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Labour market flows: facts from the United Kingdom

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Abstract

In this paper I use the Labour Force Survey to obtain stylised facts about worker gross flows in the United Kingdom. I analyse the size and cyclicality of the flows between employment, unemployment and inactivity. I also examine job-to-job flows, employment separations by reason, flows between inactivity and the labour force, flows into and out of public sector employment and flows by education. I decompose contributions of job-finding and job-separation rates to fluctuations in the unemployment rate. Although the job-finding rate has been more relevant over the past ten years, the job-separation rate was particularly important during the early 1990s recession.

Key words: Worker gross flows, job-finding rate, job-separation rate.

JEL classification: E24, J60.

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Summary

Macroeconomic policy makers need to have a good understanding of the state of the supply side of the economy in order to set monetary policy appropriately, and an important part of supply is in the labour market. Close attention is paid to the stocks of employed, inactive (ie, those not working or looking for work) and unemployed people, as well as to the balance between demand and supply often referred to as 'tightness'.

But the labour market stocks and aggregate indicators are fundamentally driven by the behaviour of flows between employment, unemployment and inactivity. These flows are very large. On average, between 1996 and 2007 nearly a million people moved into new jobs every three months, with a slightly smaller number leaving. A smaller but comparably large number of people shifted jobs each quarter as well. So these gross flows are massive. For example, at 60,000 per quarter, the average increase in employment over this period (the net flow) was less than a tenth the size of either of those two gross employment flows. It is clear therefore that an understanding of all the relevant flows is essential to our understanding of labour market dynamics and business cycle fluctuations. Moreover, from an academic point of view, they lie at the heart of many recent theories of unemployment.

Thus the simple objective of this paper is to describe the main developments in, and establish a number of key facts about, the recent history of these important UK labour market flows. For policy makers, knowledge of those facts can help improve the monitoring of business cycles, the detection of inflection (turning) points and the assessment of labour market tightness. For macroeconomists, they provide a summary of the empirical features that theoretical models should ideally have.

It is possible to draw out some broad features of the data from the analysis of the Labour Force Survey over the period 1996 to 2007. On average, in each quarter 7% of the working-age population change status between inactivity, employment and unemployment and 2% of the working-age population change their employer. In expansions, although jobs become easier to find, as the labour market becomes tighter there are fewer movements between the three pools.

The cyclical behaviour of flows between inactivity and employment seem to have changed in recent years. They were not related to the business cycle until 2001, but became positively related (procyclical) thereafter.

Every quarter 7% of all employees search for a different job, and they are seven times more likely to change jobs than those who are not searching. In booms, there are less people searching for a different job, but they are more likely to change employer. In booms, more people resign their jobs, but there are less people being fired. Involuntary separations dominate the employment-to-unemployment flows, while 70% of all employment-to-inactivity flows occur because of personal reasons. Inactive people who want a job are twice as likely to move into the labour force, and four times more likely to move into unemployment, than those inactive people who do not want a job.

Some of the structural changes in the UK labour market seem to be due to changes in the education level of the working-age population, particularly due to the increasing share of the highly educated. There are substantial differences in the employment, unemployment and inactivity rates of different education categories, as well as in the transition probabilities (the chances of moving between different labour market states). The less-educated individuals face unemployment and inactivity rates that are three times greater than those with higher education, as well as double the separation and half the job-finding rate.

Job-finding and job-separation rates are equally important determinants of unemployment fluctuations. The job-finding rate has been more important over the past ten years, but further analysis of claimant count data has revealed that the job-separation rate was particularly relevant in the period between 1989 and 1996.

1 Introduction

The behaviour of flows between employment, unemployment and inactivity drive movements in aggregate indicators, such as the employment and unemployment rate. Hence they are critical to our understanding of labour market dynamics and business cycle fluctuations. Furthermore, worker gross flows and transition rates lie at the heart of *state of the art* models of unemployment, anchored in the Mortensen and Pissarides (1994) search and matching framework.

The objective of this paper is to establish a number of key facts about the properties of the UK labour market flows, by exploring data from the Labour Force Survey over the past ten years. In so doing, it extends the work by Bell and Smith (2002) and provides a systematic study of worker gross flows based on UK data, along the lines of the pioneer work of Blanchard and Diamond (1990) for the United States.[1]

This paper contributes to the existing literature along three dimensions. First, it reassesses the findings of Bell and Smith (2002) based on a longer sample. This is particularly important, given that in recent years the UK labour market is thought to have undergone significant structural change.

Second, I have analysed particular elements of the labour market that can be useful for economists in numerous areas of research. Given the size of the flows from and into inactivity I have explored in more detail their role over the business cycle. In particular, I have disaggregated the inactive into two subgroups: those that *want a job* (and therefore can be considered marginally close to the labour market) and those that *do not want a job* and evaluated the differences between them. In the past few years the United Kingdom experienced structural changes in the level of education of the labour force. Therefore, it seems important to examine the size and the behaviour of labour market flows by education. I have also provided evidence on the differences between the public and private sector employment regarding worker flows, as well as evidence on job-to-job flows and on-the-job search, and the causes of employment separations.

Third, this paper contributes to the debate recently revived by Shimer (2007) regarding the

[1] There are also some studies that consider solely inflows and outflows of unemployment using claimant count data, notably classical studies by Nickell (1982) and Pissarides (1986) or more recently Burgess and Turon (2005).

relative importance of job-finding and separation rates for fluctuations in employment. It provides evidence for the United Kingdom using different decomposition methods proposed in the literature.

These stylised facts are of interest to policy makers and macroeconomists alike. For policy makers they can help improve the monitoring of business cycles, the detection of turning points and the assessment of labour market tightness. For macroeconomists, this paper can be seen as a reference for the calibration of a number of parameters, and also provide a guideline for the properties one should expect a model to have.

Most of the aggregate flows are stable within the sample, so the conclusions of Bell and Smith (2002) remain valid. On average, in each quarter 7% of the working-age population change status between inactivity, employment and unemployment and 2% of the working-age population change their employer. In expansions, although jobs become easier to find, as the labour market becomes tighter there are fewer movements between the three pools. Only the cyclical behaviour of flows between inactivity and employment seem to have changed in recent years. As reported by Bell and Smith (2002), they were not related to the business cycle until 2001, but the analysis in this paper using an extended data set suggests that these flows became procyclical thereafter.

Every quarter 7% of all employees search for a different job, and they are seven times more likely to change jobs than those who are not searching. In booms, there are less people searching for a different job, but they are more likely to change employer. Inactive people who want a job are twice as likely to move into the labour force, and four times more likely to move into unemployment, than those inactive people who do not want a job.

Some of the structural changes in the UK labour market seem to be due to changes in the education level of the working-age population, particularly due to the increasing share of the highly educated. There are substantial differences in the employment, unemployment and inactivity rates of different education categories, as well as in the transition probabilities. The less-educated individuals face unemployment and inactivity rates that are three time greater than those with higher education, as well as double the separation and half the job-finding rate.

Close to 25% of total employment is public sector employment which, unlike private sector

employment, is countercyclical. The separation rate in the private sector is twice as high as in the public sector. In contrast, both the unemployed and the inactive are six times more likely to find a job in the private sector than in the public sector.

Job-finding and job-separation rates are equally important determinants of unemployment fluctuations in the United Kingdom. The job-finding rate has been more important over the past ten years, but further analysis of claimant count data has revealed that the job-separation rate was particularly relevant in the period between 1989 and 1996.

2 Preliminary concepts

2.1 Labour market dynamics

In order to analyse labour market dynamics I make use of some fundamental equations that describe the evolution of the stock of employed E and the stock of unemployed U. The pool of inactive is denoted as I. Adding the three pools gives us the working-age population W, while summing up employment and unemployment corresponds to the labour force L.

Total employment evolves according to the following equation:

$$E_{t+1} = E_t + M_t^{UE} + M_t^{IE} - S_t^{EU} - S_t^{EI} \qquad \textbf{(1)}$$

where M is the gross hiring flow from the pool indicated by the superscript and S is the gross separations flow. If we normalise this equation by the total working-age population, we get the following equation that focuses on the total gross flows as the determinant of changes in the employment rate.

$$\frac{E_{t+1} - E_t}{W_t} = \frac{M_t^{UE}}{W_t} + \frac{M_t^{IE}}{W_t} - \frac{S_t^{EU}}{W_t} - \frac{S_t^{EI}}{W_t} \qquad \textbf{(2)}$$

Alternatively, **(2)** may be written in terms of hiring rates (h) and separation rates (s):

$$\frac{E_{t+1}}{E_t} - 1 = h_t^{UE} + h_t^{IE} - s_t^{EU} - s_t^{EI}. \qquad \textbf{(3)}$$

We can perform a similar decomposition of the changes in unemployment:

$$U_{t+1} = U_t - M_t^{UE} + S_t^{EU} - G_t^{UI} + G_t^{IU} \qquad \textbf{(4)}$$

where G represents the movement between unemployment and inactivity. Again, we can either

focus on the gross flows or on the transition rates:

$$\frac{U_{t+1} - U_t}{W_t} = -\frac{M_t^{UE}}{W_t} + \frac{S_t^{EU}}{W_t} - \frac{G_t^{UI}}{W_t} + \frac{G_t^{IU}}{W_t} \quad \textbf{(5)}$$

$$\frac{U_{t+1}}{U_t} - 1 = -f_t^{UE} + s_t^{UE}\frac{E_t}{L_t}\frac{L_t}{U_t} + \frac{G_t^{IU} - G_t^{UI}}{L_t}\frac{L_t}{U_t} \quad \textbf{(6)}$$

where f is the job-finding rate.

The empirical literature has changed the emphasis that is put on each approach. Earlier work by Blanchard and Diamond (1990), Bleakley, Ferris and Fuhrer (1999) or Burda and Wyplosz (1994) focus on gross flows, while more recently, authors like Shimer (2007) or Fujita and Ramey (2007) have given more emphasis to transition rates. The two perspectives are complementary in the analysis of the labour market and the interest in one or the other depends ultimately on the theoretical model one has in mind. Thus I explore both of them.

2.2 Labour Force Survey

The data are constructed from the quarterly Labour Force Survey (LFS). The LFS panel samples around 60,000 households for five successive quarters. The sample is split into five waves. Every quarter one wave leaves the survey and a new wave enters. In this way, we can observe the changes in the labour market status of 80% of the households that took part in the survey and, therefore, obtain the gross labour market flows.

Estimating gross flows on the basis of survey data has two shortcomings: they suffer from non-response bias, and response error bias. The first occurs if an individual does not take part in the survey. For the LFS the non-contact rate is around 5% while the refusal rate ranges between 10% and 15%. The best way to minimise this problem is to have a good weighting procedure; namely, using the characteristics more associated with the non-response.

The response error bias occurs if the respondent provides wrong information about their current status. This is a more serious problem, because in longitudinal data the errors are cumulative and lead to an overestimation of flows. There is no practical way to deal with response-error bias. We should bear in mind that the results might be biased upwards, particularly in the flows between unemployment and inactivity. Nevertheless there is no reason to believe that the response-error bias affects the cyclical properties of the gross flows.

The constructed flows series are weighted for the population using sex, age and region[2] and are seasonally adjusted using the X12 Census programme. In contrast to Bell and Smith (2002), which use the raw series, I take a four-quarter moving average to all series to remove the high frequency movements that are very pronounced in the data. The sample covers the 1996-2007 period.[3]

3 Worker gross flows in the United Kingdom

3.1 Average gross flows

Chart 1 summarises the average quarterly worker flows over the 1996-2007 period. It reports the total number of people that changed status in thousands (t), as a percentage of the working-age population (p) and as a transition probability or hazard rate (h).

Over the sample period there was an average 60,000 net increase in employment every quarter. Substantial quarterly gross flows hide, however, behind this value. An average of 870,000 people move out of employment every quarter, approximately 60% of whom go into inactivity. An average of around 930,000 people move into employment, where the split is broadly similar between unemployment and inactivity. In addition to the 2.7% of the total working-age population that join the pool of employed, there is an additional 2.1% that change employer every quarter. These values are slightly lower, but close to the ones reported in Bell and Smith (2002).

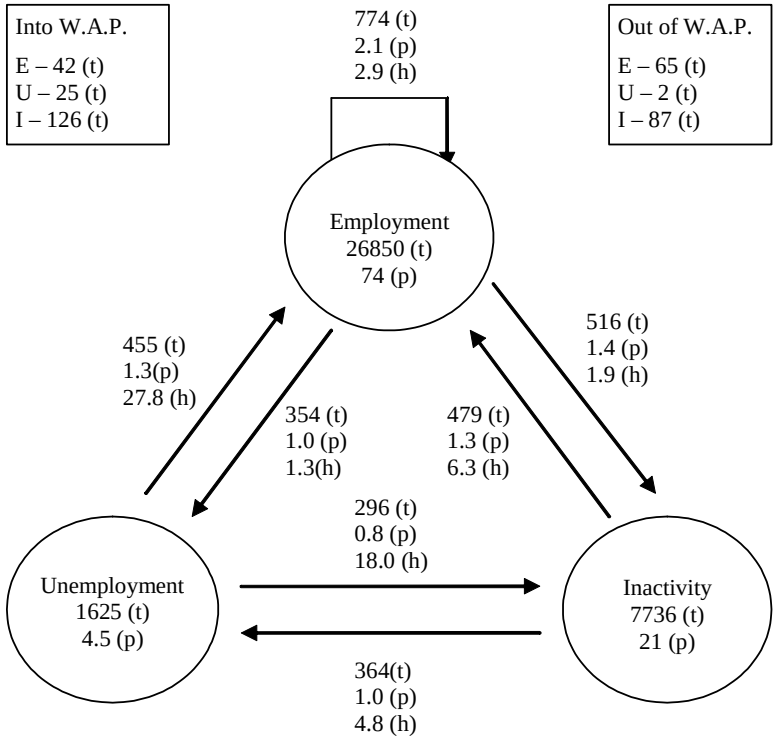
Demographic change represents a very small fraction of worker turnover, as shown in the two boxes within the chart. Only a minority of young people (less than 16 years of age) joining the working-age population enter the labour force directly. Similarly, more than half of the people that reach retirement age (65 plus for men, 60 plus for women) are already inactive. For this reason, I exclude from the analysis new entries and exits from the working-age population.

How do these numbers compare to those for the United States? Table A compares the quarterly figures for the United Kingdom with the monthly values for the United States taken from Blanchard and Diamond (1990), Bleakley *et al* (1999) and Fallick and Fleischman (2004). If we

[2] The Office for National Statistics suggests using these three variables.

[3] All series used are available from the author upon request.

Chart 1: Average quarterly worker flows, Labour Force Survey, 1996-2007



Note: the worker flows are expressed as total number of people in thousands (t), as a percentage of the working-age population (p) and as a transition probability or hazard rate (h). The two boxes show the movements in and out of the working-age population.

interpret the size of the gross flows between unemployment, employment and inactivity as a proxy for labour market flexibility, one could be tempted to say that the labour market in the United Kingdom is much less flexible than in the United States. While 6.8% of the population change status every quarter in the United Kingdom, in the United States between 5% and 7% change status every month. In my opinion, a comparison between these values can be misleading due to the existence of multiple transitions.

Suppose someone is unemployed in the first month, then moves to inactivity in the second, and then back to unemployment. While a monthly survey would pick up all transitions, the quarterly survey would not detect any. It is possible to overcome the problem of multiple transitions by calculating the monthly transition probabilities that generate the observed quarterly probabilities. For example, estimates of quarterly transition probabilities for the United States are sums across monthly transition probabilities (as, for instance, in Shimer (2007)). But for this comparison to be correct, it assumes that, to continue with this example, all unemployed workers have the same probability of finding a job, regardless of whether they have been employed in the past or not. In

Table A: Gross flows for United States and United Kingdom (% of working-age population)

	UK Quarterly	US (BD) Monthly	US (BFF) Monthly	US (FF) Monthly
$E \rightarrow U$	1.0	0.8	0.8	0.8
$E \rightarrow I$	1.4	1.0	1.7	1.7
$U \rightarrow E$	1.3	1.0	1.0	1.0
$U \rightarrow I$	0.8	0.5	0.8	0.8
$I \rightarrow E$	1.3	1.0	1.5	1.6
$I \rightarrow U$	1.0	0.6	0.6	0.9
Total	6.8	4.9	6.4	6.9
Job-to-job	2.1			1.6

other words, it assumes that the conditional probabilities are equal across different histories.

To illustrate this point, I have calculated for the last year of the LFS sample the job-finding and separation rates conditional on the status at the previous period.

$$s^{EU}_{t|E_{t-2}} = \frac{S^{EU}}{E_{t-1}} \mid E_{t-2} = \frac{S^{EU}|E_{t-2}}{M^{EE}_{t-1}} \qquad f^{UE}_{t|E_{t-2}} = \frac{M^{UE}}{U_{t-1}} \mid E_{t-2} = \frac{M^{UE}|E_{t-2}}{S^{EU}_{t-1}}$$
$$s^{EU}_{t|U_{t-2}} = \frac{S^{EU}}{E_{t-1}} \mid U_{t-2} = \frac{S^{EU}|U_{t-2}}{M^{UE}_{t-1}} \qquad f^{UE}_{t|U_{t-2}} = \frac{M^{UE}}{U_{t-1}} \mid U_{t-2} = \frac{M^{UE}|U_{t-2}}{S^{UU}_{t-1}}$$
$$s^{EU}_{t|I_{t-2}} = \frac{S^{EU}}{E_{t-1}} \mid I_{t-2} = \frac{S^{EU}|I_{t-2}}{M^{IE}_{t-1}} \qquad f^{UE}_{t|I_{t-2}} = \frac{M^{UE}}{U_{t-1}} \mid I_{t-2} = \frac{M^{UE}|I_{t-2}}{G^{IU}_{t-1}}$$

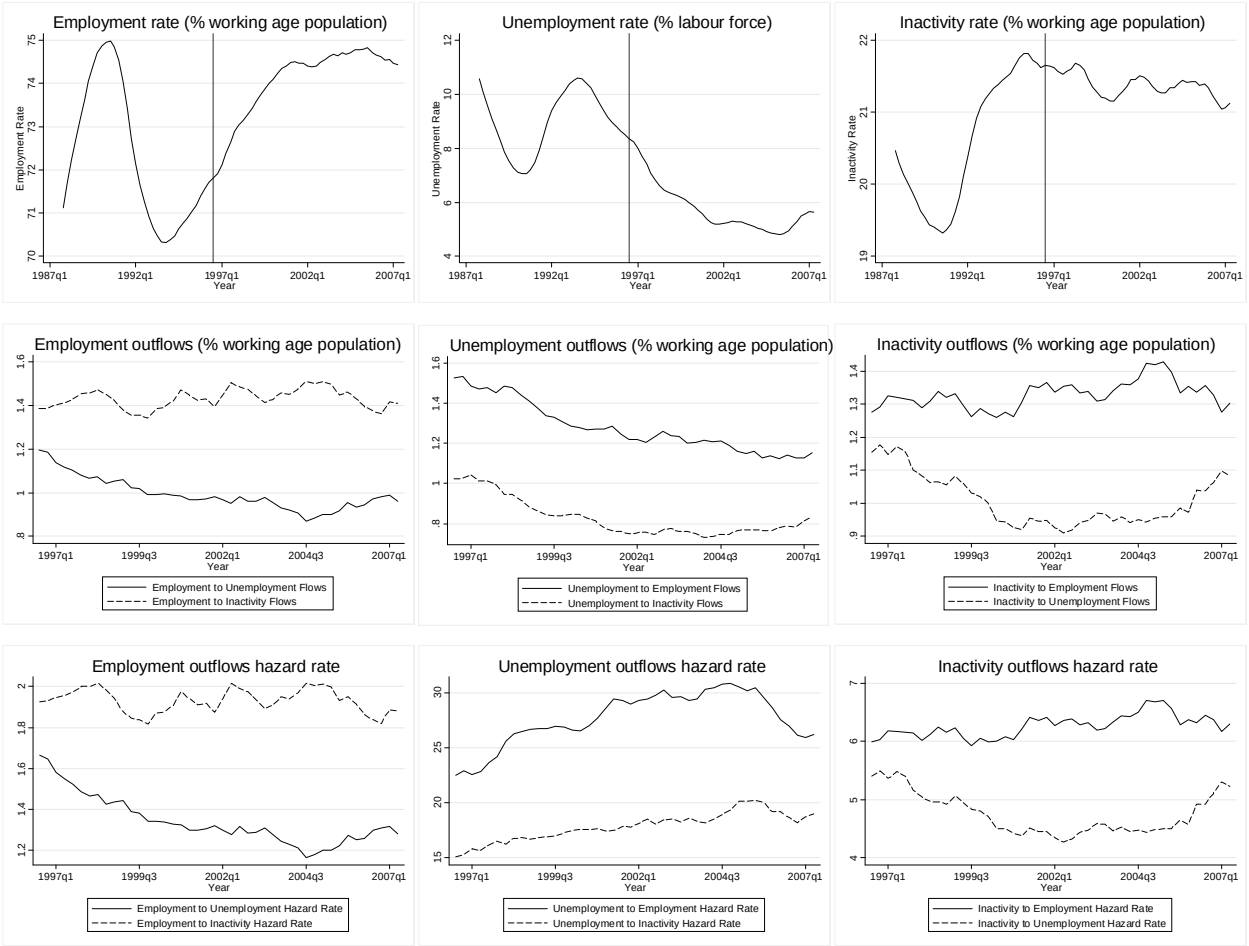
The probability of separation from employment to unemployment is 1% if the person was previously employed, 10% if he was previously unemployed and 6% if he was inactive. In addition, the job-finding rate is 46% if two quarters earlier the person was employed, 23% if the person was inactive and 18.6% if the person was unemployed. These results indicate substantial differences in conditional probabilities. And because there are no monthly surveys in the United Kingdom that can be used to calculate gross flows, I believe it remains a challenge to compare the two labour markets.

3.2 Evolution of labour market stocks and flows

The first row in Chart 2 displays the evolution of the employment rate, unemployment rate and inactivity rate in the United Kingdom over the past 20 years. The vertical line indicates the beginning of our flows sample. From these three graphs, we can see one of the main limitations of data which are only available from 1996 onwards. While the three main aggregates have

strong fluctuations since 1987, the period after 1996 seems to be a long-lived expansion. The employment rate increased until 2001 and has, since then, stabilised. The unemployment rate continued to fall until 2001 and it has also been relatively steady since. The inactivity rate has experienced a small downward trend, but compared to historical standards it can be considered relatively flat.

Chart 2: Labour market stocks, gross flows and hazard rates



The second and third rows in Chart 2 show the flows between the three pools, as a percentage of the working-age population and as transition probabilities (hazard rates). Most of the action in the flows over the sample has been driven by the flows into and out of unemployment. For instance, at the beginning of the sample, 2.8% of the working-age population moved into employment every quarter, but by the end of the sample less than 2.5% of the working-age population were entering the pool of employed. The reduction of the inflows to employment comes exclusively from unemployment: every quarter, the gross flows from unemployment to

employment fell by 0.4% of the working-age population which corresponds to, roughly, 150,000 people. Similarly, flows from employment to unemployment have also been decreasing, from 1.2% to 1% of the working-age population. By contrast, flows between employment and inactivity have remained broadly stable across the sample period.

Although the picture of the gross flows and hazard rates is very similar for employment and inactivity, this is not the case for unemployment. While the actual number of people that moved out of unemployment fell, shrinking the pool of unemployed, the probability of moving out of unemployment increased sharply between 1996 and 2005.

3.3 Cyclical properties of labour market flows

The literature on worker flows defines the cyclicality of flows as their correlation with the level of economic activity. In this paper I use the unemployment rate as an indicator of the business cycle.[4] I detrend the series using an Hodrick-Prescott filter with a smoothing parameter of 10^5.[5] For robustness purposes I split the sample into two periods with equal length: the first from 1996:3 to 2001:3, and the second from 2001:4 to 2007:2. The correlation with the unemployment rate of the gross flows and hazard rates for both the full and partitioned samples are reported in Table B.

Bell and Smith (2002), conversely, do not detrend the series and use employment as a cyclical indicator. Nevertheless, their results are equivalent to the ones from the first subsample, both in terms of sign and significance.

The cyclical properties of almost all worker flows are stable across subsamples. Inflows and outflows of all pools are countercyclical. In economic downturns, as the labour market gets looser, there are more movements between the three pools. In particular, most of the action occurs in the unemployment pool. More of the inactive start looking for a job and more workers lose theirs. Also, more of the unemployed find jobs or they stop searching.

[4]The results using the employment rate are very similar to the ones presented here. Additionally, I used detrended GDP or capacity utilisation but, although the results pointed in the same direction, the correlations were weaker and in many cases insignificant.

[5]An HP filter with this smoothing parameter is very close to linear detrending. The use of the original series gives very similar results. Conversely, when I used a Baxter-King band-pass filter, an HP filter with the usual quarterly data parameter (1600) or removing a quadratic trend, the correlations were very low and not significant. The HP filter with a smoothing parameter of 1600 and the band-pass filter remove too much of the variation of the series.

Table B: Correlation of labour market flows with the unemployment rate

	Gross flows			Hazard rates		
	Full sample	96:3–01:3	01:4–07:2	Full sample	96:3–01:3	01:4–07:2
$\rightarrow E$	0.29**	0.36	0.09			
$E \rightarrow$	0.50*	0.51**	0.46**	0.65*	0.65*	0.72*
$\rightarrow U$	0.95*	0.93*	0.97*			
$U \rightarrow$	0.86*	0.77*	0.93*	−0.90*	−0.94*	−0.96*
$\rightarrow I$	0.50*	0.49*	0.49**			
$I \rightarrow$	0.73*	0.69*	0.77*	0.81*	0.73*	0.88*
$E \rightarrow U$	0.88*	0.91*	0.91*	0.90*	0.93*	0.94*
$E \rightarrow I$	−0.42*	−0.18	−0.69*	−0.25	0.01	−0.58*
$U \rightarrow E$	0.65*	0.51**	0.77*	−0.90*	−0.90*	−0.97*
$U \rightarrow I$	0.89*	0.83*	0.95*	−0.64*	−0.51**	−0.75*
$I \rightarrow E$	−0.23	0.04	−0.57*	−0.20	−0.06	−0.49**
$I \rightarrow U$	0.90*	0.84*	0.98*	0.91*	0.87*	0.98*

Note: * denotes significant at 1% and ** significant at 5%. All series are detrended using an HP filter with a smoothing parameter of 10^5.

The separation rate from employment to unemployment, and the transition probability from inactivity to unemployment are strongly countercyclical, while the job-finding rate is strongly procyclical. In other words, recessions are periods when it is harder for an unemployed individual to find a job, an employed person is more likely to lose their job and an inactive person is more likely to start looking for one.

The only structural break between the two subsamples occurs in the flows between employment and inactivity. While they both look acyclical in the first period, as reported in Bell and Smith (2002), they are procyclical in the second. One possibility is that this break can be attributed to structural changes in the UK labour market associated with the decline in equilibrium unemployment over the sample and the rise in female labour force participation. When the pool of unemployed is very small, firms might find it easier to attract people out of inactivity. The increase in female participation may have made the pool of inactive more 'flexible' and therefore more responsive to economic conditions.

The countercyclicality of the flows between employment and unemployment, as well as, the procyclicality of flows between employment and inactivity observed in the second subsample are in line with the pattern observed in the United States by Blanchard and Diamond (1990).

4 Other perspectives on the UK labour market

4.1 Job-to-job flows

Many economists think that on-the-job search and job-to-job flows are important elements of business cycles. For instance, Krause and Lubik (2007), building on Pissarides (1994) on-the-job search model, concluded that on-the-job search and job-to-job transitions greatly amplify shocks to the economy.

The LFS allows us to calculate job-to-job flows. It asks the respondent what is the length of current job tenure. So, if an individual is employed in the first quarter and still employed in the second quarter, but with a job tenure of less than three months, it counts as a job-to-job flow. We should bear in mind that this measure of job-to-job flows includes people that changed job directly as well as individuals that had non-measured spells of unemployment or inactivity. In other words, individuals that moved out of employment and back into employment within the quarter.

Chart 3: Job-to-job flows

The first graph of Chart 3 plots the job-to-job flows as a percentage of the working-age population. Job-to-job flows increased from 1996 to 2001, as reported by Bell and Smith (2002), but have fallen since. As one expects, there are substantial differences in the transition probabilities among employees engaged in on-the-job search and the ones that are not searching. If a worker is searching for a job, the probability of changing job in any given quarter is, on average, 14%. If he is not searching, the probability is only 2%. Each quarter, on average, 7% of workers are searching for a different job. This is higher than the value of 5.2% found by

Pissarides and Wadsworth (1994). All in all, roughly one third of all the job changers were previously searching for a job.

Table C: Correlation of job-to-job flows with the unemployment rate

Job-to-job flows	−0.57*
Job-to-job hazard rate if searching	−0.73*
Job-to-job hazard rate if not searching	−0.73*
% Employees searching	0.37**

Note: * denotes significant at 1% and ** significant at 5%. All series are detrended using an HP filter with a smoothing parameter of 10^5.

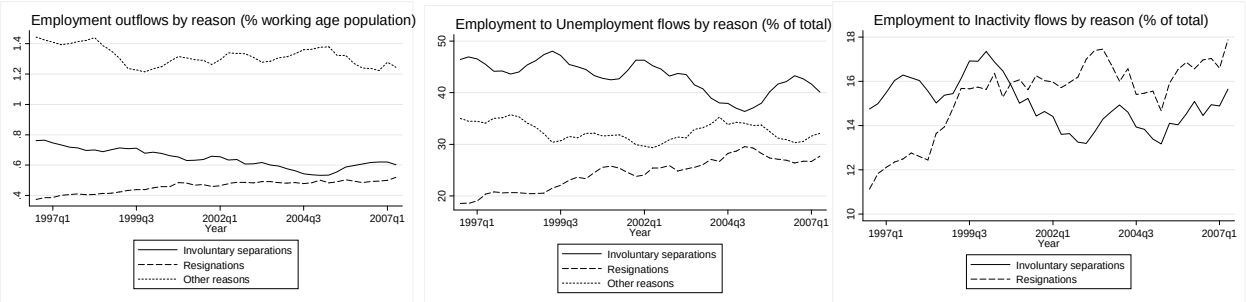
Evidence from the United States suggests that job-to-job flows are strongly procyclical (Fallick and Fleischman (2004)). We observe the same pattern in the United Kingdom (see Table C). Job-to-job transition probabilities are strongly procyclical whereas actual job-to-job flows are somewhat less procyclical. This is because the number of employed searching for a job is mildly countercyclical. Economic downturns are periods when it is harder for an employee to find a different job, but more employees are trying to find one. The countercyclicality of the number of employees searching for a different job is not consistent with the theory. The stylised model presented in Pissarides (2000) predicts that increasing productivity leads to more people searching for jobs and more job-to-job transitions.

4.2 Outflows from employment by reason

Are separations from employment driven by firms or workers? The LFS allows us to split the cause of employment separations into three categories: *involuntary separations*, *resignations*, or by *other reasons*. The first category includes dismissals, termination of temporary employment contracts or redundancies, which are involuntary from the worker's point of view. *Resignations* include cases where the worker resigned, and also where they took voluntary redundancy. Finally, *other reasons* encompasses giving up work for health, family or personal reasons or taking early retirement.

The first figure in Chart 4 plots the total outflows from employment, as a percentage of the working-age population, by reason. Roughly half of total outflows from employment are due to *other reasons* and the other half is due to both *resignations* and *involuntary separations*. These

Chart 4: Employment outflows by reason



two have had different movements over the past ten years: while *involuntary separations* have decreased, *resignations* have increased.

The flows from employment to unemployment are clearly dominated by *involuntary separations*. Between 40% and 45% of total employment to unemployment flows were due to *involuntary separations*. But there has been an increase in the share of *resignations* during the past decade: in the beginning of the sample *resignations* only accounted for 20% of total employment to unemployment flows, while in 2007 that value was close to 30%.

Altogether, *other reasons* accounts for more than 70% of the employment to inactivity flows. The second graph of Chart 4 plots the share of the *involuntary separations* and *resignations* of employment to inactivity flows. Within the remaining 30%, since 2000 the majority of those have resigned as opposed to having lost their job.

We can see in Table D that, as expected, *involuntary separations* are strongly countercyclical, while *resignations* are very procyclical. In economic slowdowns less people quit, which partially counterbalances the fact the more people lose their jobs. Separations by *other reasons* are acyclical which is consistent with the incidence of personal reasons having a weaker relationship with the business cycle.

Table D: Correlation of employment outflows by reason with the cyclical unemployment rate

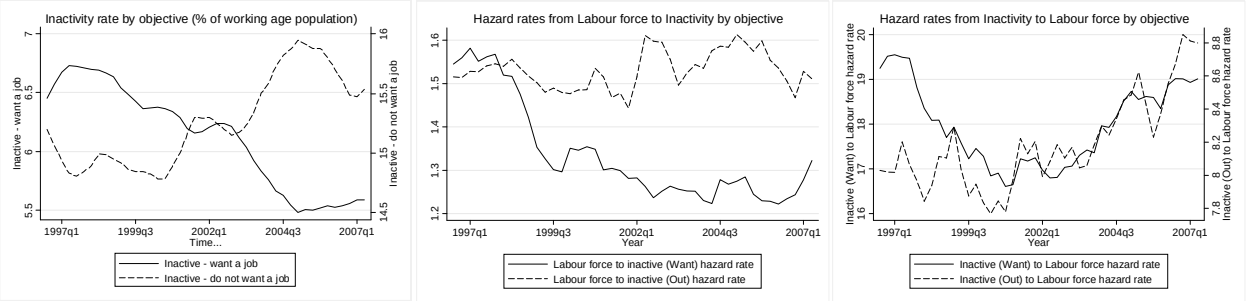
Involuntary separations	0.59*
Resignations	−0.67*
Other reasons	0.21

Note: * denotes significant at 1% and ** significant at 5%. All series are detrended using an HP filter with a smoothing parameter of 10^5.

4.3 Disaggregating inactivity

Given the magnitude of the flows in and out of inactivity, researchers have asked if some of the inactive should be considered as unemployed. Flinn and Heckman (1983) analysed conditional and unconditional transition probabilities between the two states and concluded that they are essentially different.[6] Blanchard and Diamond (1990) use Current Population Survey data that disaggregates the pool of inactive into two well-defined subgroups: those that *want a job* (Iw) and those that *do not want a job* (Io). The inactive that *want a job* can be considered marginally close to the labour market, and consequently more likely to go into the labour force. The LFS also allows for this distinction.

Chart 5: Disaggregated inactivity



The first figure in Chart 5 shows the two series as a percentage of the working-age population. It is evident that the relative size of the two groups has changed over the sample. While the pool of inactive that *want a job* have a negative trend similar to the unemployment rate, the pool of

[6] In the United Kingdom, however, Joyce, Jones and Thomas (2003) found that many subgroups of the inactive have the same transition probability to employment as the unemployed.

inactive that *do not want a job* has increased. On average, the number of inactive that *do not want a job* is almost three times higher than the number of inactive that *want a job.*

Table E: Transition matrix, LFS (% per quarter)

From: / To:	Employment	Unemployment	Inactive (Want)	Inactive (Out)
Employment	96.8	27.8	8.4	5.4
Unemployment	1.3	54.1	9.6	2.8
Inactive (Want)	0.7	11.6	60.4	10.8
Inactive (Out)	1.2	6.5	20.8	81.0

Table E reports the transition probabilities between the four groups. The inactive that *want a job* are twice as likely to join the labour force, and almost four times more likely to join the pool of unemployed than the inactive that *do not want a job.* Additionally, every quarter, 11% of the unemployed move into inactivity but still *want a job* while only 6.5% move to inactivity and *do not want a job*. There are also relatively high transition probabilities between the two groups of inactive. Around 20% of the inactive that *want a job* abandon their intentions by the following quarter. It seems that this state is a limbo between inactivity and the labour force.

Table F: Correlation of inactivity flows with unemployment rate

	Gross flows	Hazard rates
$L \rightarrow Iw$	0.73*	0.72*
$L \rightarrow Io$	−0.03	−0.05
$Iw \rightarrow L$	0.77*	0.85*
$Io \rightarrow L$	0.61*	0.63*
$Iw \rightarrow Io$	−0.20	0.43*
$Io \rightarrow Iw$	0.21	0.00

Note: * denotes significant at 1% and ** significant at 5%. All series are detrended using an HP filter with a smoothing parameter of 10^5.

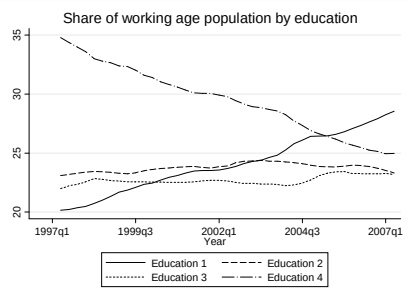
Table F exhibits the cyclical properties of the gross flows and hazard rates between the two groups of the inactive and the labour force. The outflows from inactivity to the labour force are countercyclical, independent of the subgroup of inactive we consider. However the converse is not true. Whereas the flows from the labour force to inactivity (out) are not related to the cycle, the flows between the labour force and the inactive that *want a job* are strongly countercyclical. In recessions, more people leave the labour force but still want a job.

Taking the evidence as a whole, there seems to exist a closer link between the pool of the inactive that *want a job* and the labour force, particularly unemployment.[7]

4.4 Flows by education

Previous studies on labour market flows have paid relatively little attention to differences by levels of education. To explore such differences, I divide the working-age population into four groups depending on the level of education: higher education (*Education 1*), A-levels or equivalent (*Education 2*), GCSE or equivalent (*Education 3*) and below GCSE (*Education 4*). Chart 6 shows the share of the working-age population of each education category.

Chart 6: Working-age population by education

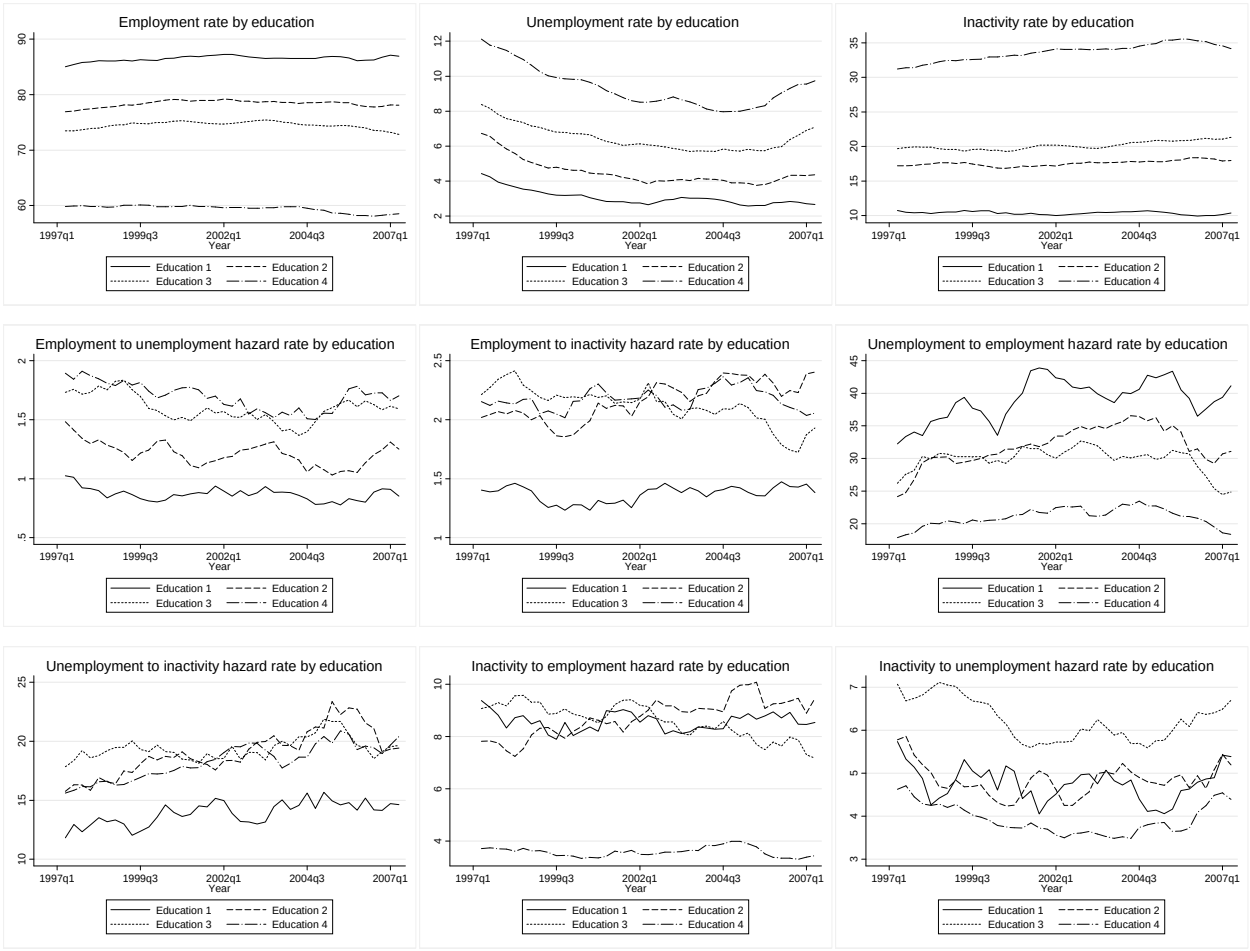


The chart reveals a significant change in the UK economy over the past decade, with the share of working-age population with higher education increasing from 20% in 1997 to almost 30% in 2007. Over the same period, the share of the working-age population in the lowest education category fell from around 35% to 25%. The share of the working-age population in the middle education categories stayed relatively constant throughout the sample.

There are striking differences across the four education groups with respect to employment, unemployment and inactivity rates, as one can see in the first row of Chart 7. The average employment rate among the most educated is 86%, as opposed to 59% for individuals in the lowest education category. Both the unemployment rate and inactivity rate are monotonically decreasing in the level of education. Individuals in the lowest education category face an average unemployment rate of 9.3%, three times higher than the average unemployment rate of those

[7]See also Joyce *et al* (2003) for a description of the trends in inactivity since the mid 1980s and the implications these have for overall labour availability.

Chart 7: Labour market stocks and hazard rates by education



with higher education. The average inactivity rates are, in increasing order of level of education, 34%, 20%, 18% and 10%.

The difference between education categories extends to transition probabilities, as shown in the remaining figures of Chart 7. For example, the average separation rates from employment to unemployment are 0.87%, 1.21%, 1.6% and 1.7% as we go down the education ranking. The job-finding rate also presents significant differences. By the end of the sample, individuals in the highest education category are twice as likely to find a job than individuals in the lowest education group.

Another interesting fact is that, after 2001, the employment rate had fallen and the inactivity rate had increased for all groups, with the exception of the more educated. In other words, the

employment rate had fallen for 70% of the working-age population. The aggregate employment rate since 2001 has, therefore, been largely supported by the increase in the share of the working-age population in the highest education category.

Table G: Correlation of labour market flows with unemployment rate by education

	Educ.1	Educ.2	Educ.3	Educ.4
$E \rightarrow U$	0.52^{*}	0.57^{*}	0.56^{*}	0.71^{*}
$E \rightarrow I$	0.56^{*}	0.16	-0.38^{**}	-0.51^{*}
$U \rightarrow E$	-0.73^{*}	-0.75^{*}	-0.89^{*}	0.93^{*}
$U \rightarrow I$	-0.31^{**}	-0.33^{**}	-0.20	-0.45^{*}
$I \rightarrow E$	0.16	-0.37^{**}	-0.42^{*}	-0.31^{**}
$I \rightarrow U$	0.47^{*}	0.77^{*}	0.73^{*}	0.91^{*}

Note: * denotes significant at 1% and ** significant at 5%. All series are detrended using an HP filter with a smoothing parameter of 10^5.

Table G presents the correlations of each transition probability with the unemployment rate of the respective education category. The cyclical properties of most transition probabilities are quite robust across levels of education. The job-finding rate is highly procyclical and the separation rate from employment to unemployment is countercyclical. The probability of moving from inactivity to unemployment is countercyclical at all levels of education.

The differences across levels of education exist in the flows for which the aggregate properties are not so well defined, particularly in the flows between employment and inactivity. The probability of moving from employment to inactivity is procyclical for the bottom two categories but countercyclical for those in the higher categories. The inactivity to employment transition rate is mildly procyclical except for the highest education category, which is acyclical.

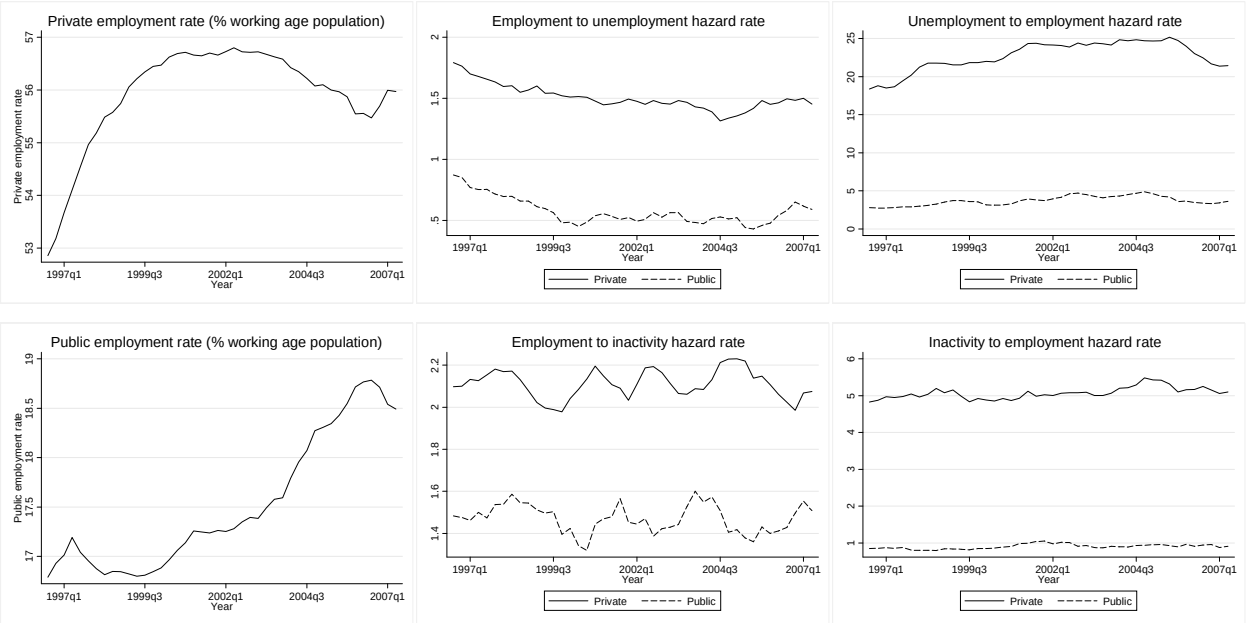
4.5 Public and private sector employment

As in other OECD countries, the level of public employment in the United Kingdom is quite high at around 25% of total employment over the sample period. However, this sample average masks significant growth in public sector employment over the period.

LFS employment can be decomposed into public and private sector. Public sector employment is composed mainly of employment from local and central government and health authorities, but it also includes employment by public companies, universities, armed forces, charities and other

organisations.[8] In this section we consider gross flows and hazard rates by sector, in order to assess whether the increase in public sector employment may have an impact on the cyclical flows.[9] Chart 8 shows the public and private sector employment rates and the different transition probabilities.

Chart 8: Employment rates and transition probabilities of public and private sectors



The behaviour of the two employment rates differ significantly. The private sector employment rate grew from 53% of the working-age population in 1996 to just under 57% in 2002 before falling back somewhat. By contrast, the public sector employment rate was relatively stable until 2002, at around 17% of the working-age population, but had risen close to 19% by the end of the sample.

On average, the separation rate to unemployment is 2.5 times higher in the private sector than in the public sector. If one is unemployed, the average probability of finding a public sector job is 3.6%, while for a private sector job it is 22% – six times higher. The probability of moving from

[8] As the LFS is a household survey, the split is based on individuals self-reporting whether they work in the public sector and is therefore they are prone to misclassification error.

[9] Holmlund and Linden (1993), Hörner, Ngai and Olivetti (2007) and Quadrini and Trigari (2007) are examples of attempts to model the labour market impacts of public sector employment in a search and matching framework.

inactivity to private sector employment is also, roughly, six times higher than for the public sector.

Table H summarises the cyclical properties of private and public sector employment rates and their transition probabilities. While private sector employment is naturally procyclical, public sector employment is countercyclical. Previous studies, for instance Algan, Cahuc and Zylberberg (2002), have also identified this positive correlation between public sector employment and the unemployment rate in several OECD economies.

The most puzzling element of Table H is the fact that we cannot identify why private and public sector employment rates have opposite cyclical behaviours. Job-separation rates are strongly countercyclical for both sectors. Moreover, job-finding rates go up in expansions for both sectors although the cyclicality is stronger for private sector employment. This dual behaviour of private and public sector employment cannot also be explained by flows between the two sectors or with inactivity, as they all seem unrelated to the business cycle.

Table H: Correlation of labour market flows by sector with unemployment rate

Private sector		Public sector	
E^P	-0.90^*	E^G	0.66^*
$E^P \rightarrow U$	0.89^*	$E^G \rightarrow U$	0.85^*
$E^P \rightarrow I$	-0.14	$E^G \rightarrow I$	0.09
$U \rightarrow E^P$	-0.93^*	$U \rightarrow E^G$	-0.61^*
$I \rightarrow E^P$	-0.15	$I \rightarrow E^G$	-0.27
$E^P \rightarrow E^G$	-0.03	$E^G \rightarrow E^P$	0.10

Note: * denotes significant at 1% and ** significant at 5%. All series are detrended using an HP filter with a smoothing parameter of 10^5.

5 What drives unemployment in the United Kingdom?

What dictates the cyclical behaviour of unemployment: hires or separations? The seminal work on labour market flows by Blanchard and Diamond (1990) and Davis and Haltiwanger (1992) set the 'conventional wisdom' that recessions are mainly driven by high job loss rates. In two recent papers, Shimer (2007) and Hall (2005) have challenged this view by presenting evidence that cyclical unemployment dynamics are largely driven by a time-varying job-finding rate and that the separation rate is very close to being acyclical. These two papers had a very strong impact on the field. On the one hand, many researchers have used this evidence to develop models that

incorporate constant job destruction rates (for instance Blanchard and Gali (2008) or Gertler and Trigari (2006)). On the other hand, other researchers put forward more evidence that opposes their claims. Davis, Faberman and Haltiwanger (2006) provide new empirical evidence in support of the view that a recession starts out with a wave of separations. Fujita and Ramey (2007) and Elsby, Michaels and Solon (2007) argue that both job-separation rate and job-finding rate play a significant role in unemployment fluctuations. The current *status quo* is that, in the United States, the job-finding rate accounts for two thirds of unemployment volatility (Pissarides (2007)).

The evidence for the United Kingdom is also controversial. Pissarides (1986) finds that, for the period between 1967 and 1983, almost all changes in unemployment can be accounted for by changes in the job-finding rate. More recently, Petrongolo and Pissarides (2008) also find that the main contribution to unemployment volatility is from the job-finding rate, except for a few years in the early 1990s. In contrast, Burgess and Turon (2005) claim that between 1967 and 1998 the unemployment dynamics arise mostly from shocks to inflows.

The ongoing debate about the roles of hires and separations give emphasis to the use of different methodological approaches and data sources across researchers. To evaluate the contribution of job-finding and job-separation rates in the United Kingdom I use standard procedures. I correct the data for time aggregation bias and use three decompositions of unemployment that have been proposed in the recent literature: Shimer (2007), Elsby *et al* (2007) and Fujita and Ramey (2007).

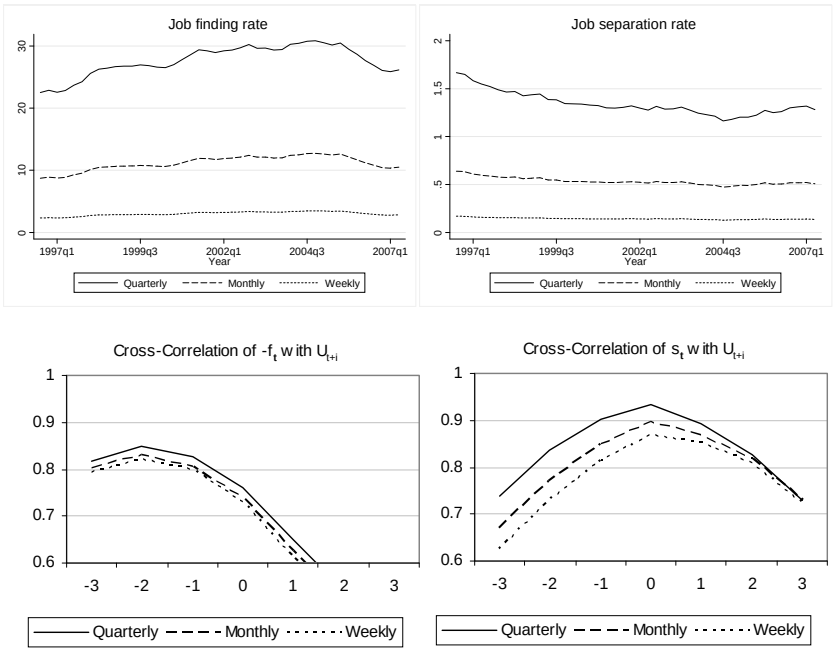
5.1 Time aggregation bias

Shimer (2007) argues that, when analysing gross flows, many studies suffer from time aggregation bias. In expansions, an employed person that becomes unemployed is more likely to get a job before the next survey, and as a consequence the employment-unemployment transition and the unemployment-employment transition would not be accounted for. This effect biases the correlation of the job-finding rate with the cycle downwards. He proposes a correction method that calculates the continuous transition probability, by allowing multiple transitions within the period. Elsby *et al* (2007) consider that Shimer's method overcorrects for time aggregation in the sense that it considers two transitions if a person separates from their job and finds another one in a very short period of time, for instance, an hour. They propose a discrete correction method that ignores movements out of a given state and back, which occur within one week. I apply a similar

method to get the monthly and weekly transition probabilities. We can write each one of the nine quarterly transition probabilities as a non-linear function of all nine monthly or weekly transition probabilities. We can then retrieve the monthly or weekly transition probabilities by solving a system of nine equations.[10]

Chart 9 shows the quarterly, monthly and weekly job-finding and job-separation rates and their cross-correlation with the unemployment rate. As argued by Shimer, the time aggregation correction not only scales down both transition probabilities, but it also changes the procyclicality of the series, particularly the job-separation rate. Nevertheless, even after the correction, both the job-finding rate and job-separation rate are still highly correlated with the unemployment rate (above 0.8). The cross-correlation of job-separation rate with unemployment rate peaks contemporaneously, while job-finding rate lags the cycle by two quarters.

Chart 9: Quarterly, monthly and weekly job-finding and job-separation rates



Note: The last two graphs plot the cross-correlation of job-finding rate $(-f_t)$ and job-separation rate (s_t) with leads and lags of unemployment rate.

[10] See details in appendix.

5.2 Unemployment decompositions

The starting point for all unemployment decompositions is the equation of the steady-state unemployment u_t^{ss}:

$$u_t^{ss} = \frac{s_t}{s_t + f_t} \tag{7}$$

Shimer (2007) isolates the effect of the job-finding rate by constructing a counterfactual unemployment rate, if the job separation was always at its sample average (denoted u_t^f). Similarly, he constructs the series for unemployment, if the job-finding rate was at its sample average (denoted u_t^s).

$$u_t^f = \frac{\bar{s}}{\bar{s} + f_t}, u_t^s = \frac{s_t}{s_t + \bar{f}} \tag{8}$$

Shimer's decomposition has faced strong criticism, because the steady-state approximation is non-linear in the two hazard rates. In this sense, if we chose different values for $\bar{s}$ and $\bar{f}$ instead of the sample average we could get different answers. Elsby *et al* (2007) propose a more natural decomposition. If we log differentiate the equation of the steady-state unemployment, we get the following expression:

$$d \ln u_t^{ss} \approx (1 - u_t^{ss})[d \ln s_t + d \ln f_t]. \tag{9}$$

As u_t^{ss} is small, changes in the log of the job-finding and job-separation rates translate almost one to one into changes in the log unemployment. So to evaluate the importance of each, we only have to compare the volatility of the log of the job-finding rate and job-separation rate.

Finally, Fujita and Ramey (2007) suggest a different approach. By linearising steady-state unemployment around the previous period steady-state u_{t-1}^{ss}, we get the following expression:

$$\frac{u_t^{ss} - u_{t-1}^{ss}}{u_{t-1}^{ss}} = (1 - u_{t-1}^{ss})\frac{s_t - s_{t-1}}{s_{t-1}} - (1 - u_{t-1}^{ss})\frac{f_t - f_{t-1}}{f_{t-1}} \tag{10}$$

which is simply breaking down the percentage change of the steady-state unemployment rate into percentage changes on both job-finding and job-separation rates. We can restate this expression as $du_t^{ss} = du_t^f + du_t^s$, where

$$du_t^{ss} \equiv \frac{u_t^{ss} - u_{t-1}^{ss}}{u_{t-1}^{ss}}, du_t^f \equiv -(1 - u_{t-1}^{ss})\frac{f_t - f_{t-1}}{f_{t-1}}, du_t^s \equiv (1 - u_{t-1}^{ss})\frac{s_t - s_{t-1}}{s_{t-1}} \tag{11}$$

The variance of the percentage change of the steady-state equilibrium unemployment is the sum of the covariance between du_t^{ss} and du_t^f and the covariance between du_t^{ss} and du_t^s:

$$Var(du_t^{ss}) = Cov(du_t^{ss}, du_t^f) + Cov(du_t^{ss}, du_t^s) \tag{12}$$

Table I shows the decomposition of unemployment using the three methodologies. Results for the different decompositions are very similar. If we look at weekly transition probabilities, the job-finding rate accounts for around twice as much unemployment volatility as the job-separation rate. These values are in line with the values found for the United States. Results for the monthly and quarterly frequency also indicate the relative importance of job-finding to unemployment volatility.

Table I: Unemployment decomposition, LFS 1996-2007

	Quarterly			Monthly			Weekly		
	Shimer	EMS	FR	Shimer	EMS	FR	Shimer	EMS	FR
u^{ss}	0.0057	0.117	0.00087	0.0057	0.118	0.00090	0.0220	0.118	0.00097
f	0.0031	0.066	0.00044	0.0037	0.078	0.00053	0.0039	0.083	0.00052
s	0.0023	0.048	0.00043	0.0018	0.039	0.00037	0.0017	0.035	0.00030

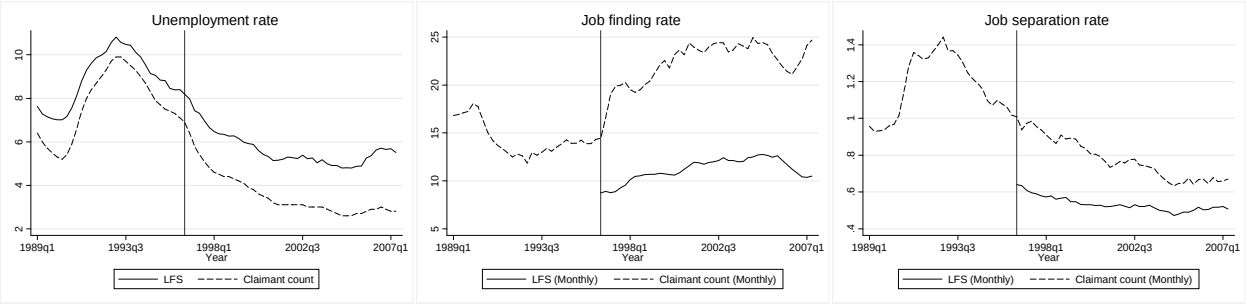
Note: the f and s refer to the contributions of job-finding rate and job-separation rate to volatility of unemployment u^{ss}. They are calculated according to the different methodologies. For Shimer, the values are the standard deviation of the detrended (HP filter $\lambda = 10^5$) steady-state unemployment and the two counterfactual steady-state unemployment rates. For Elsby *et al*, the values correspond to the standard deviation of the detrended (HP filter $\lambda = 10^5$) natural logarithm of steady-state unemployment rate, job-finding rate and job-separation rate. For Fujita and Ramey, the values correspond to the variance of du_t^{ss}, the covariance between du_t^{ss} and du_t^f and the covariance between du_t^{ss} and du_t^s. As the Fujita and Ramey decomposition is based on growth rates, no detrending is necessary.

5.3 Robustness analysis: claimant count data

One way to assess the robustness of the results is to redo the exercise using data generated at a monthly frequency. I use data on the claimant count unemployment outflows and inflows to calculate a proxy for job-finding and job-separation rates. This data covers the unemployed that are claiming unemployment benefits. It is provided by the ONS and is available at a monthly frequency since 1989. It is a proxy for two reasons. First, people registered in the claimant count are only a subset of the unemployed. Secondly, despite constituting the large majority, claimant count flows include not only flows between unemployment and employment but also include flows between unemployment and inactivity. Chart 10 shows a comparison between the unemployment rate, the monthly job-finding rate and the monthly job-separation rate based on the LFS and the ones calculated from the claimant count (three month average for the quarter).

We can see that the claimant count job finding and job separation rates are always higher than the

Chart 10: Comparison between LFS and claimant count data



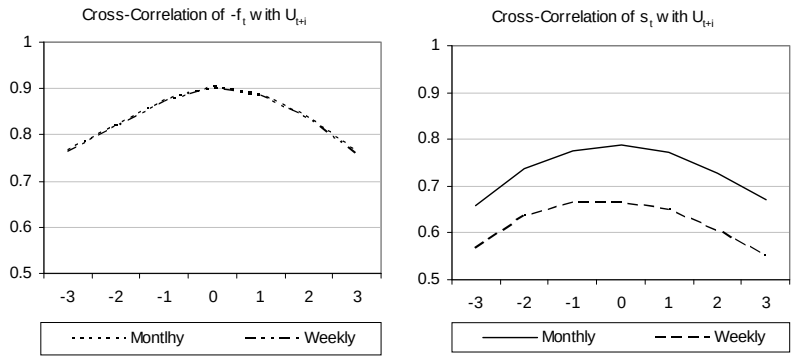
monthly transition probability calculated from the LFS. The job-finding rate is between 5 to 10 percentage points higher and job-separation rate between 0.2 and 0.6 percentage points higher. As discussed above, claimant count flows data also include flows into and from inactivity. These flows will bias the job-finding and separation rates upwards. The unemployed registered in the claimant count are a subset of total unemployment and have a more effective search mechanism but they are also more likely to lose their jobs and therefore have higher transition rates. In addition, the discrepancy in the results might be attributed to the time aggregation correction of the quarterly LFS data. If there are substantial differences in conditional transition probabilities, time aggregation correction might generate an incorrect series as discussed previously. Putting these issues aside, the correlations between the series are quite high: 0.97 between the unemployment rates, 0.92 between the job-separation rates and 0.80 between the job-finding rates.

Chart 11 shows the cross-correlations of monthly and weekly claimant count job-finding and job-separation rates with leads and lags of the unemployment rate.[11] Again, time aggregation bias correction reduces the correlation of job-separation rate with unemployment rate. Nevertheless both the job-finding rate and the job-separation rate have a very high correlation with the unemployment rate.

As previously mentioned, one of the limitations of the LFS data is that its reduced sample does not include any significant downturn. With the claimant count data we can go back to 1989,

[11] To compute the weekly job-finding and job-separation rates, as there is no information on the flows with inactivity, I solve the system of four non-linear equations (rewriting the monthly transition probabilities as a non-linear function of the four monthly transition probabilities). See details in appendix.

Chart 11: Cross-correlation of claimant count job-finding and job-separation rates with the unemployment rate



Note: the two graphs plot the cross-correlation of claimant count job-finding rate ($-f_t$) and job separation rate (s_t) with leads and lags of unemployment rate.

which allows us to capture the early 1990s recession. Table J displays the three decompositions of unemployment, for the same sample period used in the analysis of the LFS data, but also for the full sample and for the period between 1989:1 and 1999:4.

When we restrict the sample to 1996 onward the results are close to those of the LFS. Although there are larger differences across the three methods, the job-finding rate is between two and three times more important than the job-separation rate. When we analyse the unemployment decomposition with the full sample, the results change significantly. Even after the time aggregation correction for weekly frequency, the job-finding rate is only marginally more important than the job-separation rate (between 20% to 35% depending on the methodology). I find similar results when I restrict the period to the first ten years of the sample.

This evidence suggests that, although the job-finding rate has been more important than the job-separation rate over the past ten years, the job-separation rate played a crucial role during significant downturns, like the one in the early 1990s. This gives strength to the point made by Davis *et al* (2006) that changes in the job-separation rate explain most of the variation in unemployment during sharp recessions, whereas fluctuations of the job-finding rate are the focal element during mild economic slowdowns.

Table J: Unemployment decomposition, claimant count

	1989:1-2007:2			1989:1-1999:4			1996:1-2007:2		
	Shimer	EMS	FR	Shimer	EMS	FR	Shimer	EMS	FR
Monthly									
u^{ss}	0.0142	0.220	0.145	0.0177	0.263	0.203	0.0064	0.118	0.077
f	0.0068	0.133	0.077	0.0092	0.152	0.108	0.0040	0.101	0.061
s	0.0059	0.114	0.073	0.0086	0.141	0.090	0.0016	0.040	0.039
Weekly									
u^{ss}	0.0142	0.220	0.145	0.0177	0.263	0.203	0.0064	0.118	0.077
f	0.0073	0.143	0.083	0.0098	0.162	0.114	0.0044	0.109	0.067
s	0.0054	0.107	0.067	0.0081	0.133	0.083	0.0014	0.037	0.034

Note: the f and s refer to the contributions of job-finding rate and job-separation rate to volatility of unemployment u^{ss}. They are calculated according to the different methodologies. For Shimer, the values are the standard deviation of the detrended (HP filter $\lambda = 10^5$) steady-state unemployment and the two counterfactual steady-state unemployment rates. For Elsby *et al*, the values correspond to the standard deviation of the detrended (HP filter $\lambda = 10^5$) natural logarithm of steady-state unemployment rate, job-finding rate and job-separation rate. For Fujita and Ramey, the values correspond to the variance of du_t^{ss}, the covariance between du_t^{ss} and du_t^f and the covariance between du_t^{ss} and du_t^s. As the Fujita and Ramey decomposition is based on growth rates, no detrending is necessary.

6 Conclusion

The objective of this paper is to set out a number of stylised facts about the UK labour market flows using the LFS data for the period between 1996 and 2007. Although it is descriptive by nature, the main contribution of this paper is to provide a summary of a wide range of information about worker gross flows from several different angles. These facts might prove useful to researchers working on various spheres of the UK labour market. The main conclusions are:

- In each quarter, 7% of the working-age population change status between inactivity, employment and unemployment and 2.1% of the working-age population change their employer.
- Gross flows in and out of the three pools are countercyclical. In expansions, as the labour market becomes tighter there are fewer movements between the three pools.
- Unemployment to employment flows are countercyclical but the transition probability – the job-finding rate – is procyclical.
- Employment to unemployment flows are countercyclical too, as well as the transition probability – the job-separation rate.

- The cyclical behaviour of flows between inactivity and employment seem to have changed in recent years. Both flows and transition probabilities were acyclical until 2001 and became procyclical thereafter.
- Every quarter, 7% of all employees are searching for a different job. They are seven times more likely to change jobs than the ones that are not searching. Job-to-job transition probability is strongly procyclical, but the number of employees searching for a different job is countercyclical.
- *Resignations* are strongly procyclical, *involuntary separations* (layoffs) are countercyclical and separations for '*other reasons*' are acyclical. *Involuntary separations* dominate the employment to unemployment flows while 70% of all employment to inactivity flows occur because of '*other reasons*'.
- The inactive that *want a job* are twice as likely to move into the labour force and four times more likely to move into unemployment than the inactive that *do not want a job*.
- Some of the structural changes in the UK labour market seem to be due to changes in the education of the working-age population, particularly due to the increasing share of the highly educated.
- There are substantial differences in the employment, unemployment and inactivity rates of different education categories, as well as in transition probabilities. Individuals in the lowest education category face a three times higher unemployment and inactivity rate, twice as high separation rate and half the job-finding rate, than individuals in the highest education category.
- Close to 25% of total employment is public sector employment which, unlike private sector employment, is countercyclical. The separation rate is twice as high in the private sector as in the public sector. In contrast, both the unemployed and inactive are six times more likely to find a job in the private sector than in the public sector.
- The job-finding rate and job-separation rate are equally important determinants of unemployment fluctuations. The job-finding rate has been more important over the past ten years, but further analysis of claimant count data has revealed that the job-separation rate was particularly relevant in the period between 1989 and 1996.

In addition to theses facts, it is worth highlighting three other findings. First, I have found substantial disparities in conditional transition probabilities in the LFS. As a result, one should be cautious when comparing results from surveys carried out at different frequencies, which often

happens between the United States, United Kingdom and other European economies. One should also be careful when applying standard procedures like time aggregation correction, that rely on the implicit assumption of equality of conditional transition probabilities.

Second, the cyclical properties of the gross flows in the United Kingdom are similar to those found by other authors and consistent with the theory. One significant exception regards the percentage of employees searching for a different job. The standard model presented in Pissarides (2000) shows that the number of employees searching for a different job should be procyclical. In contrast, the empirical evidence shows that, during expansions, fewer employees are searching for a different job.

Finally, as in other studies, I found that the public sector employment rate is positively correlated with the unemployment rate. Nevertheless, it is not possible to determine which flows generate the countercyclicality of public sector employment. Both job-finding and job-separation rates have the same properties for both public and private sector employment.

Appendix: Time aggregation bias correction

When we use the claimant count data, there are only the transition rates between employment and unemployment p^q_{EE}, p^q_{EU}, p^q_{UE} and p^q_{UU}. If we consider that the person could have moved between the two categories within the quarter and if we considered constant monthly probabilities, we can write each one of the quarterly transition probabilities as a function of all the four monthly transition probabilities. For instance:

$$p^q_{EE} = p^m_{EE} \cdot p^m_{EE} \cdot p^m_{EE} + p^m_{EE} \cdot p^m_{EU} \cdot p^m_{UE} + p^m_{EU} \cdot p^m_{UE} \cdot p^m_{EE} + p^m_{EU} \cdot p^m_{UU} \cdot p^m_{UE}$$

$$p^q_{EU} = p^m_{EE} \cdot p^m_{EE} \cdot p^m_{EU} + p^m_{EE} \cdot p^m_{EU} \cdot p^m_{UU} + p^m_{EU} \cdot p^m_{UE} \cdot p^m_{EU} + p^m_{EU} \cdot p^m_{UU} \cdot p^m_{UU}$$

$$p^q_{UU} = p^m_{UU} \cdot p^m_{UU} \cdot p^m_{UU} + p^m_{UU} \cdot p^m_{UE} \cdot p^m_{EU} + p^m_{UE} \cdot p^m_{EU} \cdot p^m_{UU} + p^m_{UE} \cdot p^m_{EE} \cdot p^m_{EU}$$

$$p^q_{UE} = p^m_{UU} \cdot p^m_{UU} \cdot p^m_{UE} + p^m_{UU} \cdot p^m_{UE} \cdot p^m_{EE} + p^m_{UE} \cdot p^m_{EU} \cdot p^m_{UE} + p^m_{UE} \cdot p^m_{EE} \cdot p^m_{EE}$$

We can then calculate the monthly rates by solving this system of four non-linear equations.

When we use LFS data we have data on flows between the three states: employment, unemployment and inactivity. We have nine quarterly transition probabilities: p^q_{EE}, p^q_{EU}, p^q_{EI}, p^q_{UE}, p^q_{UU}, p^q_{UI}, p^q_{IE}, p^q_{IU} and p^q_{II}. If we consider that the person could have moved between all categories within the quarter and that the monthly probabilities are constant, we can write each one of the quarterly transition probabilities as a function of all monthly transition probabilities. For instance, the quarterly probability of staying in employment equals the sum of the probabilities of changing between any category during the three months within the quarter, but ending up with a job: $p^q_{EE} = p^m_{EE} \cdot p^m_{EE} \cdot p^m_{EE} + p^m_{EE} \cdot p^m_{EU} \cdot p^m_{UE} + p^m_{EE} \cdot p^m_{EI} \cdot p^m_{IE} + p^m_{EU} \cdot p^m_{UE} \cdot p^m_{EE} + p^m_{EU} \cdot p^m_{UU} \cdot p^m_{UE} + p^m_{EU} \cdot p^m_{UI} \cdot p^m_{IE} + p^m_{EI} \cdot p^m_{IE} \cdot p^m_{EE} + p^m_{EI} \cdot p^m_{IU} \cdot p^m_{UE} + p^m_{EI} \cdot p^m_{II} \cdot p^m_{IE}$.

After writing the nine non-linear equations, a conventional mathematical software, such as Matlab, easily solves the system. The problem is analagous for the weekly transition probabilities.

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