the

transition probability from unemployment to being an employee did not change over the three phases is found to be consistent with the data.

The final column of Table 28 presents the estimated model for the probability of being low paid (i.e. in the bottom wage group) at  $t+1$  conditional on being an employee. This probability shows a decline over the three phases. This is in line with the results in the other two columns. After controlling for other factors, this conditional probability is 5.9 percentage points lower in phase 3 than in phase 1 and this difference is significant at the 1% level. There is a smaller decline between phases 1 and 2 and it is not statistically significant.

In the raw probabilities there is evidence that differences between the phases differ by gender, age and region. This is now examined in the context of the probability model controlling for other factors. This is done by including interactions with the phase dummies. The results are presented in Table 29. Only the estimated coefficients on the phase dummies are presented from the various specifications. These are presented multiplied by 100 to give the effect on the particular probability in percentage terms. All models contain the same control variables as those in Table 28.

All three of the probabilities modelled in Table 29 differ insignificantly between phases 1 and 2 for all seven of the sub-groups considered as they do for the full sample. The significant decline in the probability of transition into low pay between phases 1 and 3 seen in the full sample is due more to women than to men, more to those aged below 35 than those who are older, and more to those in London and the South East than those elsewhere in the country.

The gender and regional differences are the most clear-cut, both for this probability and for the probability of being low paid at  $t+1$  conditional on being an employee. The picture is slightly more complicated for the age groups, particularly for the oldest age group, where a significant decline in the conditional probability of low pay is largely offset by a significant increase in the probability of moving into employment, producing an insignificant difference in the unconditional probability.

## 9. Models for transitions by the low paid

This section looks at simple models for transitions by the low paid. The transition rate from the bottom wage group to the next wage group up is found in Tables 13 and 14 to have significantly risen between the “before” and “after” phases, with the probability of remaining in the bottom showing a significant fall. However other factors influence this transition rate, as has been seen in Section 7. The current section addresses two main questions: first has the probability of moving into the next wage group up risen after controlling for other factors, and second does the rise differ between identifiable sub-groups, in particular with respect to gender, age and region.

Simple linear probability models are again estimated in this section for those who are employees in the bottom wage group (“state” 1) at time  $t$ . Three models are estimated: one for the probability of still being low paid (i.e. being in the bottom wage group) at time  $t+1$ , one for the probability of still being an employee in employment at time  $t+1$ , and one for the probability of being low paid at  $t+1$  conditional on being an employee.

As in the previous section, the models are estimated on the pooled data for all three phases and contain dummy variables for phase 2 (spanning the introduction of the minimum wage) and for phase 3 (after the introduction of the minimum wage) together with a set of control variables. (Phase 1 is again the base for comparison.) The same control variables are included as in the models in the previous section.

Table 30 gives the estimated models for these three probabilities. Looking first at the probability of still being low paid at  $t+1$ , there are strong qualification, gender and regional effects. There is also a significant difference between phase 3 (after the introduction of the minimum wage) and phase 1 (before the introduction). Other things equal, the probability of still being low paid at  $t+1$  for those in this initial state group is 3.1 percentage points lower in phase 3 (after the introduction of the minimum wage) than in phase 1 (before its introduction), and this difference is statistically significant with a p-value of 1.4%. Thus the significant difference between the phases in the raw probability (Tables 13 and 14) is not removed by the inclusion of control variables. The probability is lower in phase 2 (spanning the introduction of the

minimum wage) than in phase 1, but the difference is not statistically significant. Thus for both these probabilities the findings match those in the previous section for the unemployed.

The second column of Table 30 presents the estimated model for the probability of still being an employee at time  $t+1$ . Again there are strong qualification effects and in this case there are also strong age, marital status and health effects. The probability is slightly higher in phase 3 than phase 1, but the difference is not statistically significant. Neither is that between phase 2 and phase 1. As in the previous section (for those initially unemployed), the null hypothesis that, after controlling for the listed variables, the probability of those initially low paid remaining employees did not change over the three phases is found to be consistent with the data.

The final column of Table 30 presents the estimated model for the probability of still being low paid (i.e. in the bottom wage group) at  $t+1$  conditional on still being an employee. This probability shows a decline over the three phases. This is in line with the results in the other two columns. After controlling for other factors, this conditional probability is 4.1 percentage points lower in phase 3 than in phase 1 and this difference is significant at the 1% level. There is a smaller decline between phases 1 and 2 and it is not statistically significant.

For these transitions probabilities too there is evidence that the differences between the phases differ by gender, age and region. This is now examined in the context of the probability model controlling for other factors. This is done in the same way as in the previous section – by including interactions with the phase dummies. The results are presented in Table 31. Only the estimated coefficients on the phase dummies are presented from the various specifications and once again these are presented multiplied by 100 to give the effect on the particular probability in percentage terms. All models contain the same control variables as those in Table 30.

The significant decline between phases 1 and 3 in the probability of remaining low paid that is seen in the full sample is primarily due to those outside the South East. The change in London and the rest of the South East is much smaller and insignificantly different from zero. The decline is also larger for the oldest and

particularly the youngest age group, and less so and insignificant for the middle age group. There is significant change for both men and women, of slightly greater magnitude for men. This contrasts with the finding for those initially unemployed in the previous section.

## **10. Models for transitions by the economically inactive**

This section looks at simple models for transitions by those who are economically inactive but want work (“state” 8). The transition rate from this group into being inactive and not wanting work is found in Tables 13 and 14 to have significantly declined between the “before” and “after” phases, with the probability of remaining in the wanting work category showing a significant rise. However other factors influence this transition rate, as has been seen in the Section 5. The current section addresses two main questions: first has the probability for the economically inactive of moving from wanting work to not wanting work fallen after controlling for other factors, and second does the extent of the fall differ between identifiable sub-groups, in particular with respect to gender, age and region.

Simple linear probability models are estimated in this section for those who are economically inactive but want work at time  $t$ . Three models are estimated: one for the probability of still being inactive and wanting work at time  $t+1$ , one for the probability of still being inactive at time  $t+1$ , and one for the probability of wanting work at  $t+1$  conditional on still being inactive.

As in the previous two sections, the models are estimated on the pooled data for all three phases and contain dummy variables for phase 2 (spanning the introduction of the minimum wage) and for phase 3 (after the introduction of the minimum wage) together with a set of control variables. (Phase 1 is again the base for comparison.) The same control variables are included as in the models in the previous two sections.

Table 32 gives the estimated models for these three probabilities. Looking first at the probability of still being economically inactive and wanting work at  $t+1$ , there are strong age, qualification, gender, marital status and health effects. There is also a

significant difference between phase 3 (after the introduction of the minimum wage) and phase 1 (before the introduction). Other things equal, the probability of still being economically inactive and wanting work at  $t+1$  for those in this initial state group is 3.9 percentage points higher in phase 3 (after the introduction of the minimum wage) than in phase 1 (before its introduction), and this difference is statistically significant at the 1% level. Thus the significant difference between the phases in the raw probability (Tables 13 and 14) is not removed by the inclusion of control variables. The probability is also slightly higher in phase 2 (spanning the introduction of the minimum wage) than in phase 1, but the difference is not statistically significant.

The second column of Table 32 presents the estimated model for the probability of still being inactive at time  $t+1$ . Again there are strong qualification, gender, marital status and health effects. However the probability is not significantly different over the three phases after controlling for other factors.

The final column of Table 32 presents the estimated model for the probability of still wanting work at  $t+1$  conditional on still being inactive. This probability shows a rise over the three phases. This is in line with the results in the other two columns. After controlling for other factors, this conditional probability is 4.5 percentage points higher in phase 3 than in phase 1 and this difference is significant at the 1% level.

For these transitions probabilities too there is evidence that the differences between the phases differ by gender, age and region. This is examined in the context of the probability model controlling for other factors in the same way as in the previous section – by including interactions with the phase dummies. The results are presented in Table 33. As before, only the estimated coefficients on the phase dummies are presented from the various specifications and once again they are presented multiplied by 100 to give the effect on the particular probability in percentage terms. All models contain the same control variables as those in Table 32.

The significant rise between phases 1 and 3 in the probability of remaining inactive and wanting work that is seen in the full sample is primarily due to those outside the South East. The change in London and the rest of the South East is negligible and insignificantly different from zero. The decline is also larger for the older two age

groups. There is significant change for both men and women of a very similar magnitude.

## **10. Conclusions**

This report has examined transition probabilities between labour market states and between wage groups among employees. In particular it has examined how these probabilities changed after the introduction of the minimum wage compared with what they had been prior to its introduction. Changes in three main groups of transition probabilities are identified and analysed.

First, the probability of those unemployed at  $t$  moving into employment in the bottom wage group is significantly lower after the introduction of the minimum wage than before it and this is so for both the unconditional probability and for that conditional on entering employment. This decline is due more to the experiences of women than men, more to those aged below 35 than those who are older, and more to those in London and the South East than those elsewhere in the country.

Second, the probability of those in the bottom wage group at  $t$  still being there at time  $t+1$  is significantly lower after the introduction of the minimum wage than before it, both conditional on being in employment and unconditional. There is less clear-cut heterogeneity in the effect with respect to gender and age than for those initially unemployed, and this change is driven more by those outside London and the South East.

Third, the probability of those who are economically inactive but wanting work at  $t$  being in the same state at  $t+1$  is significantly higher after the introduction of the minimum wage than before. This is despite there being no significant difference between the two phases for this group in just remaining economically inactive. So there is a significant rise both conditional on remaining economically inactive and unconditionally. This rise is due to those outside London and the South East and primarily to those aged above 35, but it is equally true for both men and women.

Finally it should be noted that this type of analysis examines changes in transition probabilities over time, in particular comparing the values of these probabilities after the introduction of the minimum wage with those before. The changes are found to be significant for the probabilities described above, but this does not necessarily demonstrate a causal role for the minimum wage. The changes identified may be the result of the minimum wage, but they may also have been caused by other events at around the same time.

**Table 1**  
**Transition matrix for full sample: LFS**

<i>State at t</i>	<i>State at t+1</i>									<i>Sample size</i>
	1	2	3	4	5	6	7	8	9	
1	35.8	23.1	10.7	5.3	13.4	1.2	2.9	2.6	5.0	10,238
2	13.8	37.9	23.5	5.1	12.1	1.0	2.2	1.5	3.0	13,526
3	3.4	10.9	48.5	20.1	12.2	0.9	1.4	0.9	1.7	23,933
4	1.0	1.2	7.9	75.1	10.8	1.1	1.0	0.5	1.4	51,117
5	6.0	9.2	16.1	29.4	32.6	1.9	1.8	1.1	2.1	23,667
6	0.9	0.8	1.6	3.6	1.8	86.8	1.1	1.0	2.4	16,506
7	7.9	8.2	7.8	6.5	8.4	4.4	35.5	12.0	9.4	6,841
8	3.3	3.1	2.4	1.8	2.2	2.2	7.7	45.0	32.4	9,848
9	1.8	1.5	1.2	1.3	1.5	1.9	2.5	16.2	72.3	21,826
All	5.5	8.0	14.1	29.8	11.6	9.4	3.2	5.7	12.7	177,502

States:

- (1) employee with real wage < £3.75/hour
- (2) employee with real wage £3.75 - £4.78/hour
- (3) employee with real wage £4.78 - £6.76/hour
- (4) employee with real wage ≥ £6.76/hour
- (5) employee with real wage missing
- (6) self-employed
- (7) unemployed
- (8) inactive and would like work
- (9) inactive and does not want work

**Table 2**  
**Transition probability ratios: full sample: LFS**  
**(relative to employees with wage above median)**

<i>State at t</i>	<i>State at t+1</i>								
	1	2	3	4	5	6	7	8	9
1	35.03	18.83	1.37	0.07	1.24	1.11	3.04	4.80	3.52
2	13.49	30.88	3.00	0.07	1.12	0.90	2.33	2.68	2.09
3	3.31	8.89	6.18	0.27	1.13	0.81	1.44	1.63	1.21
4	1	1	1	1	1	1	1	1	1
5	5.90	7.46	2.04	0.39	3.01	1.75	1.82	1.97	1.46
6	0.91	0.67	0.20	0.05	0.17	80.39	1.11	1.84	1.72
7	7.74	6.65	1.00	0.09	0.78	4.06	36.98	21.99	6.62
8	3.21	2.49	0.31	0.02	0.20	2.03	8.01	82.66	22.90
9	1.74	1.18	0.15	0.02	0.13	1.77	2.59	29.80	51.09

Note: for definition of states see note to Table 1.

**Table 3**  
**Transition matrices for periods before, spanning & after minimum wage: LFS**

<i>State at t</i>	<i>State at t+1</i>									<i>Sample size</i>
	1	2	3	4	5	6	7	8	9	
<u>Before:</u>										
1	38.6	22.1	11.0	5.6	10.7	1.4	2.9	3.0	4.9	2,975
2	14.5	39.1	23.5	4.9	9.8	1.0	2.5	1.8	2.9	3,899
3	3.3	11.3	50.9	20.1	9.4	0.9	1.6	0.9	1.7	6,824
4	0.9	1.1	8.2	76.8	8.8	1.1	1.0	0.6	1.5	14,570
5	6.8	9.4	16.9	28.6	32.0	1.7	1.6	1.1	2.0	5,645
6	0.8	0.9	1.9	4.0	1.6	86.6	1.2	0.9	2.1	4,874
7	9.2	8.7	7.4	6.0	6.5	4.8	36.2	11.7	9.5	2,231
8	3.6	2.9	2.7	1.7	1.6	2.4	7.9	42.5	34.7	2,942
9	2.0	1.4	1.1	1.3	1.3	2.2	2.6	16.0	72.1	6,146
All	5.9	8.1	14.5	29.9	9.5	9.8	3.6	5.8	12.9	50,106
<u>Spanning:</u>										
1	35.9	24.0	10.0	4.9	13.5	1.1	3.4	2.5	4.7	2,762
2	13.4	38.1	24.3	5.2	11.0	1.0	2.6	1.2	3.3	3,517
3	3.5	11.3	49.3	19.5	11.9	0.7	1.3	0.9	1.7	6,259
4	1.1	1.3	8.1	75.5	9.8	1.1	1.1	0.6	1.4	13,259
5	6.2	9.2	16.0	29.3	32.3	2.0	1.9	0.9	2.2	5,706
6	0.9	0.8	1.5	3.7	1.6	87.1	1.1	1.0	2.5	4,203
7	8.0	7.8	8.2	5.8	8.5	4.4	36.7	11.5	9.2	1,746
8	3.8	3.4	2.6	1.8	1.9	1.9	8.9	44.7	31.1	2,629
9	2.0	1.4	1.2	1.4	1.2	1.8	2.8	16.1	72.1	5,526
All	5.7	8.2	14.3	29.8	10.9	9.3	3.5	5.7	12.6	45,607
<u>After:</u>										
1	33.8	23.3	11.0	5.3	15.2	1.2	2.6	2.4	5.2	4,501
2	13.5	37.1	23.1	5.2	14.1	0.9	1.8	1.4	2.8	6,110
3	3.4	10.5	46.6	20.4	14.2	1.0	1.3	0.9	1.8	10,850
4	1.0	1.3	7.5	73.8	12.7	1.1	0.9	0.5	1.4	23,288
5	5.6	9.1	15.7	29.9	33.0	1.9	1.8	1.1	2.0	12,316
6	1.0	0.8	1.4	3.2	2.1	86.8	1.0	1.1	2.6	7,429
7	6.8	8.0	7.9	7.4	9.9	4.1	34.2	12.5	9.4	2,864
8	2.7	3.0	2.2	1.9	2.8	2.2	6.8	46.8	31.6	4,277
9	1.5	1.5	1.1	1.3	1.6	1.8	2.2	16.4	72.5	10,154
All	5.1	7.9	13.7	29.7	13.2	9.2	2.9	5.7	12.7	81,789

**Table 4**  
**Tests of equality between “before” & “after” transition probabilities: LFS**

**(a) Test statistics [in columns 1-9 ~  $N(0,1)$ , in final column ~  $\chi^2(8)$ ]**

<i>State at t</i>	<i>State at t+1</i>									<i>Joint</i>
1	2	3	4	5	6	7	8	9	Joint	
1	<b>-4.20</b>	1.29	-0.10	-0.48	<b>5.83</b>	-0.75	-0.69	-1.47	0.63	<b>44.14</b>
2	-1.40	<b>-2.04</b>	-0.46	0.71	<b>6.61</b>	-0.46	<b>-2.16</b>	-1.33	-0.29	<b>47.53</b>
3	0.29	-1.73	<b>-5.47</b>	0.44	<b>10.00</b>	0.08	-1.45	-0.16	0.61	<b>101.27</b>
4	0.90	1.13	<b>-2.60</b>	<b>-6.77</b>	<b>12.16</b>	0.06	-1.03	-1.51	-0.65	<b>145.04</b>
5	<b>-3.02</b>	-0.78	<b>-1.99</b>	1.84	1.29	0.89	0.87	-0.13	0.36	<b>18.24</b>
6	1.36	-1.03	<b>-2.03</b>	<b>-2.37</b>	<b>2.38</b>	0.27	-1.07	1.01	1.88	<b>23.46</b>
7	<b>-3.04</b>	-1.00	0.71	<b>2.06</b>	<b>4.32</b>	-1.28	-1.50	0.83	-0.18	<b>33.96</b>
8	<b>-2.23</b>	0.26	-1.52	0.65	<b>3.53</b>	-0.28	-1.76	<b>3.57</b>	<b>-2.69</b>	<b>33.79</b>
9	<b>-2.43</b>	0.59	0.25	0.37	1.61	-1.39	-1.55	0.56	0.50	13.91

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**(b) Corresponding p-values (as percentages)**

<i>State at t</i>	<i>State at t+1</i>									<i>Joint</i>
1	2	3	4	5	6	7	8	9	Joint	
1	0.0	19.6	92.2	63.0	0.0	45.3	48.9	14.1	52.8	0.0
2	16.2	4.1	64.5	48.0	0.0	64.7	3.1	18.3	77.1	0.0
3	76.8	8.4	0.0	66.3	0.0	93.9	14.8	87.1	53.9	0.0
4	37.0	26.0	0.9	0.0	0.0	95.4	30.1	13.1	51.5	0.0
5	0.2	43.7	4.7	6.6	19.6	37.2	38.4	90.0	71.6	2.0
6	17.3	30.4	4.2	1.8	1.7	78.3	28.3	31.2	6.0	0.3
7	0.2	32.0	47.9	4.0	0.0	20.1	13.4	40.4	86.1	0.0
8	2.6	79.8	12.8	51.8	0.0	77.9	7.9	0.0	0.7	0.0
9	1.5	55.2	80.2	71.3	10.8	16.6	12.1	57.4	61.7	8.4

**Table 5**  
**Tests of equality between “before” & “spanning” transition probabilities: LFS**

**(a) Test statistics [in columns 1-9 ~ N(0,1), in final column ~  $\chi^2(8)$ ]**

---

<i>State at t</i>	<i>State at t+1</i>									
<i>at t</i>	1	2	3	4	5	6	7	8	9	Joint
1	<b>-2.09</b>	1.76	-1.28	-1.06	<b>3.27</b>	-1.14	1.11	-1.14	-0.23	<b>20.85</b>
2	-1.36	-0.94	0.82	0.54	1.66	-0.13	0.43	<b>-2.17</b>	0.92	10.97
3	0.78	-0.06	-1.77	-0.94	<b>4.70</b>	-1.60	-1.16	-0.28	-0.05	<b>26.67</b>
4	1.45	1.31	-0.42	<b>-2.56</b>	<b>3.07</b>	-0.23	1.22	-0.25	-0.46	<b>15.88</b>
5	-1.14	-0.51	-1.29	0.82	0.35	1.24	1.29	-1.18	1.10	9.08
6	0.42	-0.95	-1.37	-0.93	0.04	0.61	-0.65	0.69	1.28	6.24
7	-1.31	-1.08	0.92	-0.24	<b>2.28</b>	-0.58	0.31	-0.24	-0.30	8.92
8	0.40	0.98	-0.40	0.05	0.76	-1.05	1.36	1.66	<b>-2.85</b>	11.58
9	-0.24	0.21	0.71	0.66	-0.59	-1.31	0.73	0.04	-0.06	3.56

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**(b) Corresponding p-values (as percentages)**

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<i>State at t</i>	<i>State at t+1</i>									
<i>at t</i>	1	2	3	4	5	6	7	8	9	Joint
1	3.6	7.9	20.2	29.0	0.1	25.6	26.7	25.2	81.7	0.8
2	17.4	34.6	41.0	59.0	9.7	89.5	67.1	3.0	35.6	20.3
3	43.4	95.2	7.7	34.5	0.0	10.9	24.6	78.0	96.3	0.1
4	14.7	19.2	67.6	1.0	0.2	81.7	22.4	80.1	64.4	4.4
5	25.4	61.2	19.6	41.5	72.7	21.7	19.7	23.9	27.3	33.6
6	67.7	34.4	17.2	35.0	96.6	54.2	51.7	49.2	20.0	62.0
7	19.0	27.8	35.5	81.4	2.3	56.3	75.3	81.1	76.2	34.9
8	68.8	32.7	69.1	96.3	44.8	29.6	17.3	9.7	0.4	17.1
9	81.3	83.1	48.0	50.8	55.8	18.9	46.6	96.9	95.0	89.4

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**Table 6**  
**Transition matrix for full sample: LFS**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>								<i>Sample size</i>
	1	2	3	4	6	7	8	9	
1	42.2	27.3	12.6	6.2	1.2	2.9	2.6	5.0	10,238
2	15.9	43.6	27.1	5.9	1.0	2.2	1.5	3.0	13,526
3	3.9	12.5	55.7	23.0	0.9	1.4	0.9	1.7	23,933
4	1.2	1.4	8.8	84.6	1.1	1.0	0.5	1.4	51,117
6	1.2	1.0	2.0	4.5	86.8	1.1	1.0	2.4	16,506
7	10.1	10.4	10.0	8.3	4.4	35.5	12.0	9.4	6,841
8	4.0	3.7	2.9	2.2	2.2	7.7	45.0	32.4	9,848
9	2.2	1.8	1.4	1.7	1.9	2.5	16.2	72.3	21,826
All	6.3	9.1	15.9	33.9	10.6	3.5	6.4	14.3	153,835

Note: for definition of states see note to Table 1.

**Table 7**  
**Transition probability ratios: full sample: LFS**  
**(relative to employees with wage above median)**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
1	36.65	19.71	1.43	0.07	1.11	3.04	4.80	3.52
2	13.77	31.52	3.06	0.07	0.90	2.33	2.68	2.09
3	3.37	9.06	6.30	0.27	0.81	1.44	1.63	1.21
4	1	1	1	1	1	1	1	1
6	1.02	0.75	0.22	0.05	80.39	1.11	1.84	1.72
7	8.77	7.54	1.13	0.10	4.06	36.98	21.99	6.62
8	3.44	2.67	0.33	0.03	2.03	8.01	82.66	22.90
9	1.93	1.31	0.16	0.02	1.77	2.59	29.80	51.09

Note: for definition of states see note to Table 1.

**Table 8**  
**Transition matrices for periods before, spanning & after minimum wage: LFS**  
**(Excluding those with missing wage information & reweighted)**

<i>State</i> <i>at t</i>	<i>State at t+1</i>								<i>Sample</i> <i>size</i>
1	2	3	4	6	7	8	9		
<u>Before:</u>									
1	44.1	25.2	12.6	6.3	1.3	2.8	2.9	4.7	3,069
2	16.3	43.9	26.4	5.5	1.0	2.4	1.7	2.8	3,997
3	3.7	12.6	56.5	22.4	0.9	1.5	0.9	1.6	7,046
4	1.0	1.2	9.1	84.6	1.1	1.0	0.6	1.4	14,904
6	1.0	1.2	2.4	5.1	86.2	1.2	0.9	2.1	4,897
7	11.5	10.9	9.3	7.5	4.7	35.4	11.5	9.3	2,278
8	4.4	3.5	3.3	2.1	2.3	7.8	42.2	34.4	2,962
9	2.6	1.7	1.4	1.6	2.1	2.6	16.0	72.0	6,154
All	6.7	9.1	16.1	33.5	10.7	3.7	6.3	14.0	45,308
<hr/>									
<u>Spanning:</u>									
1	42.4	28.3	11.8	5.8	1.1	3.4	2.5	4.8	2,760
2	15.3	43.3	27.6	5.9	1.0	2.6	1.2	3.2	3,558
3	4.0	12.9	56.3	22.3	0.7	1.3	0.9	1.6	6,286
4	1.2	1.5	9.0	84.2	1.0	1.1	0.6	1.4	13,403
6	1.1	1.0	1.9	4.6	86.9	1.0	1.0	2.5	4,213
7	10.3	10.0	10.5	7.4	4.4	36.7	11.5	9.2	1,742
8	4.6	4.0	3.1	2.1	1.9	8.9	44.5	30.9	2,643
9	2.5	1.8	1.5	1.7	1.8	2.8	16.0	71.8	5,544
All	6.5	9.3	16.2	33.7	10.3	3.7	6.4	14.0	40,148
<hr/>									
<u>After:</u>									
1	40.7	28.1	13.2	6.4	1.2	2.7	2.5	5.3	4,408
2	15.9	43.7	27.2	6.1	1.0	1.9	1.5	2.9	5,971
3	4.0	12.3	54.8	24.0	1.0	1.3	0.9	1.8	10,601
4	1.2	1.4	8.6	84.9	1.1	0.9	0.5	1.4	22,810
6	1.3	1.0	1.8	4.1	87.2	1.0	1.1	2.6	7,396
7	8.9	10.3	10.3	9.6	4.1	34.7	12.7	9.5	2,821
8	3.3	3.6	2.6	2.4	2.3	6.8	47.1	31.9	4,244
9	1.9	1.9	1.4	1.7	1.8	2.2	16.4	72.7	10,128
All	6.0	9.1	15.6	34.2	10.7	3.1	6.6	14.8	68,380

**Table 9**  
**Tests of equality between “before” & “after” transition probabilities: LFS**  
**(Excluding those with missing wage information & reweighted)**

**(a) Test statistics [  $\sim N(0,1)$  ]**

<i>State at t</i>	<i>State at t+1</i>							
1	2	3	4	6	7	8	9	
1	<b>-2.71</b>	<b>2.57</b>	0.69	0.04	-0.50	-0.33	-1.11	1.14
2	-0.47	-0.23	0.85	1.25	-0.23	-1.83	-1.04	0.11
3	0.97	-0.49	<b>-2.14</b>	<b>2.30</b>	0.43	-1.03	0.18	1.09
4	1.31	1.59	-1.42	0.56	0.49	-0.64	-1.22	-0.16
6	1.41	-0.99	<b>-1.98</b>	<b>-2.30</b>	1.43	-1.02	1.06	<b>1.96</b>
7	<b>-2.73</b>	-0.62	1.10	<b>2.44</b>	-1.01	-0.54	1.30	0.24
8	<b>-2.14</b>	0.37	-1.44	0.73	-0.19	-1.59	<b>4.08</b>	<b>-2.25</b>
9	<b>-2.41</b>	0.63	0.28	0.40	-1.35	-1.51	0.67	0.87

**(b) Corresponding p-values (as percentages)**

<i>State at t</i>	<i>State at t+1</i>							
1	2	3	4	6	7	8	9	
1	0.7	1.0	49.2	96.5	61.4	74.5	26.5	25.5
2	63.9	81.9	39.8	21.0	81.9	6.7	29.7	91.5
3	33.4	62.7	3.2	2.2	66.8	30.5	85.9	27.4
4	18.9	11.2	15.5	57.4	62.4	51.9	22.4	87.4
6	15.7	32.4	4.8	2.2	15.4	30.6	28.9	5.0
7	0.6	53.2	27.2	1.5	31.5	58.6	19.3	81.3
8	3.2	71.5	15.0	46.3	85.1	11.2	0.0	2.5
9	1.6	53.1	78.2	69.1	17.6	13.1	50.4	38.5

**Table 10**  
**Tests of equality between “before” & “spanning” transition probabilities: LFS**  
**(Excluding those with missing wage information & reweighted)**

**(a) Test statistics [  $\sim N(0,1)$  ]**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
1	-1.23	<b>2.48</b>	-0.87	-0.78	-1.00	1.32	-0.94	0.04
2	-1.15	-0.52	1.17	0.67	-0.07	0.52	<b>-2.10</b>	1.02
3	1.08	0.51	-0.19	-0.16	-1.46	-0.97	-0.13	0.16
4	1.55	1.41	-0.12	-0.99	-0.13	1.32	-0.18	-0.34
6	0.43	-0.94	-1.36	-0.92	0.83	-0.64	0.70	1.30
7	-1.11	-0.88	1.16	-0.05	-0.42	0.84	0.02	-0.07
8	0.42	1.00	-0.39	0.05	-1.04	1.38	1.69	<b>-2.79</b>
9	-0.25	0.20	0.70	0.65	-1.33	0.71	-0.01	-0.22

**(b) Corresponding p-values (as percentages)**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
1	21.9	1.3	38.4	43.6	31.6	18.7	34.7	96.9
2	25.2	60.5	24.4	50.3	94.0	60.6	3.6	30.8
3	28.0	61.0	85.1	87.4	14.5	33.4	89.7	87.3
4	12.1	15.7	90.2	32.3	89.8	18.8	86.0	73.2
6	66.9	34.8	17.5	35.7	40.9	52.5	48.5	19.4
7	26.7	37.8	24.8	95.7	67.7	40.3	98.0	94.6
8	67.7	31.9	69.7	95.7	30.0	16.8	9.1	0.5
9	80.1	84.0	48.6	51.4	18.5	47.7	99.6	82.5

**Table 11**  
**Transition matrix for full sample: LFS**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>								<i>Sample size</i>
	1	2	3	4	6	7	8	9	
1	42.1	27.4	12.7	6.2	1.2	2.9	2.6	5.0	10,232
2	15.8	43.7	27.1	5.9	1.0	2.2	1.5	2.9	13,528
3	3.9	12.6	55.7	23.0	0.9	1.4	0.9	1.7	23,930
4	1.2	1.4	8.9	84.5	1.1	1.0	0.5	1.4	51,120
6	1.2	1.0	2.0	4.5	86.8	1.1	1.0	2.4	16,506
7	10.2	10.4	10.0	8.2	4.4	35.4	12.0	9.4	6,844
8	3.9	3.7	2.9	2.2	2.2	7.7	45.0	32.4	9,845
9	2.2	1.8	1.4	1.6	1.9	2.5	16.2	72.3	21,823
All	6.3	9.2	15.9	33.8	10.6	3.5	6.4	14.3	153,827

Note: for definition of states see note to Table 1.

**Table 12**  
**Transition probability ratios: full sample: LFS**  
**(relative to employees with wage above median)**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>							
1	2	3	4	6	7	8	9	
1	36.56	19.53	1.42	0.07	1.11	3.04	4.8	3.52
2	13.72	31.17	3.04	0.07	0.9	2.33	2.68	2.09
3	3.38	8.97	6.25	0.27	0.81	1.44	1.63	1.21
4	1	1	1	1	1	1	1	1
6	1.01	0.74	0.22	0.05	80.4	1.11	1.84	1.72
7	8.84	7.46	1.12	0.1	4.06	36.96	21.98	6.62
8	3.41	2.64	0.33	0.03	2.03	8.01	82.69	22.91
9	1.93	1.31	0.16	0.02	1.77	2.59	29.8	51.1

Note: for definition of states see note to Table 1.

**Table 13**  
**Transition matrices for periods before, spanning & after minimum wage: LFS**  
**(Excluding those with missing wage information & reweighted)**

<i>State</i> <i>at t</i>	<i>State at t+1</i>								<i>Sample</i> <i>size</i>
	1	2	3	4	6	7	8	9	
<u>Before:</u>									
1	44.0	25.1	12.5	6.3	1.4	2.9	3.0	4.9	2,992
2	16.3	43.8	26.3	5.5	1.0	2.5	1.8	2.9	3,901
3	3.6	12.6	56.4	22.3	0.9	1.6	0.9	1.7	6,854
4	1.0	1.3	9.1	84.5	1.1	1.0	0.6	1.5	14,512
6	1.0	1.2	2.3	5.0	86.5	1.2	0.9	2.1	4,884
7	11.4	10.7	9.2	7.2	4.8	35.8	11.6	9.4	2,254
8	4.3	3.4	3.2	2.0	2.3	7.9	42.4	34.6	2,950
9	2.5	1.7	1.3	1.5	2.2	2.6	16.1	72.2	6,135
All	6.6	9.0	15.9	33.2	10.9	3.8	6.4	14.3	44,482
<hr/>									
<u>Spanning:</u>									
1	42.3	28.4	11.8	5.8	1.1	3.4	2.5	4.8	2,751
2	15.2	43.3	27.7	5.9	1.0	2.6	1.2	3.3	3,539
3	4.0	12.9	56.3	22.2	0.7	1.3	0.9	1.7	6,252
4	1.3	1.5	9.1	84.1	1.1	1.1	0.6	1.4	13,309
6	1.1	0.9	1.9	4.6	86.9	1.0	1.0	2.5	4,211
7	10.4	10.0	10.4	7.3	4.4	36.8	11.5	9.3	1,741
8	4.5	4.0	3.1	2.1	1.9	8.9	44.6	31.0	2,639
9	2.5	1.8	1.5	1.7	1.8	2.8	16.0	71.9	5,542
All	6.5	9.3	16.2	33.6	10.3	3.7	6.4	14.0	39,983
<hr/>									
<u>After:</u>									
1	40.7	28.2	13.3	6.3	1.2	2.6	2.4	5.2	4,489
2	15.9	43.8	27.2	6.1	0.9	1.8	1.4	2.8	6,088
3	4.0	12.3	54.8	24.0	1.0	1.3	0.9	1.8	10,823
4	1.2	1.5	8.7	84.9	1.1	0.9	0.5	1.4	23,298
6	1.3	1.0	1.8	4.2	87.0	1.0	1.1	2.6	7,411
7	9.1	10.6	10.4	9.6	4.1	34.3	12.5	9.4	2,849
8	3.3	3.7	2.7	2.4	2.3	6.8	47.0	31.8	4,256
9	1.9	2.0	1.5	1.7	1.8	2.2	16.4	72.5	10,146
All	6.0	9.1	15.7	34.4	10.5	3.1	6.5	14.6	69,362

**Table 14**  
**Tests of equality between “before” & “after” transition probabilities: LFS**  
**(Excluding those with missing wage information & reweighted)**

**(a) Test statistics [  $\sim N(0,1)$  ]**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
1	<b>-2.62</b>	<b>2.73</b>	0.99	0.00	-0.71	-0.63	-1.41	0.71
2	-0.50	0.01	0.92	1.30	-0.44	<b>-2.13</b>	-1.31	-0.26
3	1.01	-0.47	<b>-2.00</b>	<b>2.45</b>	0.12	-1.39	-0.12	0.67
4	1.34	1.62	-1.37	0.98	0.01	-1.07	-1.54	-0.70
6	1.45	-0.58	-1.67	-1.76	0.83	-1.05	1.04	1.92
7	<b>-2.30</b>	-0.09	1.23	<b>2.72</b>	-1.16	-1.07	1.03	0.00
8	-1.82	0.77	-1.10	0.95	-0.23	-1.67	<b>3.82</b>	<b>-2.45</b>
9	-1.95	1.14	0.72	0.88	-1.39	-1.56	0.54	0.40

**(b) Corresponding p-values (as percentages)**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
1	0.9	0.6	32.4	99.8	47.7	52.6	15.8	47.9
2	61.4	99.2	35.6	19.2	66.1	3.3	19.2	79.7
3	31.3	63.9	4.5	1.4	90.4	16.3	90.4	50.1
4	18.1	10.5	17.2	32.8	98.9	28.4	12.4	48.4
6	14.6	55.9	9.4	7.8	40.9	29.4	30.1	5.5
7	2.1	92.9	21.8	0.7	24.6	28.6	30.3	100.0
8	6.9	43.9	27.3	34.3	81.7	9.5	0.0	1.4
9	5.1	25.4	47.2	37.7	16.3	11.9	59.2	69.2

**Table 15**  
**Tests of equality between “before” & “spanning” transition probabilities: LFS**  
**(Excluding those with missing wage information & reweighted)**

**(a) Test statistics [  $\sim N(0,1)$  ]**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
1	-1.21	<b>2.59</b>	-0.79	-0.73	-1.10	1.17	-1.08	-0.15
2	-1.21	-0.44	1.25	0.70	-0.16	0.38	<b>-2.20</b>	0.88
3	1.12	0.56	-0.18	-0.08	-1.57	-1.12	-0.25	-0.01
4	1.65	1.46	-0.09	-0.88	-0.30	1.15	-0.30	-0.54
6	0.43	-0.87	-1.14	-0.73	0.58	-0.65	0.69	1.28
7	-0.88	-0.61	1.11	0.07	-0.48	0.61	-0.09	-0.17
8	0.46	1.15	-0.20	0.09	-1.05	1.35	1.62	<b>-2.86</b>
9	0.01	0.48	0.83	0.92	-1.35	0.69	-0.07	-0.45

**(b) Corresponding p-values (as percentages)**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
1	22.5	1.0	42.7	46.7	27.3	24.2	27.9	88.1
2	22.6	66.0	21.0	48.3	87.5	70.1	2.8	38.0
3	26.5	57.7	86.1	93.4	11.6	26.3	80.3	99.6
4	10.0	14.5	93.1	37.7	76.5	25.0	76.2	58.9
6	66.6	38.6	25.3	46.8	56.1	51.7	49.2	20.0
7	37.8	54.1	26.8	94.5	62.8	54.0	93.1	86.8
8	64.3	24.8	84.0	93.1	29.4	17.7	10.6	0.4
9	99.3	63.2	40.4	35.5	17.8	49.2	94.5	65.1

**Table 16**  
**Transition matrices for alternative wage group definitions**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>								<i>Sample size</i>
	1	2	3	4	6	7	8	9	
<u>Definition 1:</u>									
1	37.3	27.1	16.0	7.5	1.2	3.0	2.7	5.2	8,501
2	15.0	40.7	30.2	6.0	1.0	2.3	1.6	3.2	11,641
3	3.9	11.3	56.6	22.9	0.9	1.5	1.0	1.9	24,727
4	1.1	1.1	8.9	84.9	1.1	1.0	0.6	1.4	53,940
6	1.0	0.9	2.1	4.7	86.8	1.1	1.0	2.4	16,506
7	8.4	9.7	11.8	9.0	4.4	35.4	12.0	9.4	6,844
8	3.2	3.5	3.6	2.5	2.2	7.7	45.0	32.4	9,845
9	1.8	1.8	1.7	1.8	1.9	2.5	16.2	72.3	21,823
All	5.1	7.8	16.6	35.7	10.6	3.5	6.4	14.3	153,827
<u>Definition 2:</u>									
1	49.1	23.4	11.5	5.0	1.2	2.9	2.4	4.6	13,291
2	18.3	41.9	27.1	5.8	1.0	2.0	1.3	2.6	13,368
3	4.7	12.6	55.4	22.6	0.9	1.3	0.9	1.7	23,535
4	1.3	1.5	9.0	84.3	1.1	1.0	0.5	1.4	48,615
6	1.4	1.0	2.1	4.2	86.8	1.1	1.0	2.4	16,506
7	13.2	9.2	9.0	7.5	4.4	35.4	12.0	9.4	6,844
8	5.0	3.1	2.7	1.9	2.2	7.7	45.0	32.4	9,845
9	2.8	1.6	1.3	1.5	1.9	2.5	16.2	72.3	21,823
All	8.4	9.0	15.6	32.2	10.6	3.5	6.4	14.3	153,827

Note:

Wage groups:

Definition 1: < £3.60, £3.60 - £4.50, £4.50 - £6.50, ≥ £6.50

Definition 2: < £4.00, £4.00 - £5.00, £5.00 - £7.00, ≥ £7.00

For definition of other states see note to Table 1.

**Table 17**  
**Transition probability ratios for alternative wage group definitions**  
**(relative to employees with wage above median)**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>							
1	2	3	4	6	7	8	9	
<u>Definition 1:</u>								
1	35.10	24.66	1.80	0.09	1.10	3.10	4.90	3.66
2	14.10	37.06	3.40	0.07	0.94	2.37	2.90	2.27
3	3.67	10.34	6.38	0.27	0.81	1.53	1.73	1.31
4	1	1	1	1	1	1	1	1
6	0.92	0.81	0.23	0.06	80.60	1.09	1.80	1.71
7	7.87	8.82	1.33	0.11	4.07	36.33	21.56	6.60
8	3.04	3.20	0.40	0.03	2.04	7.87	81.12	22.85
9	1.73	1.62	0.20	0.02	1.78	2.54	29.24	50.96
<u>Definition 2:</u>								
1	37.42	15.53	1.28	0.06	1.07	3.04	4.50	3.32
2	13.98	27.83	3.02	0.07	0.94	2.06	2.41	1.88
3	3.60	8.35	6.19	0.27	0.80	1.33	1.60	1.19
4	1	1	1	1	1	1	1	1
6	1.05	0.70	0.23	0.05	80.54	1.10	1.87	1.74
7	10.04	6.12	1.01	0.09	4.07	36.88	22.35	6.70
8	3.84	2.08	0.30	0.02	2.04	7.99	84.08	23.16
9	2.10	1.07	0.14	0.02	1.78	2.58	30.31	51.67

Note: for definition of states see note to Table 16.

**Table 18**  
**Tests of equality between “before” & “after” transition probabilities for**  
**alternative wage group definitions**  
**(Excluding those with missing wage information & reweighted)**  
**Test statistics ~ N(0,1)**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
<u>Definition 1:</u>								
1	<b>-3.51</b>	<b>2.84</b>	1.89	0.02	-1.24	-0.66	-1.38	0.98
2	-0.40	-0.11	1.10	0.39	-0.44	-1.62	-0.99	-0.06
3	0.69	-0.24	<b>-2.43</b>	<b>2.97</b>	0.78	-1.57	-0.08	0.14
4	0.41	1.59	<b>-2.16</b>	<b>2.09</b>	-0.19	-1.27	-1.83	-0.48
6	1.74	-0.57	-1.45	-1.93	0.82	-1.05	1.04	1.92
7	<b>-3.43</b>	1.08	0.26	<b>3.30</b>	-1.16	-1.07	1.03	0.00
8	<b>-2.42</b>	1.05	-1.43	1.64	-0.23	-1.67	<b>3.82</b>	<b>-2.45</b>
9	<b>-2.55</b>	0.34	1.52	1.27	-1.39	-1.56	0.54	0.40
<u>Definition 2:</u>								
1	-1.55	<b>3.29</b>	-0.49	-0.40	-1.21	-1.15	<b>-1.96</b>	1.15
2	-0.58	-0.05	1.04	0.82	1.08	<b>-2.08</b>	-0.29	-1.33
3	0.35	0.22	<b>-2.00</b>	<b>2.21</b>	-0.41	-1.20	-0.54	1.16
4	<b>2.07</b>	0.94	-1.59	1.15	-0.10	-0.96	-1.46	-0.87
6	1.79	-1.33	-1.54	-1.75	0.83	-1.05	1.04	1.92
7	<b>-2.92</b>	0.80	1.55	<b>2.62</b>	-1.16	-1.07	1.03	0.00
8	-1.26	0.14	-1.15	1.31	-0.23	-1.67	<b>3.82</b>	<b>-2.45</b>
9	-1.70	1.40	0.69	0.70	-1.39	-1.56	0.54	0.40

Note: for definition of states see note to Table 16.

**Table 19**  
**Transition matrices split by gender**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>								<i>Sample size</i>
	1	2	3	4	6	7	8	9	
<u>Male:</u>									
1	34.4	26.4	17.0	10.7	2.4	5.2	1.9	2.0	2,662
2	11.1	38.0	34.2	9.0	1.8	3.3	1.4	1.3	4,040
3	2.8	10.5	54.3	27.6	1.3	1.9	0.9	0.7	10,540
4	0.8	1.1	8.0	86.4	1.2	1.1	0.5	0.9	30,521
6	0.6	0.7	1.9	4.9	89.0	1.1	0.8	1.0	11,626
7	7.9	8.9	10.2	9.3	5.8	43.3	8.7	5.9	3,878
8	1.7	2.5	2.6	2.9	2.6	9.8	50.7	27.0	2,967
9	1.2	1.0	1.0	1.6	1.9	3.2	22.6	67.5	4,916
All	3.3	6.0	15.1	43.6	16.0	4.3	4.8	6.9	71,150
<u>Female:</u>									
1	44.8	27.7	11.1	4.6	0.8	2.1	2.9	6.0	7,571
2	17.8	46.0	24.0	4.5	0.6	1.8	1.5	3.7	9,487
3	4.7	14.2	56.7	19.4	0.5	1.0	0.9	2.5	13,386
4	1.7	1.8	10.2	81.8	0.9	0.8	0.6	2.2	20,600
6	2.6	1.8	2.2	3.7	81.5	0.9	1.5	5.8	4,881
7	13.0	12.5	9.8	7.0	2.6	25.1	16.1	13.9	2,968
8	4.8	4.2	3.1	1.9	2.0	6.7	42.5	34.7	6,879
9	2.5	2.1	1.5	1.7	1.9	2.3	14.4	73.7	16,907
All	8.9	11.9	16.6	25.4	5.9	2.7	7.9	20.7	82,678

Note: for definition of states see note to Table 1.

**Table 20**  
**Transition probability ratios split by gender**  
**(relative to employees with wage above median)**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>							
1	2	3	4	6	7	8	9	
<u>Male:</u>								
1	45.30	23.52	2.12	0.12	1.98	4.82	3.85	2.18
2	14.61	33.85	4.26	0.10	1.45	3.04	2.73	1.44
3	3.72	9.33	6.77	0.32	1.10	1.75	1.73	0.81
4	1	1	1	1	1	1	1	1
6	0.73	0.65	0.24	0.06	73.44	1.03	1.62	1.13
7	10.45	7.88	1.28	0.11	4.76	40.33	17.55	6.54
8	2.30	2.23	0.32	0.03	2.17	9.16	101.86	30.19
9	1.54	0.87	0.13	0.02	1.58	2.99	45.29	75.47
<u>Female:</u>								
1	25.83	15.26	1.09	0.06	0.88	2.69	4.66	2.77
2	10.27	25.39	2.35	0.06	0.73	2.28	2.45	1.67
3	2.74	7.84	5.54	0.24	0.59	1.26	1.48	1.14
4	1	1	1	1	1	1	1	1
6	1.49	0.98	0.21	0.05	92.28	1.20	2.38	2.65
7	7.52	6.89	0.95	0.09	2.90	31.88	26.39	6.39
8	2.79	2.31	0.30	0.02	2.27	8.58	69.45	15.90
9	1.45	1.14	0.15	0.02	2.17	2.88	23.48	33.72

Note: for definition of states see note to Table 1.

**Table 21**  
**Tests of equality between “before” & “after” transition probabilities**  
**split by gender**  
**(Excluding those with missing wage information & reweighted)**  
**Test statistics ~ N(0,1)**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
<u>Male:</u>								
1	-1.83	<b>3.39</b>	0.53	<b>-2.18</b>	0.19	-0.92	-0.17	0.43
2	-1.67	1.45	-0.33	1.49	-1.04	-1.32	0.12	-0.97
3	1.52	-1.12	-0.43	1.06	1.24	<b>-2.74</b>	0.42	0.53
4	0.82	1.55	-0.91	0.60	-0.01	-1.16	-1.75	0.55
6	-0.42	-1.07	<b>-2.37</b>	-1.75	<b>2.12</b>	0.24	0.87	1.25
7	-0.46	0.38	0.04	1.90	-0.28	-1.60	0.73	0.26
8	0.69	1.04	0.47	1.51	0.81	-0.84	1.65	<b>-2.94</b>
9	-0.81	0.66	0.13	1.19	-0.40	<b>-2.50</b>	-0.66	1.40
<u>Female:</u>								
1	<b>-2.12</b>	1.13	0.97	<b>2.08</b>	-1.12	0.16	-1.51	0.51
2	0.38	-0.90	1.34	0.41	0.44	-1.70	-1.60	0.14
3	0.16	0.29	<b>-2.32</b>	<b>2.47</b>	-1.40	1.29	-0.51	0.48
4	0.93	0.65	-1.17	1.01	0.07	-0.18	-0.26	-1.43
6	1.94	0.20	0.43	-0.33	-1.16	<b>-2.23</b>	0.52	1.24
7	<b>-2.93</b>	-0.65	1.87	<b>2.12</b>	-1.50	0.95	0.46	-0.54
8	<b>-2.19</b>	0.42	-1.50	0.03	-0.85	-1.57	<b>3.36</b>	-0.97
9	-1.74	1.03	0.76	0.41	-1.39	-0.22	0.90	-0.24

Note: for definition of states see note to Table 1.

**Table 22**  
**Transition matrices split by age**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>								<i>Sample size</i>
	1	2	3	4	6	7	8	9	
<u>Aged 18-34:</u>									
1	38.3	26.8	14.9	6.0	1.2	4.3	3.1	5.4	4,241
2	15.5	38.8	28.8	7.1	1.1	3.5	1.7	3.5	5,096
3	4.0	11.7	54.2	24.8	1.1	1.6	0.8	1.7	8,825
4	1.3	1.4	10.0	83.6	1.3	0.9	0.4	1.2	15,598
6	1.5	1.8	3.3	5.8	82.0	1.8	1.2	2.5	3,429
7	13.0	11.5	11.3	6.9	4.0	33.4	11.1	8.7	3,108
8	5.5	4.7	4.2	2.7	2.4	9.6	42.0	28.8	3,228
9	3.9	3.6	2.6	2.6	1.9	4.1	19.0	62.3	5,340
All	7.8	10.5	18.8	33.7	7.2	4.6	6.4	11.0	48,864
<u>Aged 35-44:</u>									
1	43.6	27.5	12.9	6.9	1.4	2.5	2.2	3.0	2,730
2	16.1	43.3	28.3	6.9	0.9	1.5	1.2	1.7	3,616
3	4.1	12.6	54.1	25.1	1.0	1.3	0.8	0.9	6,745
4	1.0	1.4	7.9	86.8	1.1	0.8	0.5	0.6	17,154
6	1.5	1.1	1.8	5.0	86.7	0.9	1.2	1.8	5,347
7	9.2	9.6	10.3	9.3	5.1	36.3	12.6	7.5	1,713
8	4.3	4.7	3.1	2.5	1.9	7.7	46.8	28.9	2,699
9	3.1	2.3	2.0	2.4	2.2	3.5	19.6	64.9	4,709
All	6.1	8.6	15.3	39.4	11.6	3.1	6.1	9.8	44,713
<u>Aged 45-59:</u>									
1	45.8	27.9	9.5	5.9	1.1	1.4	2.4	6.1	3,264
2	15.9	49.0	24.3	3.8	0.9	1.4	1.3	3.3	4,816
3	3.6	13.4	58.3	19.5	0.5	1.2	1.0	2.3	8,356
4	1.2	1.5	9.0	83.3	0.9	1.1	0.7	2.4	18,367
6	0.8	0.7	1.5	3.6	89.0	0.9	0.8	2.8	7,731
7	6.7	9.5	7.8	9.3	4.3	37.8	12.8	11.9	2,023
8	2.3	2.1	1.8	1.6	2.2	6.0	46.1	37.8	3,918
9	1.1	0.9	0.7	0.9	1.8	1.3	13.6	79.7	11,774
All	5.3	8.4	14.0	29.8	12.6	2.7	6.8	20.4	60,249

Note: for definition of states see note to Table 1.

**Table 23**  
**Transition probability ratios split by age**  
**(relative to employees with wage above median)**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
<u>Age 18-34:</u>								
1	30.16	19.66	1.50	0.07	0.94	4.90	7.41	4.35
2	12.17	28.48	2.89	0.08	0.86	3.95	4.19	2.79
3	3.16	8.61	5.43	0.30	0.89	1.75	1.98	1.39
4	1	1	1	1	1	1	1	1
6	1.17	1.31	0.33	0.07	65.60	2.04	2.94	2.05
7	10.22	8.47	1.13	0.08	3.22	37.79	26.56	7.05
8	4.36	3.46	0.42	0.03	1.93	10.85	100.88	23.31
9	3.08	2.61	0.26	0.03	1.50	4.66	45.52	50.37
<u>Age 35-44:</u>								
1	42.97	20.28	1.63	0.08	1.27	2.99	4.63	5.26
2	15.91	31.89	3.59	0.08	0.81	1.80	2.55	3.05
3	4.04	9.28	6.86	0.29	0.92	1.58	1.65	1.61
4	1	1	1	1	1	1	1	1
6	1.49	0.83	0.23	0.06	79.07	1.04	2.61	3.08
7	9.07	7.07	1.30	0.11	4.69	42.96	27.04	13.18
8	4.26	3.48	0.39	0.03	1.76	9.16	100.34	50.52
9	3.04	1.70	0.25	0.03	1.98	4.20	42.12	113.59
<u>Age 45-59:</u>								
1	38.76	18.92	1.06	0.07	1.17	1.22	3.26	2.61
2	13.46	33.16	2.71	0.05	1.02	1.27	1.86	1.41
3	3.04	9.07	6.52	0.23	0.57	1.10	1.44	0.99
4	1	1	1	1	1	1	1	1
6	0.67	0.44	0.17	0.04	96.78	0.76	1.04	1.21
7	5.67	6.40	0.87	0.11	4.67	33.51	17.61	5.06
8	1.98	1.43	0.20	0.02	2.39	5.37	63.70	16.06
9	0.94	0.58	0.07	0.01	1.99	1.16	18.75	33.90

Note: for definition of states see note to Table 1.

**Table 24**  
**Tests of equality between “before” & “after” transition probabilities**  
**split by age**  
**(Excluding those with missing wage information & reweighted)**  
**Test statistics ~ N(0,1)**

<i>State at t</i>	<i>State at t+1</i>							
1	2	3	4	6	7	8	9	
<u>Age 18-34:</u>								
1	<b>-2.63</b>	<b>2.11</b>	0.86	0.22	-0.82	0.35	-1.42	1.16
2	-1.54	0.95	-0.56	1.41	-0.31	-0.31	-0.96	1.21
3	1.48	-1.38	-0.99	1.49	0.39	-1.40	0.05	1.16
4	0.44	0.88	-0.85	0.42	-0.26	0.56	-0.14	-0.58
6	0.02	1.37	-0.61	-0.94	0.12	-0.53	0.85	0.56
7	-1.62	-0.09	0.56	1.17	0.03	-1.24	1.93	0.41
8	-1.35	0.99	0.51	1.18	-0.50	<b>-2.21</b>	1.47	-0.45
9	<b>-2.04</b>	<b>2.82</b>	0.33	1.35	0.82	-1.65	1.93	-1.84
<u>Age 35-44:</u>								
1	-0.93	0.33	0.78	1.76	-0.45	-0.19	-1.49	-0.51
2	0.46	-1.75	<b>2.03</b>	-0.13	0.26	0.03	-1.50	-0.32
3	0.75	0.70	-1.64	0.84	-0.74	0.18	-0.39	1.89
4	1.00	0.06	0.04	0.53	-0.37	-1.75	-1.21	-0.29
6	1.75	-1.04	-1.61	-0.63	-0.06	-0.50	1.55	1.73
7	-1.49	-1.02	0.06	<b>2.14</b>	-0.91	-0.10	0.58	0.68
8	-0.78	0.88	-1.89	-0.05	1.67	-0.37	1.68	-1.34
9	-0.89	-1.08	0.29	-0.16	-1.54	0.61	0.53	0.49
<u>Age 45-59:</u>								
1	-1.17	<b>2.08</b>	0.38	<b>-1.99</b>	0.12	-1.49	0.68	0.43
2	0.27	0.05	0.56	1.25	-0.51	<b>-3.10</b>	0.32	-1.29
3	-0.50	-0.13	-1.05	<b>2.17</b>	0.80	-0.91	0.07	-1.06
4	0.96	1.83	-1.27	0.58	0.90	-0.64	-1.25	-0.44
6	0.69	-1.39	-0.51	-1.40	1.08	-0.68	-0.48	1.10
7	-0.72	0.91	1.66	1.51	-1.31	-0.42	-0.90	-0.85
8	-0.69	-0.67	-0.55	0.54	-1.00	0.11	<b>3.21</b>	<b>-2.54</b>
9	-0.22	-0.26	0.72	0.27	-1.39	-1.57	-1.12	1.75

Note: for definition of states see note to Table 1.

**Table 25**  
**Transition matrices split by region**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>								<i>Sample size</i>
	1	2	3	4	6	7	8	9	
<u>London &amp; SE:</u>									
1	36.4	25.7	17.0	9.6	1.4	2.8	2.0	5.1	1,915
2	14.6	37.5	30.6	8.1	1.3	2.0	2.1	3.9	2,913
3	3.4	11.6	53.1	26.0	1.0	1.5	1.1	2.3	6,116
4	1.0	1.0	6.8	87.0	1.3	1.0	0.6	1.4	18,614
6	1.1	0.9	1.8	6.0	85.8	1.1	1.0	2.4	5,571
7	7.4	8.9	11.6	13.3	5.2	32.6	11.9	9.1	1,752
8	3.0	3.4	4.5	4.0	3.5	7.7	42.6	31.2	2,779
9	1.8	2.0	2.1	2.5	2.3	2.6	14.5	72.2	5,472
All	4.2	6.4	13.9	42.1	12.1	3.0	5.6	12.7	45,132
<u>Rest of UK:</u>									
1	43.4	27.7	11.6	5.4	1.2	2.9	2.8	5.0	8,317
2	16.1	45.3	26.1	5.3	0.9	2.3	1.3	2.7	10,615
3	4.0	12.9	56.5	22.0	0.8	1.3	0.8	1.5	17,814
4	1.3	1.6	10.1	83.1	0.9	1.0	0.5	1.4	32,506
6	1.2	1.1	2.1	3.8	87.3	1.1	1.0	2.4	10,934
7	11.2	11.0	9.4	6.4	4.1	36.4	12.0	9.4	5,093
8	4.3	3.8	2.3	1.5	1.7	7.7	45.9	32.9	7,067
9	2.4	1.8	1.2	1.4	1.8	2.4	16.8	72.3	16,350
All	7.21	10.3	16.72	30.38	9.95	3.63	6.8	15.01	108,695

Note: for definition of states see note to Table 1.

**Table 26**  
**Transition probability ratios split by region**  
**(relative to employees with wage above median)**  
**(Excluding those with missing wage information & reweighted)**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
<u>London &amp; SE:</u>								
1	37.09	26.27	2.52	0.11	1.01	2.95	3.42	3.57
2	14.93	38.25	4.51	0.09	0.95	2.12	3.55	2.76
3	3.49	11.85	7.84	0.30	0.73	1.56	1.92	1.63
4	1	1	1	1	1	1	1	1
6	1.13	0.87	0.26	0.07	63.87	1.13	1.73	1.71
7	7.53	9.11	1.71	0.15	3.87	34.07	20.56	6.44
8	3.05	3.46	0.67	0.05	2.60	8.09	73.37	22.02
9	1.86	2.05	0.31	0.03	1.73	2.69	24.97	50.92
<u>Rest of UK:</u>								
1	34.74	16.87	1.15	0.06	1.26	3.06	5.26	3.52
2	12.90	27.58	2.58	0.06	0.96	2.39	2.47	1.90
3	3.24	7.84	5.58	0.26	0.91	1.40	1.55	1.07
4	1	1	1	1	1	1	1	1
6	0.96	0.69	0.21	0.05	94.01	1.10	1.91	1.72
7	8.96	6.69	0.93	0.08	4.42	37.93	22.87	6.69
8	3.42	2.31	0.23	0.02	1.81	7.98	87.78	23.27
9	1.88	1.08	0.12	0.02	1.92	2.55	32.09	51.20

Note: for definition of states see note to Table 1.

**Table 27**  
**Tests of equality between “before” & “after” transition probabilities**  
**split by region**  
**(Excluding those with missing wage information & reweighted)**  
**Test statistics ~ N(0,1)**

<i>State at t</i>	<i>State at t+1</i>							
	1	2	3	4	6	7	8	9
<u>London &amp; SE:</u>								
1	0.22	1.42	-1.89	0.25	0.99	-0.90	-0.92	0.31
2	-0.47	0.80	-0.18	1.37	-0.03	<b>-2.52</b>	-0.57	-0.35
3	0.15	-1.34	-1.51	1.90	-0.30	0.47	1.71	1.01
4	0.42	1.21	0.44	-0.65	0.80	-0.21	-1.66	0.04
6	1.47	-0.79	-0.71	-1.57	0.26	0.36	0.67	1.61
7	<b>-3.22</b>	0.15	-0.23	1.85	-1.29	0.41	1.66	-0.56
8	-0.37	1.04	-1.66	0.18	-0.38	-0.15	0.92	-0.26
9	0.37	1.14	-0.29	1.75	-0.75	-0.95	-0.12	-0.36
<u>Rest of UK:</u>								
1	<b>-3.00</b>	<b>2.35</b>	<b>2.18</b>	-0.13	-1.33	-0.27	-1.14	0.63
2	-0.31	-0.28	1.09	0.60	-0.54	-1.09	-1.24	-0.14
3	1.05	0.22	-1.39	1.65	0.34	-1.91	-1.23	0.11
4	1.35	1.21	-1.84	1.57	-0.69	-1.18	-0.64	-0.90
6	0.77	-0.18	-1.54	-1.00	0.86	-1.54	0.78	1.21
7	-1.06	-0.23	1.67	<b>2.20</b>	-0.52	-1.52	0.22	0.32
8	-1.72	0.35	-0.31	0.70	-0.30	-1.83	<b>4.08</b>	<b>-2.65</b>
9	<b>-2.37</b>	0.65	1.15	-0.15	-1.14	-1.24	0.64	0.67

Note: for definition of states see note to Table 1.

**Table 28**  
**Models for transition probabilities for those unemployed at t**

	Probability low paid at t+1	Probability an employee at t+1	Prob. low paid at t+1 given employee
age	-0.0144 ( -5.30 )	-0.0162 ( -4.52 )	-0.0220 ( -3.52 )
age2	0.0001 ( 4.42 )	0.0001 ( 2.96 )	0.0002 ( 2.87 )
hq1	-0.0461 ( -3.54 )	0.2517 ( 11.45 )	-0.2585 ( -8.47 )
hq2	-0.0479 ( -2.96 )	0.1651 ( 5.88 )	-0.2511 ( -6.63 )
hq3	-0.0205 ( -1.45 )	0.1421 ( 6.77 )	-0.1771 ( -5.18 )
hq4	-0.0281 ( -1.91 )	0.0482 ( 1.99 )	-0.1369 ( -3.11 )
hq5	-0.0013 ( -0.11 )	0.1091 ( 6.49 )	-0.1136 ( -3.69 )
hq6	0.0407 ( 2.24 )	0.1233 ( 5.64 )	-0.0304 ( -0.76 )
hq7	0.0110 ( 0.68 )	0.0655 ( 2.92 )	-0.0359 ( -0.80 )
female	0.0500 ( 5.66 )	0.0316 ( 2.61 )	0.0916 ( 4.75 )
married	0.0314 ( 3.00 )	0.1187 ( 7.78 )	0.0086 ( 0.32 )
sepdvwd	0.0243 ( 1.90 )	0.0427 ( 2.24 )	0.0626 ( 1.75 )
nonwhite	-0.0051 ( -0.36 )	-0.0684 ( -3.08 )	0.0504 ( 1.35 )
health	-0.0026 ( -0.29 )	-0.0556 ( -4.25 )	0.0339 ( 1.48 )
region2	0.0164 ( 0.55 )	0.0381 ( 0.91 )	-0.0010 ( -0.01 )
region3	0.0242 ( 0.71 )	0.0910 ( 2.00 )	-0.0305 ( -0.37 )
region4	-0.0237 ( -0.81 )	0.0049 ( 0.11 )	-0.0861 ( -1.06 )
region5	0.0141 ( 0.42 )	0.0725 ( 1.56 )	-0.0167 ( -0.19 )
region6	0.0004 ( 0.01 )	0.0866 ( 2.21 )	-0.0750 ( -1.07 )
region7	0.0430 ( 1.31 )	0.0960 ( 2.19 )	0.0114 ( 0.15 )
region8	-0.0294 ( -1.09 )	-0.0361 ( -0.87 )	-0.1058 ( -1.37 )
region9	-0.0437 ( -1.72 )	0.0861 ( 2.19 )	-0.1982 ( -2.92 )
region10	-0.0157 ( -0.65 )	0.1278 ( 3.56 )	-0.1399 ( -2.18 )
region11	0.0114 ( 0.41 )	0.0784 ( 2.00 )	-0.0630 ( -0.90 )
region12	0.0001 ( 0.00 )	0.0359 ( 0.89 )	-0.0710 ( -0.93 )
region13	-0.0023 ( -0.08 )	0.0750 ( 1.78 )	-0.0769 ( -1.05 )
region14	-0.0344 ( -1.27 )	0.0861 ( 1.97 )	-0.1732 ( -2.44 )
region15	-0.0429 ( -1.49 )	-0.0165 ( -0.35 )	-0.1294 ( -1.52 )
region16	-0.0106 ( -0.34 )	0.1296 ( 2.80 )	-0.1233 ( -1.65 )
region17	0.0357 ( 1.22 )	0.0445 ( 1.10 )	0.0174 ( 0.23 )
region18	0.0309 ( 1.06 )	0.0233 ( 0.58 )	0.0449 ( 0.59 )
region19	0.0441 ( 1.49 )	0.0897 ( 2.20 )	0.0246 ( 0.34 )
region20	0.0232 ( 0.74 )	-0.0069 ( -0.17 )	-0.0105 ( -0.13 )
meth2	-0.0029 ( -0.14 )	0.0137 ( 0.49 )	-0.0163 ( -0.38 )
meth3	-0.0423 ( -2.23 )	-0.0279 ( -1.01 )	-0.0624 ( -1.46 )
meth4	-0.0074 ( -0.37 )	-0.0395 ( -1.42 )	0.0160 ( 0.35 )
meth5	-0.0047 ( -0.23 )	-0.0284 ( -1.02 )	0.0190 ( 0.42 )
meth6	-0.0130 ( -0.65 )	-0.0453 ( -1.63 )	0.0203 ( 0.45 )
meth7	-0.0102 ( -0.52 )	0.0149 ( 0.54 )	-0.0354 ( -0.83 )
meth8	-0.0133 ( -0.69 )	-0.0178 ( -0.66 )	-0.0042 ( -0.10 )
meth9	0.0010 ( 0.05 )	-0.0116 ( -0.41 )	0.0121 ( 0.27 )
meth10	-0.0059 ( -0.29 )	-0.0036 ( -0.13 )	-0.0024 ( -0.06 )
meth11	-0.0366 ( -1.92 )	-0.0575 ( -2.06 )	-0.0306 ( -0.69 )
meth12	0.0161 ( 0.75 )	-0.0076 ( -0.26 )	0.0452 ( 0.97 )
phase2	-0.0125 ( -1.14 )	-0.0035 ( -0.23 )	-0.0183 ( -0.73 )
phase3	-0.0276 ( -2.81 )	0.0167 ( 1.22 )	-0.0587 ( -2.66 )
constant	0.4048 ( 7.04 )	0.5941 ( 7.96 )	0.8722 ( 6.60 )

**Table 29**  
**Alternative models for transition probabilities for those unemployed at t**

	Probability low paid at t+1	Probability an employee at t+1	Prob. low paid at t+1 given employee
<u>All:</u>			
Phase 2	-1.25 (-1.14)	-0.35 (-0.23)	-1.83 (-0.73)
Phase 3	-2.76 (-2.81)	1.67 (1.22)	-5.87 (-2.66)
<u>Male:</u>			
Phase 2	-0.78 (-0.66)	-0.68 (-0.34)	0.23 (0.07)
Phase 3	-1.50 (-1.44)	2.94 (1.64)	-1.95 (-0.67)
<u>Female:</u>			
Phase 2	-2.28 (-1.31)	0.01 (0.01)	-4.11 (-1.11)
Phase 3	-4.82 (-3.16)	0.01 (0.01)	-10.12 (-3.08)
<u>Age &lt; 34:</u>			
Phase 2	-1.88 (-1.24)	-3.48 (-1.64)	0.06 (0.02)
Phase 3	-4.46 (-3.34)	-2.29 (-1.22)	-6.02 (-1.99)
<u>Age 34-44:</u>			
Phase 2	-0.19 (-0.11)	3.44 (1.34)	-1.30 (-0.32)
Phase 3	-2.16 (-1.68)	2.47 (1.15)	-3.99 (-1.19)
<u>Age &gt; 44:</u>			
Phase 2	-1.69 (-1.18)	1.21 (0.46)	-6.56 (-1.50)
Phase 3	-1.13 (-0.88)	6.95 (3.05)	-7.41 (-2.03)
<u>London &amp; SE:</u>			
Phase 2	-2.23 (-1.23)	-0.59 (-0.20)	-4.92 (-1.17)
Phase 3	-5.52 (-3.67)	-0.67 (-0.25)	-11.20 (-3.11)
<u>Rest of UK:</u>			
Phase 2	-1.09 (-0.91)	-0.25 (-0.14)	-0.57 (-0.18)
Phase 3	-2.01 (-1.87)	2.48 (1.57)	-3.83 (-1.42)

Notes:

1. The coefficients on the phase dummies have been multiplied by 100 to give the effect on the particular probability in percentage terms.
2. Controls variable are included for age, highest educational qualification, gender, marital status, ethnic origin, health status, region and month of interview (44 variables in all).
3. Robust t-ratios in parentheses.

**Table 30**  
**Models for transition probabilities for those low paid at t**

	Probability low paid at t+1	Probability an employee at t+1	Prob. low paid at t+1 given employee
age	-0.0040 ( -1.12 )	0.0107 ( 5.02 )	-0.0107 ( -2.74 )
age2	0.0001 ( 1.65 )	-0.0001 ( -4.42 )	0.0002 ( 3.12 )
hq1	-0.1854 ( -6.50 )	0.0312 ( 1.70 )	-0.2213 ( -7.17 )
hq2	-0.1363 ( -5.06 )	0.0430 ( 2.55 )	-0.1705 ( -5.93 )
hq3	-0.1154 ( -5.81 )	0.0067 ( 0.56 )	-0.1341 ( -6.18 )
hq4	-0.0647 ( -2.72 )	0.0321 ( 2.23 )	-0.0901 ( -3.54 )
hq5	-0.0606 ( -4.03 )	0.0192 ( 2.11 )	-0.0798 ( -4.94 )
hq6	-0.0391 ( -2.05 )	-0.0140 ( -1.21 )	-0.0359 ( -1.73 )
hq7	-0.0463 ( -2.28 )	-0.0027 ( -0.22 )	-0.0504 ( -2.29 )
female	0.0952 ( 7.48 )	-0.0115 ( -1.49 )	0.1135 ( 8.21 )
married	-0.0314 ( -1.84 )	-0.0288 ( -2.79 )	-0.0197 ( -1.05 )
sepdvwd	0.0239 ( 1.11 )	-0.0270 ( -2.08 )	0.0411 ( 1.76 )
nonwhite	0.0314 ( 0.96 )	-0.0409 ( -2.19 )	0.0597 ( 1.61 )
health	0.0007 ( 0.05 )	-0.0626 ( -8.06 )	0.0403 ( 2.88 )
region2	-0.0286 ( -0.72 )	-0.0134 ( -0.55 )	-0.0270 ( -0.64 )
region3	-0.0776 ( -1.74 )	-0.0143 ( -0.52 )	-0.0815 ( -1.71 )
region4	-0.0996 ( -2.34 )	0.0257 ( 0.97 )	-0.1294 ( -2.88 )
region5	-0.0135 ( -0.32 )	0.0080 ( 0.31 )	-0.0231 ( -0.53 )
region6	-0.0584 ( -1.57 )	-0.0105 ( -0.46 )	-0.0623 ( -1.59 )
region7	-0.1047 ( -2.53 )	0.0090 ( 0.35 )	-0.1264 ( -2.88 )
region8	-0.1464 ( -2.53 )	0.0435 ( 1.22 )	-0.1908 ( -3.09 )
region9	-0.1481 ( -3.40 )	-0.0091 ( -0.34 )	-0.1700 ( -3.61 )
region10	-0.1277 ( -3.64 )	0.0186 ( 0.85 )	-0.1577 ( -4.26 )
region11	-0.0566 ( -1.56 )	0.0125 ( 0.56 )	-0.0767 ( -2.01 )
region12	-0.1179 ( -2.90 )	0.0130 ( 0.52 )	-0.1445 ( -3.35 )
region13	-0.0794 ( -2.07 )	-0.0020 ( -0.08 )	-0.0941 ( -2.31 )
region14	-0.0883 ( -2.14 )	0.0121 ( 0.47 )	-0.1070 ( -2.46 )
region15	-0.0794 ( -1.70 )	-0.0036 ( -0.13 )	-0.0939 ( -1.87 )
region16	-0.0651 ( -1.58 )	0.0235 ( 0.92 )	-0.0900 ( -2.07 )
region17	-0.0768 ( -1.95 )	-0.0053 ( -0.22 )	-0.0889 ( -2.13 )
region18	-0.1028 ( -2.42 )	0.0079 ( 0.30 )	-0.1220 ( -2.72 )
region19	-0.0835 ( -2.18 )	0.0233 ( 0.98 )	-0.1119 ( -2.76 )
region20	-0.0537 ( -1.25 )	0.0093 ( 0.37 )	-0.0701 ( -1.53 )
moth2	0.0311 ( 1.17 )	-0.0026 ( -0.16 )	0.0392 ( 1.37 )
moth3	0.0383 ( 1.48 )	0.0125 ( 0.80 )	0.0353 ( 1.28 )
moth4	0.0216 ( 0.84 )	-0.0292 ( -1.86 )	0.0397 ( 1.42 )
moth5	0.0196 ( 0.78 )	-0.0132 ( -0.86 )	0.0312 ( 1.14 )
moth6	0.0285 ( 1.11 )	0.0083 ( 0.54 )	0.0281 ( 1.01 )
moth7	0.0184 ( 0.72 )	-0.0048 ( -0.31 )	0.0265 ( 0.96 )
moth8	0.0165 ( 0.66 )	0.0068 ( 0.44 )	0.0137 ( 0.51 )
moth9	-0.0045 ( -0.17 )	0.0278 ( 1.76 )	-0.0171 ( -0.61 )
moth10	0.0086 ( 0.34 )	-0.0091 ( -0.60 )	0.0160 ( 0.58 )
moth11	-0.0012 ( -0.05 )	0.0066 ( 0.44 )	-0.0050 ( -0.19 )
moth12	0.0097 ( 0.37 )	0.0052 ( 0.32 )	0.0084 ( 0.30 )
phase2	-0.0164 ( -1.17 )	0.0045 ( 0.53 )	-0.0205 ( -1.36 )
phase3	-0.0312 ( -2.47 )	0.0088 ( 1.15 )	-0.0405 ( -2.98 )
constant	0.5360 ( 7.41 )	0.6838 ( 15.58 )	0.7246 ( 9.28 )

**Table 31**  
**Alternative models for transition probabilities for those low paid at t**

	Probability low paid at t+1	Probability an employee at t+1	Prob. low paid at t+1 given employee
<u>All:</u>			
Phase 2	-1.64 (-1.17)	0.45 (0.53)	-2.05 (-1.36)
Phase 3	-3.12 (-2.47)	0.88 (1.15)	-4.05 (-2.98)
<u>Male:</u>			
Phase 2	-1.94 (-0.81)	1.27 (0.77)	-2.00 (-0.68)
Phase 3	-5.69 (-2.70)	0.75 (0.50)	-5.28 (-1.98)
<u>Female:</u>			
Phase 2	-3.07 (-2.03)	0.15 (0.15)	-2.07 (-1.19)
Phase 3	-4.71 (-3.46)	0.93 (1.04)	-3.63 (-2.32)
<u>Age &lt; 34:</u>			
Phase 2	-2.84 (-1.57)	-3.15 (-2.58)	-0.58 (-0.26)
Phase 3	-7.47 (-4.71)	-1.72 (-1.58)	-6.74 (-3.44)
<u>Age 34-44:</u>			
Phase 2	-3.75 (-1.83)	2.78 (2.03)	-3.91 (-1.63)
Phase 3	-1.64 (-0.95)	3.33 (2.89)	-1.06 (-0.52)
<u>Age &gt; 44:</u>			
Phase 2	-1.77 (-0.83)	3.35 (2.40)	-2.29 (-0.94)
Phase 3	-4.48 (-2.39)	2.25 (1.84)	-3.42 (-1.59)
<u>London &amp; SE:</u>			
Phase 2	-1.03 (-0.36)	1.53 (0.78)	-1.12 (-0.33)
Phase 3	-1.33 (-0.53)	0.65 (0.37)	-0.12 (-0.04)
<u>Rest of UK:</u>			
Phase 2	-3.18 (-2.22)	0.21 (0.22)	-2.28 (-1.37)
Phase 3	-5.83 (-4.51)	0.94 (1.10)	-4.98 (-3.29)

Notes:

4. The coefficients on the phase dummies have been multiplied by 100 to give the effect on the particular probability in percentage terms.
5. Controls variable are included for age, highest educational qualification, gender, marital status, ethnic origin, health status, region and month of interview (44 variables in all).
6. Robust t-ratios in parentheses.

**Table 32**  
**Models for transition probabilities for those inactive at t**

	Probability inactive and want work at t+1	Probability inactive at t+1	Prob. want work at t+1 given inactive
age	0.0196 ( 5.47 )	0.0014 ( 0.48 )	0.0220 ( 5.31 )
age2	-0.0002 ( -5.66 )	0.0000 ( 0.70 )	-0.0003 ( -6.15 )
hq1	-0.1585 ( -6.59 )	-0.1842 ( -9.26 )	-0.0829 ( -2.75 )
hq2	-0.1051 ( -4.56 )	-0.0913 ( -4.78 )	-0.0718 ( -2.73 )
hq3	-0.0784 ( -4.01 )	-0.1209 ( -7.46 )	-0.0132 ( -0.57 )
hq4	0.0111 ( 0.54 )	-0.0358 ( -2.11 )	0.0410 ( 1.80 )
hq5	-0.0406 ( -2.88 )	-0.0692 ( -5.93 )	-0.0020 ( -0.13 )
hq6	0.0012 ( 0.07 )	-0.0573 ( -3.67 )	0.0481 ( 2.23 )
hq7	-0.0101 ( -0.56 )	-0.0538 ( -3.59 )	0.0269 ( 1.33 )
female	-0.0408 ( -3.49 )	0.0734 ( 7.58 )	-0.1075 ( -8.06 )
married	-0.0836 ( -6.01 )	-0.0235 ( -2.05 )	-0.0921 ( -5.84 )
sepdvwd	-0.0193 ( -1.22 )	-0.0382 ( -2.92 )	0.0043 ( 0.24 )
nonwhite	0.0080 ( 0.38 )	-0.0038 ( -0.22 )	0.0169 ( 0.69 )
health	0.1390 ( 12.80 )	0.1721 ( 19.16 )	0.0530 ( 4.21 )
region2	-0.0108 ( -0.26 )	0.0333 ( 0.97 )	-0.0360 ( -0.78 )
region3	-0.0238 ( -0.54 )	-0.0268 ( -0.73 )	-0.0086 ( -0.17 )
region4	-0.1063 ( -2.50 )	-0.0191 ( -0.54 )	-0.1231 ( -2.59 )
region5	-0.1052 ( -2.34 )	-0.0527 ( -1.42 )	-0.0905 ( -1.78 )
region6	-0.0640 ( -1.64 )	-0.0335 ( -1.04 )	-0.0574 ( -1.31 )
region7	-0.0720 ( -1.60 )	-0.0385 ( -1.03 )	-0.0686 ( -1.35 )
region8	0.0015 ( 0.04 )	0.0116 ( 0.34 )	-0.0035 ( -0.08 )
region9	-0.0506 ( -1.28 )	-0.0440 ( -1.35 )	-0.0293 ( -0.66 )
region10	-0.0750 ( -2.08 )	-0.0490 ( -1.64 )	-0.0618 ( -1.53 )
region11	-0.0797 ( -2.10 )	-0.0305 ( -0.97 )	-0.0796 ( -1.87 )
region12	-0.0333 ( -0.81 )	-0.0298 ( -0.87 )	-0.0209 ( -0.45 )
region13	-0.0525 ( -1.26 )	-0.0168 ( -0.49 )	-0.0566 ( -1.22 )
region14	-0.0519 ( -1.24 )	0.0166 ( 0.48 )	-0.0786 ( -1.70 )
region15	-0.0292 ( -0.64 )	0.0165 ( 0.43 )	-0.0507 ( -1.00 )
region16	-0.0220 ( -0.51 )	-0.0028 ( -0.08 )	-0.0237 ( -0.49 )
region17	0.0105 ( 0.26 )	0.0372 ( 1.12 )	-0.0141 ( -0.32 )
region18	-0.0578 ( -1.45 )	-0.0229 ( -0.69 )	-0.0526 ( -1.18 )
region19	-0.0107 ( -0.26 )	-0.0249 ( -0.74 )	0.0067 ( 0.15 )
region20	0.1168 ( 2.83 )	0.0564 ( 1.65 )	0.1004 ( 2.21 )
meth2	0.0203 ( 0.84 )	0.0162 ( 0.81 )	0.0115 ( 0.42 )
meth3	0.0182 ( 0.75 )	-0.0091 ( -0.46 )	0.0253 ( 0.92 )
meth4	0.0224 ( 0.95 )	0.0009 ( 0.05 )	0.0253 ( 0.94 )
meth5	-0.0251 ( -1.08 )	-0.0114 ( -0.59 )	-0.0278 ( -1.05 )
meth6	-0.0093 ( -0.39 )	0.0080 ( 0.41 )	-0.0221 ( -0.82 )
meth7	0.0251 ( 1.06 )	-0.0154 ( -0.79 )	0.0395 ( 1.47 )
meth8	-0.0243 ( -1.06 )	-0.0191 ( -1.01 )	-0.0234 ( -0.89 )
meth9	0.0302 ( 1.26 )	0.0196 ( 0.98 )	0.0208 ( 0.77 )
meth10	-0.0106 ( -0.45 )	0.0038 ( 0.20 )	-0.0190 ( -0.71 )
meth11	-0.0068 ( -0.29 )	-0.0024 ( -0.12 )	-0.0117 ( -0.44 )
meth12	-0.0221 ( -0.93 )	0.0065 ( 0.33 )	-0.0360 ( -1.33 )
phase2	0.0186 ( 1.42 )	-0.0164 ( -1.51 )	0.0359 ( 2.40 )
phase3	0.0389 ( 3.27 )	0.0069 ( 0.71 )	0.0451 ( 3.35 )
constant	0.1351 ( 1.69 )	0.6179 ( 9.36 )	0.3309 ( 3.57 )

**Table 33**  
**Alternative models for transition probabilities for those inactive at t**

	Probability inactive and want work at t+1	Probability inactive at t+1	Prob. want work at t+1 given inactive
<u>All:</u>			
Phase 2	1.86 (1.42)	-1.64 (-1.51)	3.59 (2.40)
Phase 3	3.89 (3.27)	0.69 (0.71)	4.51 (3.35)
<u>Male:</u>			
Phase 2	3.00 (1.25)	-2.70 (-1.37)	6.49 (2.41)
Phase 3	3.80 (1.76)	-2.21 (-1.24)	6.68 (2.75)
<u>Female:</u>			
Phase 2	1.36 (0.87)	-1.23 (-0.95)	2.33 (1.30)
Phase 3	3.95 (2.80)	1.92 (1.64)	3.60 (2.25)
<u>Age &lt; 34:</u>			
Phase 2	2.02 (0.96)	-2.10 (-1.21)	4.57 (1.82)
Phase 3	1.99 (1.07)	1.15 (0.74)	1.82 (0.83)
<u>Age 34-44:</u>			
Phase 2	0.35 (0.17)	-2.57 (-1.48)	2.42 (1.00)
Phase 3	4.01 (2.25)	0.77 (0.52)	4.93 (2.43)
<u>Age &gt; 44:</u>			
Phase 2	2.80 (1.43)	-0.59 (-0.37)	3.67 (1.71)
Phase 3	5.34 (3.11)	0.31 (0.21)	6.10 (3.23)
<u>London &amp; SE:</u>			
Phase 2	0.55 (0.22)	-2.69 (-1.29)	2.85 (0.97)
Phase 3	0.76 (0.34)	0.12 (0.07)	0.71 (0.27)
<u>Rest of UK:</u>			
Phase 2	2.28 (1.48)	-1.25 (-0.98)	3.76 (2.17)
Phase 3	5.09 (3.66)	0.89 (0.77)	5.88 (3.78)

Notes:

7. The coefficients on the phase dummies have been multiplied by 100 to give the effect on the particular probability in percentage terms.
8. Controls variable are included for age, highest educational qualification, gender, marital status, ethnic origin, health status, region and month of interview (44 variables in all).
9. Robust t-ratios in parentheses.

**Appendix A: Full list of economic activity categories for LFS variable**

Basic economic activity using ILO definition (LFS variable INECACA)

	Description	Freq.
01	Employee	124553
02	Self-employed	16473
03	Government employment & training programmes	149
04	Unpaid family worker	409
05	ILO unemployed	6987
06	Inactive - seeking, unavailable, student	18
07	Inactive - seeking, unavailable, looking after family, home	273
08	Inactive - seeking, unavailable, temporarily sick or injured	67
09	Inactive - seeking, unavailable, long-term sick or disabled	54
10	Inactive - seeking, unavailable, other reason	195
11	Inactive - seeking, unavailable, no reason given	25
12	Inactive - not seeking, would like work, waiting results of job application	31
13	Inactive - not seeking, would like work, student	106
14	Inactive - not seeking, would like work, looking after family, home	3832
15	Inactive - not seeking, would like work, temporarily sick or injured	499
16	Inactive - not seeking, would like work, long term sick or disabled	3397
17	Inactive - not seeking, would like work, believes no job available	300
18	Inactive - not seeking, would like work, not started looking	442
19	Inactive - not seeking, would like work, not looked	707
20	Inactive - not seeking, would like work, no reason	4
21	Inactive - not seeking, not like work, waiting results of job application	9
22	Inactive - not seeking, not like work, student	320
23	Inactive - not seeking, not like work, looking after family, home	10376
24	Inactive - not seeking, not like work, temporarily sick or injured	410
25	Inactive - not seeking, not like work, long term sick or disabled	6879
26	Inactive - not seeking, not like work, not need or want job	1267
27	Inactive - not seeking, not like work, retired	1773
28	Inactive - not seeking, not like work, other reason	867
29	Inactive - not seeking, not like work, no reason given	200
30	Under 16	

This variable is the standard economic activity variable and is used for consistency with current ONS practice. It gives the International Labour Organisation (ILO) standard definitions of employment, unemployment and economic activity and inactivity.

**Appendix B: Transition matrices adjusted for measurement error**

**Table B1**  
**Transition matrices for periods before, spanning & after minimum wage: LFS**  
**(Excluding those with missing wage information & reweighted)**

<i>State</i> <i>at t</i>	<i>State at t+1</i>							
1	2	3	4	6	7	8	9	
<u>Before:</u>								
1	25.0	35.9	20.0	8.4	1.3	2.7	2.6	4.2
2	15.9	36.1	28.3	11.6	1.1	2.3	1.8	2.9
3	7.2	23.7	38.1	25.6	1.0	1.6	1.0	1.9
4	3.5	11.3	30.2	50.6	1.1	1.1	0.7	1.5
6	0.9	2.0	3.0	3.5	86.5	1.2	0.9	2.1
7	8.5	14.0	10.2	5.7	4.7	35.8	11.6	9.4
8	3.1	4.7	3.4	1.7	2.3	7.9	42.4	34.6
9	1.7	2.4	1.6	1.1	2.2	2.6	16.1	72.2
<hr/>								
<u>Spanning:</u>								
1	24.4	37.0	20.0	8.1	1.0	3.1	2.1	4.2
2	15.5	36.3	28.7	11.7	0.9	2.4	1.3	3.1
3	7.3	24.0	38.1	25.5	0.8	1.5	0.9	1.9
4	3.7	11.5	30.1	50.4	1.0	1.2	0.6	1.5
6	0.9	1.8	2.7	3.2	86.9	1.0	1.0	2.5
7	7.9	13.5	10.9	5.9	4.4	36.8	11.5	9.2
8	3.3	5.2	3.4	1.7	1.9	8.9	44.6	31.0
9	1.8	2.6	1.9	1.3	1.8	2.8	16.0	71.9
<hr/>								
<u>After:</u>								
1	23.9	36.9	20.7	8.6	1.1	2.3	2.1	4.4
2	15.5	36.4	28.7	12.1	1.0	1.8	1.5	3.0
3	7.2	23.6	37.7	26.3	1.0	1.3	0.9	1.9
4	3.6	11.4	30.0	50.9	1.1	0.9	0.6	1.5
6	1.0	1.9	2.5	2.9	87.0	1.0	1.1	2.6
7	7.2	13.6	11.5	7.4	4.1	34.3	12.5	9.4
8	2.6	4.6	3.2	1.9	2.3	6.8	47.0	31.8
9	1.5	2.5	1.8	1.3	1.8	2.2	16.4	72.5
<hr/>								