The extent and cyclicality of career changes: Evidence for the U.K. ☆

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A R T I C L E   I N F O

A B S T R A C T

Using quarterly data for the U.K. from 1993 through 2012, we document that the extent of worker reallocation across occupations or industries (a *career change*, in the parlance of this paper) is high and procyclical. This holds true after controlling for workers' previous labour market status and for changes in the composition of who gets hired over the business cycle. Our evidence suggests that a large part of this reallocation reflect excess churning in the labour market. We also find that the majority of career changes come with wage increases. During the economic expansion wage increases were typically larger for those who change careers than for those who do not. During the recession this is not true for career changers who were hired from unemployment. Our evidence suggests that understanding career changes over the business cycle is important for explaining labour market flows and the cyclicality of wage growth.

1. Introduction

One of the most important functions of the labour market is to pair the right set of workers with the right set of jobs. This assignment process, however, is slowed down by frictions that impede the reallocation of labour resources. For example, moving costs, re-training, learning about one's ability, information frictions about the location of workers or jobs, among others, can be important barriers for efficient resource reallocation. The result of these frictions is that we observe large concurrent flows of workers changing jobs directly from employer-to-employer as well as through spells of unemployment. As documented by Davis (1987) and Jolivet et al. (2006), among others, this excess churning is a common feature of all labour markets in OECD countries.

The extent of reallocation is not necessarily constant over the business cycle. In one view, recessions are times in which the labour market is "cleansed" by speeding up the reallocation of workers, something that was prevented from occurring by frictions during the proceeding expansions (See, for example, Lilien, 1982; Mortensen and Pissarides, 1994; Caballero and Hammour, 1994; Groshen and Potter, 2003; Jaimovich and Siu, 2014). This view is appealing because it provides a possible

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Percent
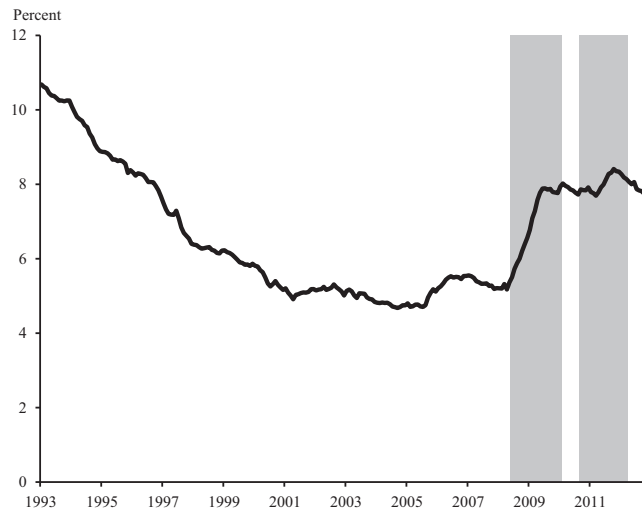
Fig. 1. Unemployment rate in the United Kingdom. Source: U.K. LFS. Recession-shading are U.K. recession dates from ECRI. Monthly data, seasonally adjusted, 3-month centered moving average.

explanation for why unemployment is persistently high in recessions. It simply takes workers time to switch, e.g., from jobs in industries and occupations for which demand is in secular decline to jobs in growing segments of the labour market.

However, this is not the only view of the reallocative effects of recessions. Barlevy (2002) argues that, since employment-to-employment transitions are large and procyclical, economic expansions, rather than recessions, are times in which labour resources tend to reallocate to better uses. In his view recessions have a "sullying" rather than "cleansing" effect on reallocation.

In this paper, we study two specific dimensions of reallocation: occupational and sectoral mobility of workers. If recessions have an important reallocative impact then occupational and sectoral mobility of workers are likely to be two important channels through which this reallocation occurs.[1] In this context we interpret a career as a sequence of jobs a worker has in the same industry and occupation. A career change is a case in which a worker changes employer and starts a new job in either a different industry or occupation from the one he or she was previously employed in.

We focus on career changes in the U.K labour market over the period from 1993 to 2012. The U.K. is an interesting country to look at for our purposes because it has one of the most flexible labour markets in Europe and exhibits one of the highest levels of worker turnover in the OECD (see Jolivet et al., 2006). This high level of turnover suggests that the U.K. labour market facilitates reallocation at a higher rate than those in other European countries.

Fig. 1 shows the evolution of the U.K. unemployment rate during the period that we study, from 1993 through 2013. It shows that this period can be split up into four distinct episodes. The first episode is a period of economic expansion until 2001, during which the unemployment rate declined by about 4 percentage points.[2] The second is a period of slow growth following 2001, when the U.K. economy skirted a recession and the unemployment rate blipped up marginally. The third episode is the economic expansion from 2002 until the start of the Great Recession in 2008, in which the unemployment rate remained centered around 5%.

Lastly, the Great Recession and its aftermath make up the final episode. Fig. 1 shows that the unemployment rate increased by 3 percentage points during that period. It is the *number* and *rate* of industry and occupation changes, as well as the associated wage changes, in this final episode that we compare with the earlier parts of our sample. For this, we use individual-level data from the U.K. Quarterly Labour Force Survey.

We present our evidence at two levels of detail. In the first part of our analysis we focus on aggregate patterns and uncover facts on (i) the extent of career changes in the labour market and (ii) how they fluctuate over the business cycle. In the second part we look closer at individual-level patterns that can shine a light on what drives these career changes. In this part we document (i) who change careers, (ii) which industries and occupations they come from and go to, and (iii) whether they do so at higher or lower wage gains than those who switch employers but stay in the same career. Five main findings emerge from our analysis of the U.K. Labour Force Survey.

The extent of career changes is high: A worker who changes employers has around a 50% chance of switching to another occupation or industry. The rates of career changes are remarkably similar for those that change employers with or without an intervening spell of non-employment. Career changes in large part reflect excess churning in the labour market: the actual net mobility across industries and occupations due to career switches only amounts to 10% and 15% of the overall

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[1] For example, Pissarides (2003) partly ascribes the persistent outward shift of the U.K. Beveridge curve in the early 1980s to delayed sectoral real-location in the wake of the fast decline of manufacturing that happened during the deep recession at the beginning of the decade.

[2] Recession dates are taken from Economic Cycle Research Institute (ECRI, 2014).

flows between occupations and industries respectively. This evidence on career mobility is in line with Longhi and Taylor (2011) who, using the same data source as us, find that the extent of occupational mobility in the U.K. is high.[3] The U.K. is not an exception. Industry and occupational mobility rates are also high in the United States (see Moscarini and Thomsson, 2007; Moscarini and Vella, 2008; Kambourov and Manovskii, 2008; Hobijn, 2012, for example.)

Career changes decrease in recessions: The total *number* of workers that change careers and the probability of a career change are procyclical. Moreover, for a worker, the *probability* of a career change is also procyclical, whether conditioning on changing employers directly, or on experiencing an intervening spell of non-participation, or a spell of unemployment. In this sense the cyclicality of career changes in the U.K. is similar to that in the U.S. For the U.S. Murphy and Topel (1987), Carrillo-Tudela et al. (2014), and Carrillo-Tudela and Visschers (2015) have all documented that the occupational and industry mobility is procyclical.[4] Moreover, just like in the U.S., excess churning in the U.K. is the main driver of the cyclicality of overall mobility across occupations or industries. This is because employer-to-employer transitions, that account for the bulk of this churning, are procyclical. Moscarini and Thomsson (2007), Moscarini and Vella (2008) and Kambourov and Manovskii (2008), document these dynamics for the U.S. labour market.

Characteristics of career changers: Career changes are more likely for (i) those workers actively searching for a job, (ii) those that made voluntary transitions (i.e. those who 'resigned' from jobs, or gave up for 'family or personal reasons', as opposed to those that were made 'redundant' or 'dismissed') and (iii) those workers that work part-time or as temps. Though models of on-the-job search with multiple job types (as in Pissarides, 1994; Akerlof et al., 1988; Barlevy, 2002; Menzio and Shi, 2011; Hagedorn and Manovskii, 2013; Moscarini and Postel-Vinay, 2013, among others) do not specifically focus on career changes, and do not include a formal occupational or industry choice, they do imply that quits are procyclical. Our evidence suggests that many of these quits in the U.K. result in career switches. This is, however, not only the case for employment-to-employment transitions. Career changes are also very common for hires out of non-employment. In terms of underlying demographics, young workers and women are more prone to change careers than their older and male counterparts. Even after accounting for these characteristics, the propensity to change careers for workers that start a new job remains procyclical. Thus, our results are not due to changes in the composition of who gets hired over the business cycle.

Career paths: Across occupations, career changes that involve an upgrade in the skill level are more likely through direct employer-to-employer transitions. On the contrary, career changes that involve a step down in skill level are more likely after spells of non-employment. Further, career changes tend to move workers from routine to non-routine employment. Our results also show that these movements did not accelerate during the Great Recession.

Wage changes upon career changes: The majority of career changes come with wage increases and these wage increases tend to be bigger than for those workers that change jobs but remain in the same career. The wage gains for those who got hired out of unemployment and changed occupations fell during the recession and became smaller than the wage gains of those who did not change occupations. Several studies have linked wage gains to employer-to-employer transitions (Akerlof et al., 1988; Hagedorn and Manovskii, 2013). Our evidence here suggests that such wage gains disproportionately get realized by workers changing careers rather than continuing in the same one.

These findings provide evidence as to which theories would be able to best explain labour market reallocation through occupational and industry mobility of workers.

Our evidence shows that outcomes for career changers are different from those who remain in the same career when changing jobs. This suggests that understanding career changes over the business cycle is important for explaining the cyclicality labour turnover and wage growth. Most current models of labour turnover, like those that allow for on-the-job search mentioned above, provide theories of why turnover is highly procyclical. Though these theories have heterogenous jobs, none of them explicitly considers a career change decision. Recent models, like Carrillo-Tudela et al. (2014) and Groes et al. (2015), do contain a career change margin and help us better understand the incidence of career changes over the business cycle and across the income distribution, respectively.

Taken together, the facts we document are consistent with the view that the Great Recession and its aftermath has affected workers across a large set of industries and occupations, with a broad-based shortfall in economic activity preventing workers from pursuing alternate careers at substantial wage gains. In this sense, our results are consistent with the "sullying" effect of recessions put forward by Barlevy (2002). Of course, career changes are only one form of reallocation of labour and other resources. Thus, our results do not imply that recessions have no cleansing effect at all but rather that such a cleansing is not happening through worker reallocation across occupations and industries. This is important, because it means we find little support in the U.K. data for recent theories of job polarization (Jaimovich and Siu, 2014) that point to occupational mobility between routine and non-routine jobs during recessions as the major driving force of the secular decline in routine jobs.

The rest of the paper is structured as follows. In the next section we discuss the Quarterly U.K. Labour Force Survey, the definitions of the main variables, as well as the level of aggregation of the industry and occupational classifications that we use. In Section 3 we present the aggregate evidence and focus on broad patterns in the level and cyclicality of career changes

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[3] We build on Longhi and Taylor (2011) by considering worker mobility across occupations *and* industries and their associated wage changes, taking into account three different labour market statuses and business cycle fluctuations.

[4] The present paper builds on our previous work by providing a more comprehensive evaluation of career changes and their implications for wage changes.
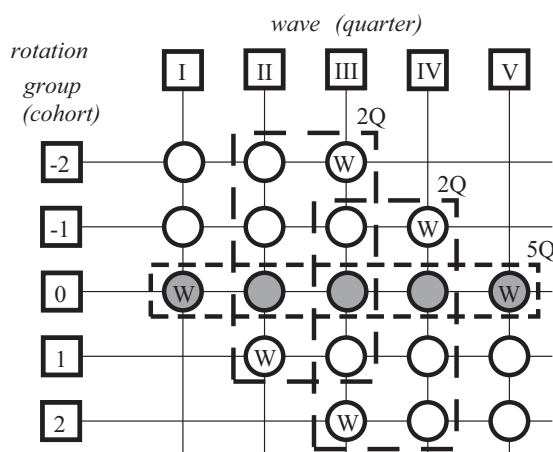
Fig. 2. Rotating panel structure of U.K. Quarterly Labour Force Survey.

Table 1
One-digit occupational codes.

SOC 1990	SOC 2000
1. Managers and administrators	1. Managers and senior officials[n]
2. Professional occupations	2. Professional occupations[n]
3. Associate professional occ.	3. Associate professional and technical occ.[n]
4. Clerical and secretarial occ.	4. Administrative and secretarial occ.[r]
5. Craft and related occupations	5. Skilled trades occupations[r]
6. Personal and protective service occ.	6. Personal service occupations[r]
7. Sales occupations	7. Sales and customer service occupations[r]
8. Plant and machine operatives	8. Process, plant and machine operatives[r]
9. Other occupations	9. Elementary occupations[r]

Note: *n* are non-routine occupations and *r* are routine occupations.

in the U.K. In Section 4 we present individual-level evidence and discuss what it suggests about the reasons for career switches. Finally, we end with a brief discussion of the theoretical implications of the facts we document in Section 5.

2. Data

The data we use are from the U.K. Quarterly Labour Force Survey (LFS) and cover the period 1993Q1–2012Q3. The LFS has a rotating panel structure, depicted in Fig. 2, in which individuals that live on the sampled address are followed for a maximum of 5 quarters, also referred to as waves. Each quarter, one-fifth of the sample of addresses is replaced by an incoming rotation group, or cohort. From this sample, we consider all male workers between 16 and 65 years of age and all female workers between 16 and 60 years of age with an ongoing career.[5]

In each wave, the respondents provide information about, among other things, their labour market status as well as their occupation and the industry they work in if they are employed. If non-employed, they provide the occupation and industry of their previous job.[6] Because we are interested in those workers who switch employers and potentially change careers, and because non-employed workers provide information on previous employment, we need observations on workers only for two consecutive quarters. Thus, we use the two-quarter (2Q) longitudinal sample of the LFS. Fig. 2 depicts two quarters of this sample as long-dashed rectangles, labeled "2Q". As can be seen from the figure, because of the rotating panel structure and sample attrition, the 2Q sample is smaller than the quarterly cross-section. It consists of about 60,000 individuals each quarter.[7]

Occupation and industrial classifications: To code occupations, the U.K. LFS uses the Standard Occupational Classification (SOC). The occupational coding system was redefined in 2001, from the SOC 1990 to the SOC 2000, which was used until the end of 2010. A drawback of this revision is that the SOC 1990 and SOC 2000 are not fully compatible. To reduce potential

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[5] We only include workers that provide information on occupation or industry.

[6] Note that around 10% of workers that start jobs with a new employer do not report information on occupation or industry. These are mainly young workers for whom this is, presumably, their first job.

[7] More information about the U.K. Quarterly Labour Force Survey can be found in Office for National Statistics (2011a, 2011b).

Table 2
Industry classification.

Homogenised SIC	
1. Agriculture, forestry	10. Financial intermediation
2. Fishing	11. Real estate, renting
3. Mining and quarrying	12. Public administration
4. Manufacturing	13. Education
5. Electricity, gas and water	14. Health and social work
6. Construction	15. Other community service activities
7. Wholesale and retail trade	16. Private households
8. Hotels and restaurants	17. Extra-territorial organisations and bodies
9. Transport, distribution	

incompatibility errors we focus on mobility across 1-digit or major occupational groups. These groups are listed in Table 1 for both the SOC 1990 and SOC 2000. At this level of aggregation, the disagreement between the two SOC is of 26.5%.

The disagreement between the two classifications introduces a level shift in some of the occupational series at the time of the switch from SOC 1990 to SOC 2000. To correct for this shift, we adjust all 5-quarter centered moving average series by running an OLS regression on the log of the corresponding series with respect to a linear time trend, the log of output per worker and a dummy which takes a value of zero before 2000Q4, and one after. We then use the coefficient estimate of the dummy variable (irrespectively if it was significant or not) to adjust the series up to 2000Q4.[8]

To code industries, the U.K. LFS uses the Standard Industrial Classification (SIC). In this case the U.K. LFS does provide homogenised industry information for workers for the entire sample period based on the SIC 1992.[9] We focus on industrial mobility on broad industrial sectors, which roughly corresponds to a one-digit aggregation level, with 17 categories displayed in Table 2.

Wage analysis: For the last part of our analysis, we also consider the change in wages when workers switch occupations or industries. The wage measure we use is the self-reported gross weekly earnings, deflated using the CPI. Individuals in the LFS only report their wages in the first and fifth waves. These are depicted by the circles labeled "W" in Fig. 2. Because they report their wages one year apart, we can calculate annual wage growth for these workers. However, to do so requires us to follow these workers for the full five quarters that they are in the LFS. This sample is known as the five-quarter longitudinal sample and is depicted by the short-dashed rectangle labeled "5Q" in the figure. This sample contains, on average, about 11,000 individuals. Using this sample we condition the wage analysis on employer changes through employment, unemployment or inactivity based only on uninterrupted spells.[10] We aggregate all these transitions to analyse the wage changes among all workers.

2.1. Level and probability of career changes

We record a *career change* when a worker changed employer *and* reported an occupation or industry in the new job that is different from the occupation or industry reported in the last job held. Then, what is flagged as a career change depends on the level of aggregation of the occupation and industry classifications used. Because we use the major occupation and industry classifications discussed above, the career changes we flag capture a substantial change in the nature of a worker's job.[11]

Since mobility across employers and careers can occur with or without intervening spells of non-employment, we analyse mobility across jobs by considering employment to employment (EE) transitions, unemployment to employment (UE) transitions, and inactivity (non-participant in the labour force) to employment (IE) transitions. We denote the labour market status of a worker in the quarter before he or she starts a new job as $S \in \{E, U, I\}$. Conditioning on labour market status history is informative, because it is a signal of the reason why a worker might decide to pursue a different career.

Throughout, we split the three types of flows, EE, UE, and IE, up by *career movers*, denoted by m, and *career stayers*, denoted by s. Career movers are those workers that work for a new employer in either a different occupation or industry as they worked in before. Career stayers are workers that start a new job in the same occupation and industry they worked in previously. In terms of this notation, EE_{t+1} is the total number of workers that move from one employer in quarter t to

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[8] There is no occupational information for 2001Q1. Moreover, because our sample is very short after 2010, such splicing is not possible for the latter period when the occupational definitions shifted to the SOC 2010. Consequently, we end the sample used to calculate results for occupations in 2010Q4.

[9] The U.K. LFS did not ask respondents about their industry of employment before 1994, and therefore our results for industries cover 1994–2012.

[10] That is, for employer-to-employer (EE) transitions, we consider workers with employment histories (within the 5-quarters) of $E_1E_2E_2E_2$, $E_1E_1E_2E_2E_2$, $E_1E_1E_1E_2E_2$, or $E_1E_1E_1E_1E_2$, where E_1 denotes the first employer and E_2 the second employer. For employment to unemployment to employment (EUE) transition, we consider workers with employment histories of $E_1UE_2E_2E_2$, $E_1E_1UE_2E_2$, $E_1E_1E_1UE_2$, $E_1UUE_2E_2$, or E_1UUUE_2, or $E_1E_1UUE_2$. For employment to non-participation to employment (EIE) transitions we consider employment histories with the same structure as for EUE transitions.

[11] Because of the address being the sampling unit of the LFS, we do not capture career changes in which people move to a different address. In that case they drop out of the sample. Moreover, given the quarterly nature of the data in the LFS, we are unable to record a worker's transitions within any given quarter and hence our estimates e.g. could miss jobs that begin and end within a quarter.

Table 3

Probability of career change, $HS^{(m)}$.

	Worker characteristics	Occupation	Industry
1.	**All workers**	0.49	0.53
2.	**Employed workers, $HE^{(m)}$**	0.47	0.52
3.	Voluntary mobility	0.48	0.52
4.	Involuntary mobility	0.44	0.51
5.	Active search	0.53	0.59
6.	Non-active search	0.46	0.49
7.	**Unemployed workers, $HU^{(m)}$**	0.51	0.56
8.	Unemp duration $< 2Q$	0.50	0.54
9.	Unemp duration $\geq 2Q$	0.56	0.61
10.	**Inactive workers, $HI^{(m)}$**	0.49	0.50
11.	Want a job	0.50	0.52
12.	Don't want a job	0.47	0.48

Note: Shares reported are averages over all quarters in 1993Q1–2012Q3 sample for which data are available.

another in quarter $t+1$, $EE_{t+1}^{(m)}$ is the number of those workers who are career *movers*, and $EE_{t+1}^{(s)}$ is the number of career *stayers*.[12]

These definitions allow us to consider the quarterly proportion of all new hires that experienced a change in occupation or industry in period $t+1$, given that in period t their labour market state was $S \in \{E, U, I\}$. Namely,

$$HS_t^{(m)} = \frac{SE_{t+1}^{(m)}}{SE_{t+1}}. \tag{1}$$

Aggregating over all three labour market statuses, $S \in \{E, U, I\}$, we obtain that the proportion of total hires that are career movers is given by

$$H_t^{(m)} = \frac{UE_{t+1}^{(m)} + IE_{t+1}^{(m)} + EE_{t+1}^{(m)}}{UE_{t+1} + IE_{t+1} + EE_{t+1}}. \tag{2}$$

We use these measures as estimates of the probability of a career change conditional on starting a new job, the previous labour market status, and being in an ongoing career. The levels of the flows and these estimated career change probabilities are the main statistics we focus on in our analysis. That is, we focus on two measures of the incidence of career changes. The *levels*, $SE_t^{(m)}$ for $S \in \{E, U, I\}$, inform us about the extent of reallocation going on in the economy, while the *rates*, $HS_t^{(m)}$ for $S \in \{E, U, I\}$, approximate the probabilities that individual workers switch careers conditional on getting hired out of a particular labor market status.

2.2. Net mobility

Theories that emphasize the cleansing effect of recessions on the labour market emphasize how downturns accelerate the shift in labour market resources from segments that are in structural decline to those that are on a positive long-run trend. These are theories that focus on the net mobility of workers across professions and sectors.

Net mobility is given by

$$NM_t = \sum_{i=1}^{K} |I_{i,t} - O_{i,t}|, \tag{3}$$

where $I_{i,t}$ is the number of career movers that start a new career in sector (or occupation), i. Similarly, $O_{i,t}$ is the number of workers that leave sector (or occupation) i to pursue a different career.

To put this net mobility in the context of the magnitude of overall flows in the labour market, we follow Davis and Haltiwanger (1992) and analyze excess reallocation. That is, we quantify by how much the total gross reallocation measured by the flows introduced in the previous subsection exceeds the minimum flows needed to achieve the net shift in the observed allocation of workers across occupations and industries.

In particular, we use the following proxy of the fraction of gross reallocation needed to achieve the net reallocation in the data. This net mobility rate, nm_t, is defined as

$$nm_t = \sum_{i=1}^{K} \left[\frac{|I_{i,t} - O_{i,t}|}{I_{i,t} + O_{i,t}} \right] \omega_{i,t}, \tag{4}$$

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[12] We similarly define UE_t, $UE_t^{(m)}$, $UE_t^{(s)}$, IE_t, $IE_t^{(m)}$, and $IE_t^{(s)}$.

where we weigh the sector (or occupation) specific flows by the employment share of the respective industry or occupation at time t, $\omega_{i,t}$. Our data allow us to compute separate quarterly series, NM_t and nm_t, for occupations and industries.

3. The extent and cyclicality of career changes

In this section we investigate both the level as well as the cyclical fluctuations of the incidence of career changes in the U. K. labour market. In the first subsection we focus on the level and report long-run averages over our whole sample period. In the second subsection we shift our focus to how the prevalence of career changes moves over the business cycle.

3.1. Long-run averages

The U.K. labour market displays a surprising degree of churning. Over our sample period, the sum of career movers and stayers is on average 1.3 million per quarter. This amounts to 4.5% of the U.K.'s working age population. Of those who get hired and have a previous career, 43% come directly from a previous employer, 29% are hired out of unemployment, and 29% were out of the labour force. These numbers are in line with Gomes (2012).

What is even more striking is the high share of these hires that involve a career change. Table 3 shows the average fraction of these hires that we classify as a career change. As can be seen from the top row of the table, 49% of those workers with a previous career who start a new job do so in a different (major) occupation from which they worked in before. This fraction is even higher for industries, for which the majority, 53%, of such hires involve a switch in major industry.

The similarities in the extent of career changes across occupations or industries arises mostly because the majority of career movers change occupations and industries at the same time. For example, on average 75% of workers who changed occupations also changed industries and 70% of workers who changed industries also changed occupations.

Though high, these numbers are in line with evidence for the United States. For example, Carrillo-Tudela et al. (2014), using data from the Current Population Survey, and Carrillo-Tudela and Visschers (2015), who rely on the Survey of Income and Program Participation, both find that about half of the hires in the United States involve a career change as well.

One caveat is important to note. Reporting errors, more so for occupations than for industries, are common in surveys like the U.K. LFS. If estimates from other datasets are applied to our results for the U.K. LFS, then, maybe even as much as a quarter, of the career moves that we measure could be due to workers misreporting their occupation and/or industry in the survey.[13] However, even if this is true, this would still mean that about a third of all hires of persons with previous work experience involves them changing either the industry or profession that they work in. Even after such a drastic downward adjustment, this would imply that more than one percent of the U.K. working age population switches careers every quarter.

Rows 2 and up of Table 3 list the probability of a career change conditional on the labour market status of the worker in the quarter before she or he starts a new job. As can be seen from the table, the average probability of a career change is around 50% for each of these types of hires.

Two groups of workers stand out as having a higher probability of switching careers than others. The first consists of workers who make an *EE* transition and who actively searched for the new position in the old job. These are more likely workers who actively pursue a voluntary change in their career path. To be specific, career or job changes are categorised as *voluntary* when workers report in the LFS that they left their previous employer because they "resigned", went to "education or training" or "gave up for family or personal reasons". *Involuntary* career or job changes are made by those workers who left their last job because they were "dismissed", "made redundant/took voluntary redundancy", "temporary job finished" and "gave up work for health reasons". Finally, workers in the *other* group are those who left their last job because they "took early retirement", "retired" and due to "other reasons".[14] Active search encompasses all activities that involve the worker to contact or actively pursue job opportunities rather than browse job opportunities that are available. This is the definition of job search that defines a person without a job as being unemployed. The specific LFS answers that result in a person being classified as an active searcher are listed in the Appendix.

The second group of workers with a higher probability of moving to a different career are those who were unemployed for two quarters or more in the quarter before they started their new jobs. These transitions most likely reflect involuntary career decisions that occur in long spells of unemployment. Such career changes are often emphasized as driving up the natural rate of unemployment in the short-run in the wake of a recession due to mismatch in the labour market. Recent studies show that mismatch can only account for a small part of overall fluctuations in the unemployment rate.[15]

Most studies of mismatch in the labour market compare the composition of job openings by industry and occupation with the composition of the pool of unemployed workers. This assumes that it is the pool of unemployed workers that are required to make all the adjustments to make the skill composition of the labour supply adjust to the composition of skills

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[13] Mellow and Sider (1983) estimate a misreporting rate of about 20% for major occupations and 8% for major industry sector in the Current Population Survey for the U.S. Lynn and Sala (2006) find similar misreporting rates for the BHPS in the U.K.

[14] Overall, voluntary employer changes account for 48% of total *EE* transitions, while involuntary employer changes account for 24% and the remainder by the 'other' category. From those employed workers that experienced a voluntary or involuntary separation, over 85% found another job without an intervening spell of non-employment.

[15] See, for example, Smith (2012) and Patterson et al. (2013) for a quantitative analysis of this type of mismatch in the U.K.

a

Workers per quarter (thousand)


b

Workers per quarter (thousand)
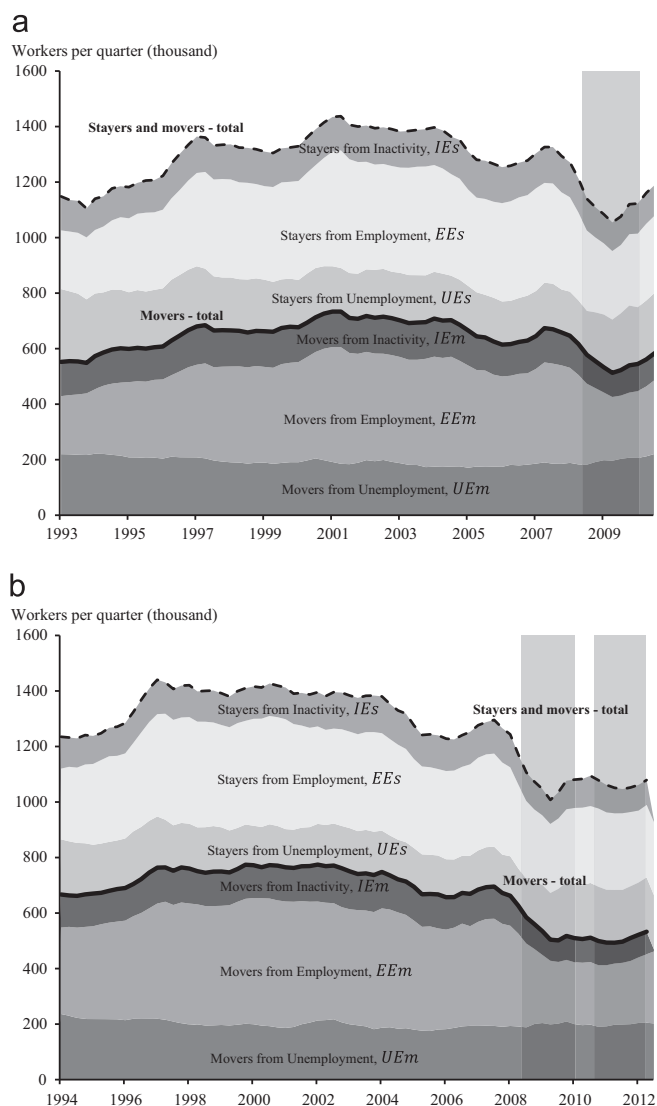
Fig. 3. Hires of workers with ongoing careers, by career movers and stayers. Source: U.K. LFS and authors calculations. Recession-shading are U.K. recession dates from ECRI. Quarterly series, centered 5-quarter moving averages. (a) Occupations and (b) Industries.

demanded. It turns out that more than half of the workers that get hired out of unemployment end up making such an adjustment. Moreover, our results suggest that the large number of *EE* career switchers helps to accelerate this adjustment process.

By providing a measure of the gap between the skill requirements needed to fill the stock of job openings and the skill composition of the pool of unemployed, measures of mismatch are a proxy for the *net* amount of reallocation needed in the labour market to equilibrate the supply of and demand for skills. However, gross mobility between careers far exceeds net mobility. The average net mobility rates, nm_t, over our sample period are 10% for occupations and 13% across industries.[16] This echoes the findings for the U.S. of Jovanovic and Moffitt (1990), Kambourov and Manovskii (2008) and Auray et al. (2014), who show that net mobility accounts for only a small proportion of gross mobility across industries and occupations.

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[16] The small contribution of net mobility is also present when considering transitions only through unemployment or only through employment. For the former case, the average net mobility rates are 17% for occupations and 20% for industries; while for the latter the rates are 12% for occupations and 15% for industries.

a

Fraction of hires

b

Fraction of hires
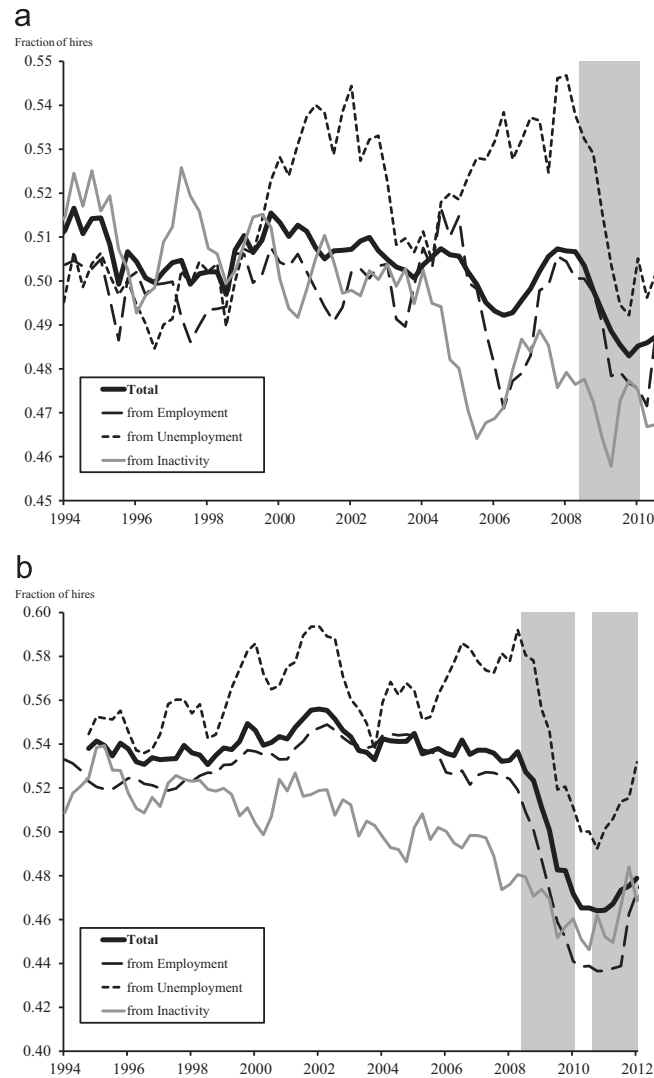
Fig. 4. Probability of career change: *Hm*, and *HSm* for $S \in \{U, E, I\}$. Source: U.K. LFS and authors calculations. Recession-shading are U.K. recession dates from ECRI. Quarterly series, centered 5-quarter moving averages. (a) Occupations and (b) Industries.

3.2. Cyclical fluctuations

Whether recession are times of accelerated or of relatively slow reallocation in the labour market can, of course, not be gleaned from the long-run averages we reported so far. To answer this question we now present evidence on the fluctuations, in deviation from these averages, in the extent and probabilities of career changes over our sample period.

The evidence on the extent of career changes is depicted in Fig. 3.[17] It plots the six types of hires of workers with ongoing careers. The bottom three shaded areas are the career movers coming from unemployment, $UE^{(m)}$, employment, $EE^{(m)}$, and inactivity, $IE^{(m)}$, respectively. The top three shaded areas plot the same flows but then for career stayers instead. The solid line in the middle is the number of career movers in the quarter, while the dashed line on top is the sum of career movers and stayers.

The first thing to take away from this figure is that overall turnover for workers with previous work experience is procyclical. This can be seen from the fact that the dashed line in the figure follows almost exactly the reverse pattern as the unemployment rate in Fig. 1. The procyclicality of turnover in our data is mainly driven by people who move directly from one employer to another employer, i.e. by $EE^{(m)}$ and $EE^{(s)}$. As can be seen from Fig. 3, the bulk of the hires of workers with an

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[17] Throughout we show time series that are 5-quarter *centered* moving averages. Though this allows for symmetric centering, it could induce residual seasonality in our time series. However, tests for such seasonality do not reject the null hypothesis of its absence.

Workers per quarter (Thousand)
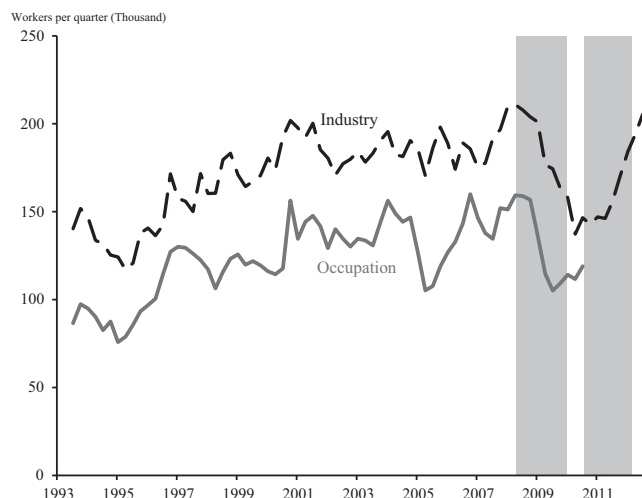
Fig. 5. Net mobility, NM_t, for career changes to different occupations and industries. Source: U.K. LFS. Recession-shading are U.K. recession dates from ECRI. Quarterly data, 5-month centered moving average.

ongoing career are *EE* hires. This is consistent with the turnover estimates for the U.K. in Hobijn and Şahin (2013) and for the United States.[18]

The solid line in Fig. 3 reveals that, just like overall turnover, the number of career changes is procyclical. Employer-to-employer transitions, $EE^{(m)}$, also make up the majority of career changes. The main driving force behind the incidence of career changes over the business cycle is that the number of workers that change employers to pursue a different career declines substantially when the unemployment rate spikes.

This force is partly offset by the fact that the number of workers that change careers after a spell of unemployment increases during and in the wake of recessions. However, in the aftermath of the Great Recession this uptick in career changes after unemployment, $UE^{(m)}$, was rather small. It pales in comparison to the decline in $EE^{(m)}$ flows during the same period and thus contributed very little to the fluctuations in reallocation in the labour market over the last business cycle.

Moreover, if one compares the number of $UE^{(m)}$ and $UE^{(s)}$ transitions in Fig. 3, one can see that the number of workers that find a job after being unemployed and remain in the same career increases more during recessions than the number of unemployed that end up taking a job in a different industry or occupation. This suggests that the probability of a career change for those workers hired out of unemployment actually declines rather than increases during the recession.

This is shown to be the case in Fig. 4. It plots the time series of the unconditional probability of a career change for hires with previous work experience, $H^{(m)}$, as well as this probability conditional on what labour market state they were hired from, i.e. $HS^{(m)}$ for $S \in \{U, E, I\}$. The bold line in the figure shows that $H^{(m)}$ declined during the recession for both occupation and industry changes. This decline is starker for changes across industries, shown in panel (b), than for changes across occupations, in panel (a). The short-dashed line is the probability that a hire out of unemployment changes careers. This probability also declined substantially during the Great Recession.

Above, we have focused on comparing the Great Recession with the previous episodes in the data. The procyclicality of the level and probability of career changes that we documented, however, is also robust to other ways of business cycle accounting. For example, it also shows up if one uses the Hodrick and Prescott (1997) filter to distinguish between trend and cycle in the unemployment rate and the time series plotted in Figs. 3 and 4.[19]

One possible explanation for the procyclicality of the propensity to change careers out of unemployment is the increased incidence of workers being recalled to their previous job during downturns. For example, Fujita and Moscarini (2012) find that, in the U.S., those workers that become unemployed after being permanently separated from their previous jobs are much more likely to make an occupational change than those that were on layoff and recalled within 3 months. However, in the UK such recall practice is minimal and, hence, is thus not likely to affect the results presented here.

What could be more pertinent is that, on the supply side, those workers who get laid off in recessions would first look for a job that is similar to the one they lost and only slowly broaden their search.[20] However, as Carrillo-Tudela et al. (2014) argue, workers take into account that they may be less likely to start a particularly successful career path during a recession, which reduces their incentives to change careers at any duration.

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[18] See Lazear and Spletzer (2012) for evidence for the United States, for example.

[19] It also shows up when regressing the log of these series with respect to a constant, the log of output per worker or of the unemployment rate and a time trend.

[20] Indeed, the number of unemployed workers who found a job after an unemployment spell of less than 6 months and changed careers actually decreased during the Great Recession.
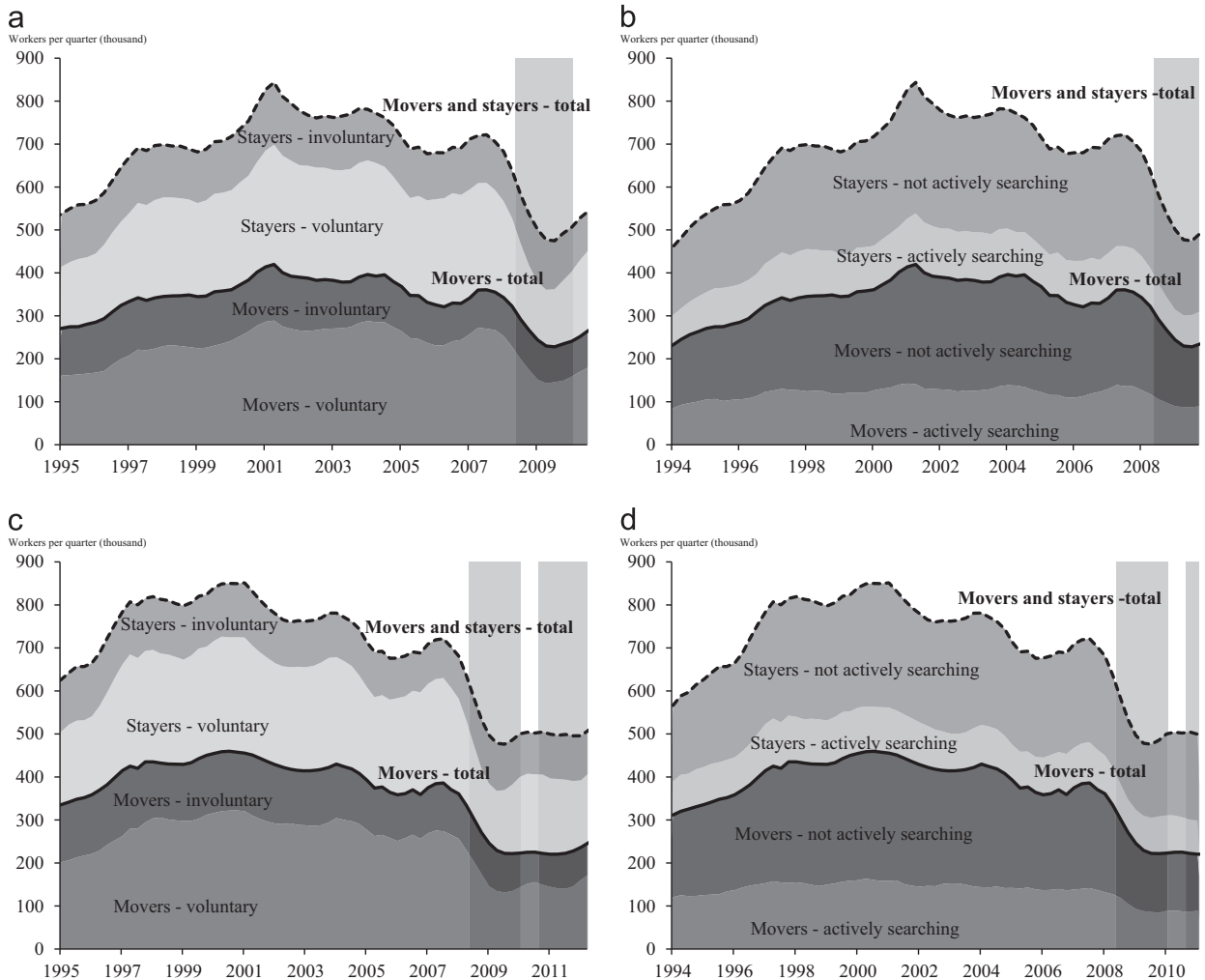
Fig. 6. Composition of *EE* by movers, stayers, and whether job transition was voluntary or result of active search. (a) Occupations, voluntary or not, (b) Occupations, active search or not, (c) Industries, voluntary or not and (d) Industries, active search or not.

On the labour demand side, because of the increased size of the pool of unemployed workers in recessions, employers would be more likely to find candidates that more closely match the career profile they are looking for. Some studies, like Ravenna and Walsh (2012) and Sedláček (2014), suggest that employers also get more selective in their hiring practices during downturns. Such an increase in the pickiness of employers about who they hire in downturns also affects the opportunities of those who are employed and are looking to change jobs and pursue a different career. These effects could result in a decline in the fraction of *EE* transitions that result in a switch in industry or occupation during recessions, as can be seen from the long-dashed line in Fig. 4.

Another way to gauge the relative importance of these effects is to look at the fluctuations in net mobility, *NM*, over the business cycle. Net mobility for both occupations and industries is plotted in Fig. 5. If recessions had a major "cleansing" effect that resulted in a substantial shift in workers from occupations and industries in secular decline to those for which demand is booming, then net mobility would increase during the recession as well during the subsequent recovery. This is because during the recovery workers would, gradually perhaps, find jobs in careers different from those that they were in before. It is exactly this slow adjustment during the recovery that is often pointed to as a source of the jobless recoveries from the last three recessions in the U.S. (Groshen and Potter, 2003; Jaimovich and Siu, 2014).

However, as Fig. 5 shows, there is no such persistent spike in net mobility. Net mobility briefly went up at the onset of the Great Recession, but then declined to levels rather lower than typical values in the period 2001–2008Q1. While the early rise coincided with the wave of layoffs described by Elsby and Smith (2010), by the end of the recession net mobility rate had fallen deeply, however. From this low level, net sectoral mobility started to increase again during the 2010–2011 recession, only reaching pre-recession levels at the end of the second recession. The increase in net mobility in 2010 and 2011 is mainly due to workers flowing towards services sectors. The main contributors to this increase are all in the service

a

Fraction of hires

b

Fraction of hires
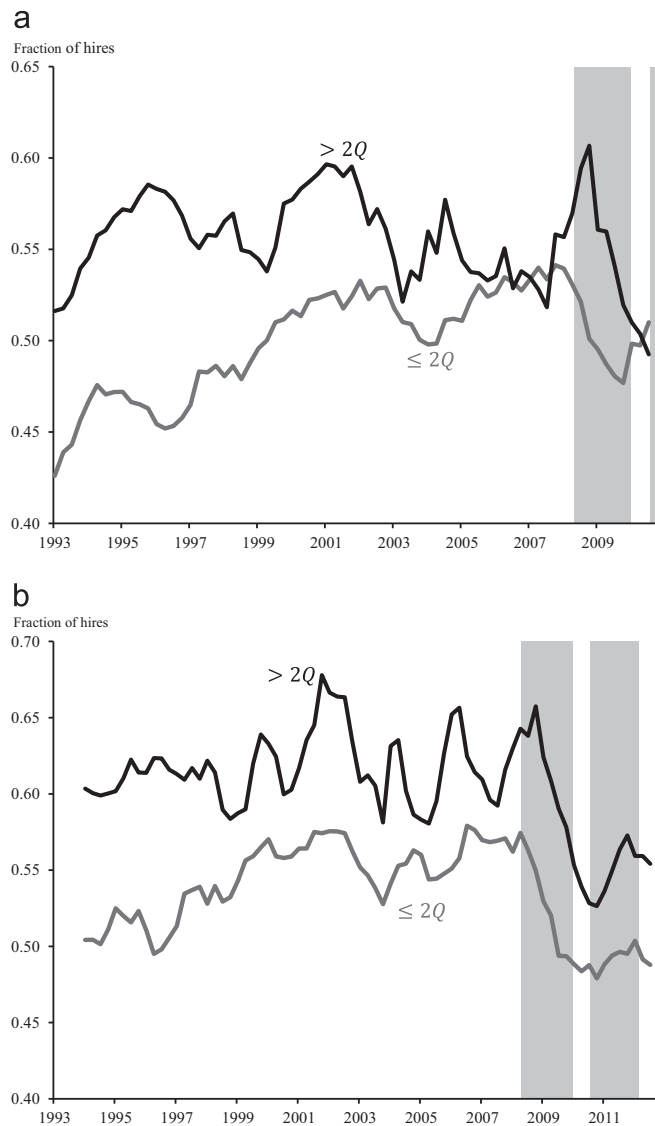
Fig. 7. *HUm* for workers finding jobs after spells shorter and longer than 2 quarters. Source: U.K. LFS and authors calculations. Recession-shading are U.K. recession dates from ECRI. Quarterly series, centered 5-quarter moving averages. (a) Occupations and (b) Industries.

sector (in order of importance): (i) Real estate, renting and business activities; (ii) Health and social work; (iii) Education; (iv) Wholesale and Retail Trade including Repairs; and (v) Transport, storage and distribution.

This evidence on net mobility, together with that on the level and probability of career changes presented above, is in line with Barlevy's (2002) interpretation of the role of business cycle for labour market dynamics, here for career changes, rather than job changes. He argues that, because labour turnover is higher during expansions than during downturns, the reallocation of labour market resources is procyclical rather than countercyclical.

Our interpretation of the above results is that, in terms of worker reallocation across occupations and industries, recessions do *not* appear to be times of accelerated labour market reallocation which is prevented from happening during expansions due to frictions. Instead, in a recession, workers seem to stay put in their respective occupations and industries when labour market opportunities for them dry up during downturns.

4. Career changes: why, who, where, and at what wage gains?

In this section we dive into the details underlying these aggregates and use additional information from the U.K. LFS to analyse the reasons for the career changes, who changes careers, what they do before and after the career change, and how

Table 4
Probit estimates for *Hm*.

Dependent variable: Hire results in career change, $Y_i = 1$, or not, $Y_i = 0$.

	Independent variables	Occupations 1993–2010				Industries 1994–2012			
		All	E	U	I	All	E	U	I
		I	II	III	IV	V	VI	VII	VIII
1.	agg urate	−0.59***	−1.10***	−0.79**	−0.24	−1.38***	−1.83***	−1.64***	−0.44
2.	reg-agg urate	−0.59***	−0.53	−1.10**	−0.27	−0.41*	−0.51	−0.57	0.23
3.	age	−0.01***	−0.01***	−0.01***	0.00	−0.01***	−0.01***	−0.01***	0.01**
4.	age²	0.06***	0.10***	0.08***	−0.09***	0.05***	0.12***	0.06**	−0.12***
5.	mar/cohab	−0.03***	−0.02***	−0.03***	−0.02*	−0.03***	−0.02**	−0.02*	−0.02*
6.	nchild	−0.00	−0.01*	−0.01	0.00	−0.00	0.002	−0.01	−0.00
7.	spell dur		−0.002	0.03***			−0.01***	0.03***	
8.	female	0.01**	0.02***	−0.01	0.002	0.07***	0.07***	0.06***	0.03***
9.	high skilled	0.03***	0.01	0.04***	0.01	−0.05***	−0.08***	−0.00	−0.04**
10.	med skilled	0.02***	0.01	0.03***	−0.001	−0.01***	−0.03***	0.02**	−0.02**
11.	ft job	−0.04***	−0.01*	−0.07***	−0.04***	−0.04***	−0.04***	−0.04***	−0.07***
12.	temporary	0.02***	0.06***	−0.03***	0.01	0.04***	0.08***	−0.01	0.01
13.	unemployed	0.04***				0.03***			
14.	inactive	−0.01**				−0.06***			
15.	invol		−0.03***				−0.02**		
16.	other		−0.02***				−0.03***		
17.	job centre		0.02				0.09***		
18.	ads		0.07***	0.02***			0.10***	0.02*	
19.	direct app		0.03*	−0.03**			0.02	−0.08***	
20.	family/friend		0.04**	−0.04***			0.02	−0.07***	
21.	other method		0.04**	−0.01			0.02	−0.04**	
22.	want a job				0.03***				0.05***
23.	no. of obs.	77,303	34,272	19,619	14,298	83,995	37,210	21,458	15,103
24.	pseudo-R²	0.023	0.040	0.023	0.034	0.035	0.051	0.031	0.040

Note: Sample includes all hires of workers with a previous career in our sample. Regional and previous occ/ind dummies included in all specifications. Coefficients reported are marginal probabilities and the one for age² is multiplied by 1000.
  * Significance level: $p < 0.10$.
  ** Significance level: $p < 0.05$.
  *** Significance level: $p < 0.01$.

the change affects their wages. This turns out to yield further evidence supportive of the "sullying effect" of recessions through the lenses of career changes.

4.1. Reasons for career change

Unfortunately, the U.K. LFS survey does not directly ask respondents who take jobs in a different occupation or industry about the specific reason for their career change. However, some of the questions asked allow us to indirectly infer some of the potential reasons. In particular, we revisit the questions we first focused on in Table 3. That is, for those who move directly from one employer to another we consider whether this move was voluntary and whether or not they had been actively searching for a job before they switched. For those who were unemployed in the quarter before they started their new job, we consider the duration of their unemployment spell in that quarter.

Because *EE* flows account for the bulk of the turnover in Fig. 3, we focus on the evidence for this switchers first. Fig. 6 divides up the *EE* flows into movers and stayers and classifies them by whether or not they made a voluntary *EE* switch, panels (a) and (c), and by whether they were actively searching on the job before they made the switch, panels (b) and (d).

The first thing that stands out from the figure is that the bulk of *EE* transitions are voluntary. Moreover, the vast majority of *EE* transitions is not the result of the worker actively searching for another job but rather of the worker getting a job offer without searching. We interpret these two facts as suggesting that a lot of job changes are voluntary quits that could occur as result of employers contacting workers. Recent evidence for the U.S. also shows that many workers get hired without ever reporting to be actively looking for a job (see Topa et al., 2014; Carrillo-Tudela and Visschers, 2015, for example).

It is the procyclicality of this type of hires that makes labour turnover move with the business cycle. This is also the type of hire that accounts for the procyclicality of $EE^{(m)}$ flows. This can be seen from the fluctuations in the numbers of voluntary movers, in panels (a) and (c), and of movers that did not actively search for a job, in panels (b) and (d). Thus, Figs. 3 and 6 jointly point to voluntary *EE* career changes due to workers being recruited for rather than finding a new job as the main driving force behind the procyclicality of career changes.

This type of voluntary job and career switches occurs side by side to those that are the result of workers being displaced and changing careers after a spell of unemployment. Fig. 7 splits up the probability of a career change for hires out of unemployment, $HU^{(m)}$ plotted as the short-dashed line in Fig. 4, by whether the worker was unemployed for less or more than 2-quarters before finding a new job. These two series are denoted by $\leq 2Q$ and $> 2Q$ respectively.

Comparing the $\leq 2Q$ and $> 2Q$ probabilities in the figure for the entire period, it is clear that those who are unemployed for longer change careers more frequently. This is consistent with the finding of Faberman and Kudlyak (2012), who, using data from an on-line job-search website, find that workers apply more to vacancies outside their usual occupational field as their spell duration increases.

What is surprising is that the decline in $HU^{(m)}$ in Fig. 4 is not only because those who find a job after a short unemployment spell in the recession are more likely to find a job similar to the one they had before. Even the probability of a career change for those with unemployment spells longer than two quarters declined during the Great Recession.[21]

This contrasts with the common perception, as expressed in Jaimovich and Siu (2014), that recessions are times of accelerated involuntary structural transformation. During such times a large number of workers supposedly gets displaced from jobs that will never come back and thus are forced to look for and take jobs in sectors and occupations different from those they worked in before.

One possible explanation for why the incidence of career changes among hires out of unemployment does not spike in the recession is that workers that get displaced from jobs that are in secular decline might decide to drop out of the labour force rather than to switch careers. This is especially a concern in the United States, where the labour force participation rate dropped by more than 3 percentage points in the five years after the start of the Great Recession.[22] Such flows to inactivity, however, are not likely to be important in the U.K. where the labour force participation rate actually increased between 2007 and 2012.

4.2. Who changes careers?

Of course, the discussion in the previous subsection focuses on the Great Recession versus the rest of the sample. In addition, the evidence presented does not condition on other factors that might be correlated with the variables used to proxy for different reasons for a career change. Here we show that the procyclicality of the probability of career changes, shown in Figs. 4 and 7, is statistically significant even if one considers the whole sample and also corrects for factors that affect the probability of a career switch.

We do so by presenting Probit estimates derived from a model where the dependent variable is whether or not the hire of a worker with previous work experience results in a career change. The explanatory variables include a set of worker

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[21] At the beginning of the recession, looking at occupations, there is a temporary increase in the probability of an career change among those workers who, at that point, found a job after being unemployed for more than 2 quarters. Note that at this early moment in the recession, only few workers are covered by this statistic, and (or because) a large part of them have entered unemployed before the start of the recession. Instead, for the typical long-term unemployed of the Great Recession, who will only find a job after the second quarter of 2008, the probability of a career change is decreased substantially relative to its average value.

[22] See Daly et al. (2012), for example, for discussion of the decline of the U.S. labour force participation rate.

Table 5
Transition matrix: occupations.

| From	To	High skill			Medium skill			Low skill		Misc.
		Managers	Professional occupations	Associate Profes-sional technical occ	Clerical/admin secretarial occ	Sales occupations	Personal serv. occupations	Craft/skilled trade related occ	Plant and machine operatives	Elementary/other occupations
		1.	2.	3.	4.	5.	6.	7.	8.	9.
1. **Managers**	**Total**	**0.46**	**0.07**	**0.10**	**0.11**	**0.08**	**0.05**	**0.04**	**0.04**	**0.05**
	EE	0.53	0.07	0.10	0.10	0.07	0.03	0.04	0.03	0.04
	UE	0.38	0.06	0.11	0.14	0.09	0.06	0.04	0.05	0.07
	IE	0.38	0.08	0.10	0.13	0.09	0.07	0.04	0.04	0.07
2. **Professional occupations**	**Total**	**0.07**	**0.68**	**0.08**	**0.05**	**0.02**	**0.03**	**0.02**	**0.01**	**0.02**
	EE	0.09	0.71	0.08	0.04	0.02	0.02	0.02	0.01	0.01
	UE	0.07	0.60	0.11	0.06	0.04	0.04	0.03	0.03	0.04
	IE	0.04	0.68	0.07	0.07	0.02	0.04	0.03	0.01	0.03
3. **Asscociate profes-sional technical occ**	**Total**	**0.09**	**0.09**	**0.50**	**0.10**	**0.06**	**0.05**	**0.03**	**0.03**	**0.05**
	EE	0.10	0.09	0.54	0.09	0.05	0.05	0.03	0.02	0.04
	UE	0.07	0.09	0.44	0.12	0.08	0.05	0.04	0.04	0.07
	IE	0.05	0.07	0.50	0.12	0.07	0.06	0.03	0.03	0.06
4. **Clerical/admin secretarial occ**	**Total**	**0.06**	**0.03**	**0.07**	**0.54**	**0.10**	**0.07**	**0.02**	**0.03**	**0.07**
	EE	0.08	0.03	0.08	0.58	0.09	0.05	0.02	0.03	0.05
	UE	0.04	0.03	0.07	0.50	0.12	0.07	0.03	0.04	0.09
	IE	0.05	0.04	0.06	0.50	0.11	0.11	0.02	0.02	0.10
5. **Sales occupations**	**Total**	**0.05**	**0.02**	**0.06**	**0.16**	**0.39**	**0.10**	**0.03**	**0.04**	**0.14**
	EE	0.06	0.02	0.07	0.18	0.37	0.11	0.03	0.04	0.12
	UE	0.04	0.02	0.06	0.15	0.41	0.09	0.03	0.05	0.16
	IE	0.03	0.03	0.05	0.12	0.44	0.12	0.02	0.03	0.16
6. **Personal serv occupations**	**Total**	**0.03**	**0.03**	**0.06**	**0.09**	**0.10**	**0.51**	**0.02**	**0.04**	**0.11**
	EE	0.04	0.03	0.06	0.09	0.11	0.50	0.02	0.05	0.10
	UE	0.02	0.02	0.04	0.08	0.11	0.50	0.03	0.05	0.13
	IE	0.03	0.03	0.06	0.08	0.08	0.55	0.02	0.02	0.13
7. **Craft/skilled trade and related occ**	**Total**	**0.02**	**0.02**	**0.03**	**0.03**	**0.04**	**0.03**	**0.60**	**0.11**	**0.12**
	EE	0.03	0.02	0.03	0.03	0.03	0.03	0.63	0.11	0.10
	UE	0.01	0.02	0.02	0.03	0.04	0.03	0.58	0.12	0.14
	IE	0.03	0.03	0.04	0.04	0.05	0.05	0.56	0.07	0.14
8. **Plant and machine operatives**	**Total**	**0.02**	**0.01**	**0.03**	**0.05**	**0.06**	**0.06**	**0.11**	**0.49**	**0.18**
	EE	0.03	0.01	0.03	0.05	0.06	0.05	0.11	0.51	0.16
	UE	0.01	0.01	0.03	0.05	0.07	0.05	0.10	0.47	0.21
	IE	0.02	0.02	0.04	0.05	0.07	0.08	0.08	0.44	0.20
9. **Elementary/other occupations**	**Total**	**0.02**	**0.01**	**0.04**	**0.08**	**0.12**	**0.09**	**0.07**	**0.09**	**0.48**
	EE	0.02	0.02	0.04	0.09	0.14	0.10	0.07	0.11	0.42
	UE	0.01	0.01	0.03	0.07	0.10	0.07	0.08	0.11	0.52
	IE	0.02	0.01	0.03	0.07	0.11	0.10	0.04	0.04	0.57
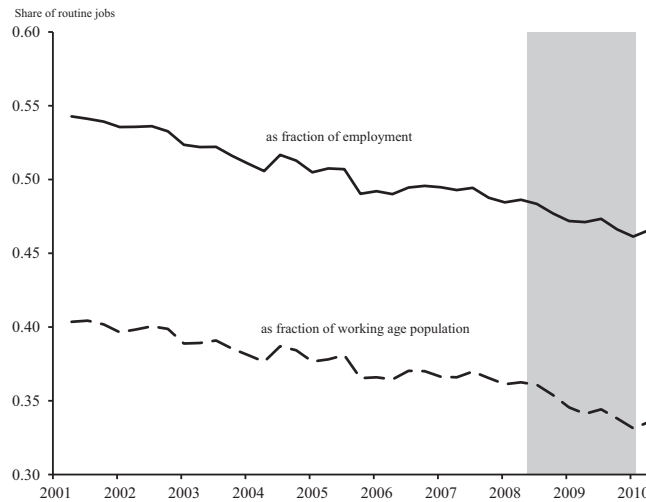
Fig. 8. Shares of working age population and total employment working in routine occupations. Note: routine occupations in SOC 2000 listed in Table 1.

Table 6
Probability of positive real wage growth by percentile of wage in previous job.

	Quartile of the wage before changing		Occupations		Industries	
			Movers	Stayers	Movers	Stayers
			I	II	III	IV
1.	0th–25th	**Total**	**78.5**	**67.0**	**79.9**	**65.5**
	EE		80.3	71.8	81.1	69.7
	EUE		80.7	69.2	78.8	67.6
2.	25th–50th	**Total**	**56.9**	**51.1**	**57.5**	**51.1**
	EE		56.7	48.7	57.9	49.4
	EUE		55.1	55.3	62.3	50.9
3.	50th–75th	**Total**	**37.6**	**46.1**	**36.1**	**46.3**
	EE		35.8	44.3	34.7	44.5
	EUE		40.1	40.8	34.5	47.0
4.	75th–100th	**Total**	**27.0**	**35.8**	**26.4**	**37.2**
	EE		27.2	35.2	26.4	36.5
	EUE		23.6	34.3	23.4	34.5

Note: Percent of workers that receive a wage increase after changing jobs for all job changes in the sample.

characteristics, properties of the job the worker is hired in, and variables that proxy for the potential reasons for why the worker changed careers or not. Because the availability of some of the variables related to the reasons for the career change depends on the labour market status of the worker before he or she accepted the new job, we present the Probit estimates not only for all hires but also condition them on what labour market status the worker had in the quarter before starting the new job. The estimation results are presented in Table 4.[23]

In terms of the effects of human capital on the probability of a career change, we find that age decreases the probability of a career change, suggesting the importance of on-the-job human capital accumulation. Educational attainment, however, affects occupations and industries differently. Across occupations, high and medium skilled workers have a higher probability of a career change than low skilled workers (our reference category). Across industries, we find that low skilled workers have a higher probability of a career change than medium and high skilled workers. These results seem to arise from differences in the impact of skill levels by employment status. Across occupations, it is only the unemployed for which high and medium skilled workers have a higher probability of a career change. Across industries, low skilled workers have a higher probability of changing career when mobility is through employment or inactivity, but not through unemployment.

Table 4 also shows the effects of different types of job characteristics on the probability of a career change. This probability increases if the worker obtains a part-time versus a full-time job or if the worker obtains a temporary versus a permanent job.[24] Women have a higher probability of a career change than men. Furthermore, the larger the household someone is part of, the less likely a person is to change careers. That is, *Hm* is lower for persons who are married or cohabitate. It also decreases, although not significantly, in the number of children.

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[23] Details about the definitions of the explanatory variables are provided in the Appendix.
[24] The exception is that for unemployed workers obtaining a permanent job increases the probability of a career change.

Table 7
Distribution of real wage changes for hires: 1997-end of sample.

Percentile		Whole sample		1997–2000		2001–2007		2008–end	
		Movers	Stayers	Movers	Stayers	Movers	Stayers	Movers	Stayers
(a) Occupations									
25th	**Total**	**− 16.4**	**− 13.0**	**− 13.0**	**− 9.6**	**− 16.0**	**− 11.3**	**− 24.0**	**− 22.1**
	EUE	− 32.4	− 22.9	− 32.5	− 18.7	− 27.4	− 21.6	− 48.9	− 29.5
	EE	− 10.9	− 8.2	− 7.4	− 5.1	− 12.2	− 6.6	− 12.8	− 16.7
50th	**Total**	**10.7**	**6.8**	**16.8**	**10.8**	**9.7**	**6.0**	**2.6**	**2.0**
	EUE	− 2.1	− 3.0	1.3	1.8	1.1	− 3.4	− 19.6	− 10.5
	EE	13.4	9.6	19.1	13.4	11.7	8.8	8.5	4.9
75th	**Total**	**54.8**	**33.6**	**71.8**	**40.5**	**49.1**	**30.9**	**42.0**	**29.9**
	EUE	48.3	28.7	59.0	33.4	54.9	26.6	6.5	27.2
	EE	56.8	34.6	75.5	41.1	50.1	32.4	44.3	29.8
(b) Industries									
25th	**Total**	**− 17.0**	**− 12.5**	**− 12.5**	**− 9.3**	**− 16.3**	**− 12.3**	**− 22.4**	**− 15.8**
	EUE	− 29.7	− 24.7	− 30.1	− 19.9	− 27.2	− 23.2	− 33.7	− 31.6
	EE	− 11.7	− 7.1	− 7.7	− 4.5	− 12.0	− 7.5	− 14.8	− 8.9
50th	**Total**	**9.8**	**6.7**	**15.2**	**11.1**	**8.6**	**6.6**	**6.9**	**2.8**
	EUE	− 2.1	− 2.7	2.4	4.8	0.5	− 2.4	− 10.6	− 10.4
	EE	12.4	9.2	17.7	13.4	11.2	8.7	9.5	6.0
75th	**Total**	**54.3**	**32.1**	**69.0**	**40.7**	**48.3**	**30.3**	**50.5**	**26.9**
	EUE	42.4	27.6	46.8	41.6	49.7	26.8	26.0	15.9
	EE	55.0	32.5	66.3	40.6	49.8	31.0	53.2	27.7

Note: Percentile of the distribution percent wage changes. Reported are averages of the quarterly time series of percentiles over the sample periods listed. Wage data only available after 2007.

The Probit estimates also reaffirm the results found in Table 3 and Figs. 3, 6, and 7. We find that for employed workers, career changes are more likely among those employed workers that made voluntary *EE* transitions and among those that were actively searching for a job (our baseline category with respect to all the search channels). Unemployed workers are more likely to make career changes than employed (our baseline category) or inactive workers, while a career change through unemployment is more likely to occur at longer unemployment spells.

Using individual-level data in the Probit regression allows us to shine a more detailed light on search method workers employed to find their new jobs and how it affects their chance of changing careers. In particular, the explanatory variables listed in Rows 18 through 21 get at this.[25] We find that those workers who find jobs responding to ads are more likely to change careers than those who find jobs through other means.

Conditioning on the worker-, job-, and search- characteristics does not erase the significance of the procyclicality of career changes. This suggests that the business cycle movements in occupational and industry mobility of workers are not the result of the composition of the group of workers with a previous career that gets hired changing with the cycle.

As can be seen from the marginal probability estimates reported in Row 1 and columns I and V of Table 4, a one percentage point increase in the unemployment rate reduces $H^{(m)}$ by 0.6 percentage points for occupations and 1.4 percentage points for industries.[26] Contrary to the discussion above, these results are based on the whole sample period and not only on comparing the Great Recession and its aftermath with the preceding episodes in the data.

The higher sensitivity of occupational switches compared to industry switches to the aggregate unemployment rate is offset by the higher sensitivity of occupational mobility with respect to the regional component of the unemployment rate, reported in Row 2 of Table 4. Taking the results of Rows 1 and 2 of Table 4 together both occupational as well as industry mobility comove very significantly with labour market conditions.

4.3. Origins and destinations

Another way to gauge the reasons for career switches is to consider what type of job in which industry and occupation workers come from and what type of job they end up in. This is what we explore in this subsection. We focus on three aspects of the origins and destinations of career changers in our data. The first is whether the jobs are full- or part-time. The second is what industry and occupation career changers come from and which ones they go to. Finally, we refine the occupation analysis by considering whether the occupations are routine or non-routine.

Full- versus part-time jobs: So far, we have documented that most career changes result from voluntary labour turnover and that the share of career changes that is voluntary is procyclical. That is, during downturns a higher fraction of career changes is

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[25] The baseline category "direct application to employers".
[26] Because these are marginal probability estimates, this interpretation is for the "average" hire in terms of the covariates in our sample.
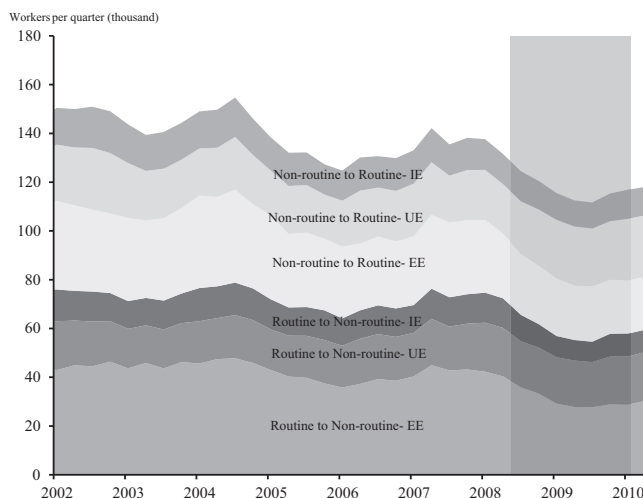
Workers per quarter (thousand)

Fig. 9. Number of career switches between routine and non-routine occupations. Note: routine occupations in SOC 2000 listed in Table 1.

involuntary (see Fig. 6). This cyclical behaviour of voluntary career changes is mirrored by the extent to which occupational mobility results in full- or part-time jobs.

Career changes turn out to be an important mechanism through which workers move between part-time and full-time jobs and, on net, contribute positively to part-time and to full-time job flows.[27] On average 65% of hires resulted in a full-time job and 35% of hires resulted in a part-time job during the 1993–2007 period. These hires are disproportionately people who change occupations.[28] Career *movers* on average get a full-time job in 60% and a part-time job in 40% of the time.

For those that switch directly between employers we know both their full-time status before and after they get hired and can thus infer whether their full-time status changed when switching jobs. Using these data, we find that on average 13% workers making an *EE* transition move from part-time into full-time employment, while 7% move from full-time to part-time employment during the 1993–2007 period. The bulk of changes in the full-time nature of work, in either direction, involves a career change. Of those who moved from part-time into full-time employment, 66% changed careers; while from those that moved from full-time to part-time employment 59% changed careers.

During the Great Recession, however, the incidence of part-time work increased. On average 37% of hires now resulted in a part-time job, while 63% of hires resulted in a full-time job. Consistent with this, the net contribution of career changes to part-time-to-full-time flows declined during the same period.[29]

Thus, if we would consider part-time jobs to be typically less desirable than full-time jobs, then the shift in the full-time/part-time composition of career movers' new jobs during the recession reflects a relative worsening of outcomes associated with changing careers in downturns and thus a deceleration of the pace with which workers move to higher quality jobs during those periods. Note, however, that the shift in the full-time/part-time composition is much less pronounced than the shift in terms of voluntary versus involuntary turnover, depicted in Fig. 6.

Industries and occupations: Above, we suggested that transitions from part-time to full-time jobs are generally considered a step up the job ladder while the reverse are considered a step down. To paint a more detailed picture of the job ladders that career changers are on, we consider the origins and destinations of their career moves here in terms of industry and occupation. We do so by constructing industry and occupation transition matrices for workers' career changes. These matrices provide useful information on the mobility patterns of workers as they shed light on the potential importance of individual occupations or industries in driving overall mobility.

Table 5 shows the transition matrix for workers changing careers across occupations.[30]

This matrix shows that all occupations exhibit a high degree of mobility. The dark-shaded cells list the fraction of hires that get hired in the same major occupation as they were working in before. Looking at the numbers for all hires, labeled as "Total", the probability of a career change ranges from 61% for sales occupations to 32% for professional occupations.

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[27] For recent investigations of cyclical fluctuations in full/part-time jobs, see e.g Borowczyk-Martins and Lalé (2015), and Singleton (2015).

[28] In our analysis of full- versus part-time jobs we limit ourselves to career moves that involve a change in occupation.

[29] In the exposition here we contrast the Great Recession with the period before. Unreported regression results show that the cyclicality of the incidence of part-time employment we discuss here is present over our whole sample period.

[30] To construct the transition matrix for occupations we have combined the SOC 1990 and SOC 2000 occupation classifications. We do this as our results hardly change when considering a separate transition matrix for each classification. Furthermore, we present the results for the entire period of study and not before and during the Great Recession, as the transition matrices for the Great Recession period have the same characteristics as those for the pre-recession period. For the sake of brevity, we limit ourselves to the discussion of origins and destinations for occupations here.

Across occupations, however, we observe some clustering by skill level. To show this, we group together those occupations that require similar skill levels. This results in three groups of high-, medium-, and low-skilled occupations. The first two groups consist of three major occupation codes and the last group consists of two major occupation codes. Career changes within each of these groups are highlighted in light grey as the block diagonal in the transition matrix. As can be seen, the transition probabilities in the grey cells tend to be higher than those in the other cells. There are two destination occupations that are notable exceptions to this pattern. First, a substantial number of career changes out of high-skill occupations result in jobs in "Clerical and administrative" jobs. Second, the miscellaneous ninth category absorbs a large number of career switchers from middle-skilled jobs.[31]

Although we observe similar non-diagonal probabilities between rows in the transition matrix, we also observe that workers are more likely to stay within their skill category or move to the highest skill category after an *EE* transition and more likely to move to a lower skill category through a *UE* or *IE* transition.[32] These patterns suggest that workers tend to move more often to occupations that demand skills closer to the ones they can supply. However, conditional on moving to a different skill category, workers are more likely to make career changes that involve an upgrade in the skill level through direct *EE* transitions, while career changes that involve a lower skill level are more likely through spells of non-employment. This evidence reinforces the view that occupational mobility through *EE* transitions are more likely to be voluntary career changes in which workers mostly pursue upward career moves, while occupational mobility through non-employment are more likely to be involuntary career changes.

Routine and non-routine occupations: One particular type of occupational mobility that has been emphasized in the recent literature is that between occupations that involve routine and those that involve non-routine tasks. The distinction between these two types of occupations is relevant for the "Polarization" hypothesis (see Autor, 2003, Acemoglu and Autor, 2011, Autor and Dorn, 2013, among others). This hypothesis is that, over the last decades, job tasks that can be captured easily by a set of explicit of simple instructions or rules, i.e. 'routine tasks', have been increasingly taken over by computers and machines. As a result, employment in those occupations in which workers are mainly executing routine tasks, summarily called 'routine occupations', has declined. In its place, employment has risen at the bottom of the wage distribution, in occupations that require physical labour, yet with tasks that cannot easily be captured in routines to be automated. This includes simple service jobs that require physical eye–hand coordination and physical navigation, typically under the heading 'non-routine manual' jobs. Employment has also risen higher in the wage distribution, where tasks require knowledge acquisition and creative thinking, with jobs put under the 'non-routine cognitive' header.[33] Jaimovich and Siu (2014) argue that this secular process of job polarization accelerates during recessions when many routine jobs are permanently destroyed and workers in those jobs are forced to pursue other careers. In this way, they claim, the cycle is actually the trend, since this type of job polarization during recessions is not reversed during expansions.

To consider whether job polarization is happening in the U.K. labour market and to what extent it is reflected in workers switching from careers in routine to non-routine occupations, we split up the post-2000 data by occupation into routine and non-routine occupations, following Acemoglu and Autor (2011). The second column of Table 1 contains a marker that signifies which SOC 2000 occupations are classified in which category.

Fig. 8 shows employment in routine occupations as both a share of the working age population as well as of total employment. The figure shows that the share of employment in 'routine occupations' has steadily declined in the U.K., similar to that in the U.S. (Jaimovich and Siu, 2014). However, there was no acceleration in this trend during the Great Recession, as the "trend-is-the-cycle" hypothesis would suggest. In fact, using more formal regression-based techniques we find no significant cyclical component in the routine share series plotted in Fig. 8. This is in line with the evidence for the U. S. in Foote and Ryan (2014).

Fig. 9 shows the time series of career changes that result in a switch between routine and non-routine occupations. The first thing that stands out from this figure is the excess churning we already saw in terms of the net mobility measure in Fig. 5. The net change in routine employment induced by these career switches is negative and contributes to the trend decline shown in Fig. 8. Just like in the U.S. (Cortes et al., 2014) IE and UE flows contribute the bulk of this net decline. Most importantly, however, is the observation that the share of routine to non-routine career switches does not increase significantly during the recession, indicating that, in terms of career switches, there is no evidence that the long-run downward trend in the share of routine employment accelerates during recessions. In fact, the overall turnover between these two categories of occupations seems to have declined in the recession.

Of course, the data in Fig. 9 only includes workers who have been employed before at some point, and are hired again. This means that adjustment in the overall level of routine employment could also come about by a diminishing inflow into routine occupations by labour market entrants, and by an increased outflow of retirees from these occupations is not visible

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[31] These patterns for occupational transitions are remarkably similar to those documented in Hobijn (2012) for the U.S.

[32] When making a career change outside a given skill category, workers in high skill occupations are more likely to move to an occupation in the medium skill category; workers in the medium skill category are more likely to move to an occupation in the low skill category. However, workers in the low skill category are more likely to move to an occupation in the medium skill category. The exception are those workers in the clerical/admin and secretarial occupations, who are more likely to move to an occupation in the high skill category conditional on a career change.

[33] With routine jobs in these occupations mostly located in the middle segment of the wage distribution, employment gains at the low end of the wage distribution, in non-cognitive manual and at the high end of the wage distribution, in cognitive non-routine job imply a 'hollowing out' of the middle, which is often referred to as 'job polarization'.

in our statistics. Cortes et al. (2014), for example, emphasize that such a cohort effect is an important driver behind the trend decline in routine employment in the United States. However, the lack of a cyclical pattern in Fig. 9 suggests that this cohort effect most likely also does not fluctuate a lot over the business cycle.

Thus, our analysis for the U.K. is supportive of the same conclusion that Albanesi et al. (2013) draw for the U.S.; weakness in the labor market in the Great Recession was shared by non-routine and routine occupations alike, did not disproportionately affect routine occupations, nor did it accelerate the secular decline in routine jobs.

4.4. Wage gains

Thus far, we have shown that career switches make up a substantial fraction labour market turnover, and of voluntary turnover in particular. Recent theoretical (Hagedorn and Manovskii, 2013) and empirical (Daly et al., 2012) studies have emphasized the importance of voluntary turnover and employer-to-employer transitions for understanding the cyclical behaviour of wage growth. Our data suggest that distinguising between career switchers and stayers would refine our understanding of wage growth over the business cycle even more.

To see why, consider Tables 6 and 7, which summarize the distribution of percent real wage changes for job switchers, conditional on moving careers or staying in the same career, for the whole sample as well as for the three main periods in our sample.[34] Because we are interested in wage *changes*, our analysis only includes hires for which we have data in waves 1 and 5 of the survey, depicted in Fig. 2. In particular, that means that for workers who flow through unemployment, we only have wage changes for those with an unemployment spell shorter than 4 quarters.

Long-run perspective: Table 6 shows the probability that the hire of a worker with previous work experience results in a wage gain. The table lists this probability conditional on whether the hire involves a change in career and on the level of the wage earned in the previous job, measured in terms of the percentile of the wage distribution. The probability of a positive wage gain is much higher for workers who earned a low wage in their previous jobs. More importantly, for those workers this probability is also higher when they change careers than when they did not. For workers making an above-median wage, however, the probability of obtaining a positive wage growth when changing employer is closer to 30% but now is higher for those who do not change careers. This suggests that a large part of the voluntary career mobility through employer-to-employer moves that we document is workers moving up the job ladder to progress their careers.[35]

Where Table 6 provides information about the sign of the wage change, the columns for the "Whole sample" in Table 7 show the distribution of the magnitude of wage changes.[36] The first takeaway from this table is the large degree of *dispersion* in wage growth that results from a change in employers. Below the 50th percentile of each distribution, workers can experience large negative wage losses when moving employers, while above the 50th percentile workers experience large wage gains.[37]

The most striking feature of the distributions shown in Table 7 is that the dispersion of wage gains is larger for career movers than for career stayers. This also holds true when we condition on whether the worker changed employers through an intervening spell of unemployment or not. Relative to stayers those who changed careers have higher wage growth at and above the 50th percentile of the wage growth distribution; while the opposite happens below the 50th percentile. This evidence again supports our interpretation that workers typically change careers for wage gains bigger than for those that stayed in the same occupation. It might seem counterintuitive that career changes through unemployment do tend to lead to positive wage gains that are larger than those obtained by unemployed workers who will stay in the same career. However, this evidence is not inconsistent with a theory in which these potentially larger wage gains can only be obtained after a costly reallocation process which only becomes worthwhile after job prospects in the original career have deteriorated sufficiently (see, for example, Carrillo-Tudela et al., 2014).

Cyclical patterns: The last six columns of Table 7 show how the distribution of wage changes varies over different business cycle episodes in the U.K. labour market. Across occupations and industries the wage growth distribution of those workers that change careers through unemployment shifts down during the recession. The decrease is stronger across occupations than industries. Further, the shift in the wage growth distribution of those who changed occupations through unemployment is sufficiently big that their wage gains are now below the wage gains of career stayers even at the 75th

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[34] Recall that these wages are self-reported gross weekly earnings, deflated using the CPI. Given that the LFS only provides wage information on its 5-quarter sample and only for a worker's Q1 and Q5 interview wave, we are not able to subdivide the analysis by demographic or job characteristics or by the other stratifications we used in the previous sections without running into small sample problems. We also focus our attention to those workers that made *EE* or *UE* transitions given the small sample of those workers making *IE* transitions for which we have wage information. Further information about Q1 and Q5 wages is only available as from 1996. Further, we also checked whether the cyclicality of our *Hm* rates is robust if we changed to the 5-quarter sample. Across occupations and industries we find that *Hm*, *HEm* and *HUm* are procyclical; while *HIm* is acyclical.

[35] Indeed, when adding the quartile of the wage earned in the previous job as an explanatory variable to the Probit analysis reported in Section 4.2, we find that the probability of a career change through an *EE* transition deceases with the wage earned in the previous job.

[36] Note that these tables convey different information than the one presented in Longhi and Taylor (2011). For occupational movers, they compare the average wage in the worker's previous occupation with the average wage in the worker's new occupation. Using this information they distinguish between upward and downward occupational mobility by workers' employment status. In contrast, we compute the difference in the wages the *individual* obtains from changing occupation. This allows us to understand the relative gains for the individual of a career change.

[37] These numbers are consistent with the large set of evidence that finds re-employment wage loses for displaced workers (see Jacobson et al., 1993) and wage gains for workers that undergo direct *EE* transitions (see Topel and Ward, 1992). The actual wage losses due to displacement are likely underestimated in our data since our sample only contains unemployment spells that lasted shorter than 4 quarters.

percentile of the wage growth distribution. In contrast, the wage growth distribution of workers that changed employers directly through an *EE* transition or those that changed employers through unemployment but did not undertake a career change, do not seem to respond as much to business cycle conditions.[38]

The evidence presented suggests that career changers have a higher probability of a substantially large wage increase than career stayers. However, during the recession the wage gains of occupational changers decrease to the point that, for unemployed workers, these have become smaller than the wage gains from changing employer in the same occupation. As argued, for example, in Carrillo-Tudela et al. (2014), the decrease in the gains of reallocation can help explain the drop in the probability of a career change during the recession, documented in Section 3.2.

Thus, the procyclicality of the incidence of career changes and the associated wage gains that we document suggest that adding a career change margin to our models of labour market fluctuations will help improve our understanding of the, not well-understood, link between unemployment, labour turnover, and aggregate wage growth.[39]

5. Discussion and conclusion

Overall, the patterns in the UK LFS suggest that in good times career changes imply a chance to improve a worker's position in the labour market. In downturns the gains associated with career changes appear to diminish. From a theory perspective one can build on Carrillo-Tudela et al. (2014) and Wiczer (2013) to reconcile these patterns using a framework that incorporates heterogeneity in labour market conditions, costly mobility choices between labour markets (career changes) and business cycle shocks. In such a framework, fluctuations in the expected net returns to a career change induce workers to adjust their mobility choices. In downturns, when net returns are low, workers decide to stay in their careers and wait for conditions to improve instead of changing to a new occupation or industry.

In such a framework two motives for job mobility can arise: (i) workers may move to other jobs because their current employment conditions worsen while outside opportunities stay the same; (ii) workers may move because outside opportunities improve while current employment conditions are unaffected. Although both reasons may be at work, they are not necessarily two sides of the same coin. Aggregate conditions may interact differently with the idiosyncratic shocks to workers' current employment than with the stochastic arrival of new employment opportunities in different occupations or industries.

In these models, adverse shocks to current employment could then generate 'involuntary' transitions, through which workers try to recover the loss of prospects in their current job. Increased opportunities elsewhere could draw workers to 'voluntarily' change their jobs and careers. The 'pull' of the latter kind of opportunities can be especially strong in booms, in line with the evidence presented in this paper; while the mobility 'push' associated with the shocks behind 'involuntary' transitions could be especially relevant in recessions.

Taken together, career changes are different from other hires in terms of their cyclicality, their associated (wage) gains and the cyclical variations in these gains. Incorporating a career-mobility dimension in equilibrium business cycle models of the labor market can be a promising direction to contribute to our understanding of the overall behaviour of labour turnover and wage growth over the business cycle, and could help guide better policy responses to business cycle fluctuations.

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[38] These observations are also confirmed when regressing the wage growth of workers on output per worker and a time trend, showing that these patterns are not particular to the Great Recession.

[39] Of course, some of the aggregate wage growth is driven by a composition effect (Solon et al., 1994; Daly et al., 2012). This is the same composition effect that partially drives the procyclicality of career changes. For our understanding of aggregate time series it is important to have theoretical models that capture the main sources of (self-)selection that drives this composition effect.

Appendix A

In this appendix we supplement the description of the U.K. Quarterly Labour Force Survey provided in the main text. In particular, we describe how we constructed the different categories we used to described workers' search activities, unemployment durations and the variables used in the probit regressions.

Search activity: In the U.K. LFS employed workers are asked whether they were actively searching for a job or not and which search channels did they use. We categorise workers as using a "job centre" when they declared that their main method of search was "visit a job centre, job market or jobs and benefit centres", "visit a job club", "have your name on the books of a private employment agency", or "visit a careers office". Workers in the category "ads" were those that declared that their main method of search was "advertise for jobs in newspapers and journals", "answer advertisements in newspapers and journals", "study situations vacant in newspapers or journals". Workers in the category "direct applications" were those whose main method was "apply directly to employers". Workers in the category "ask a friend or relative" correspond to those that declared their main method of search to be "ask friends, relatives, colleagues or trade unions about jobs". The last category "do anything else" includes those who responded "wait for the results of an application for a job", "look for premises or equipment", "seek any kind of permit", "try to get a loan or other financial backing for a job or business", and "do anything else to find work". Among the employed, 77% of workers that made an employer-to-employer transition declared they were not actively searching for a job and the reminder 33% did.

Workers who declared themselves as non-participants in the labour market were considered to "want a job" if they were seeking but unavailable because they were a student, looking after family, temporarily sick or injured, long-term sick or disabled or due to other reasons or no reasons given. In addition we categorise as wanting a job those non-participants that are not seeking, but would like to work and are waiting for results of job applications, believe no jobs are available, have not looked, are a student, looking after family, temporarily sick or injured, long-term sick or disabled, or no reason given. Those who "do not want a job" are those workers that declared they are not seeking, would not want to work and are waiting for results of job applications, do not need or want a job, are a student, looking after family, temporarily sick or injured, long-term sick or disabled, retired or or due to other reasons or no reasons given. Although there are many reasons why a worker declares him or herself out of the labour force, for those that want or do not want a job, there are three main reasons: being either a student, looking after family or long-term sick.[40]

Unemployment duration: To construct the category of unemployed workers that found a job within the first 2 quarters of their unemployment spell and the category of those that found a job after that, we use the following categorical variable for the duration of unemployment: (1) less than 3 months, (2) 3 months but less that 6 months, (3) 6 months but less than 12 months, (4) 1 year but less than 2 years, (5) 2 years but less than 3 years, (6) 3 years but less than 4 years, (7) 4 years but less than 5 years, (8) 5 years or more. We label workers in (1) and (2) as "less than or equal to 2 quarters" and the rest as "more than 2 quarters".

Probit analysis: To further analyse the workers' likelihood of a career change, we use the latent variable model

$$P_{ij} = \mathbf{x}_i' \boldsymbol{\beta_j} + \varepsilon_{ij}, \tag{5}$$

where P_{ij} is the latent variable that measures the probability of an occupational or industry change, ε_{ij} is i.i.d and follows a multivariate normal distribution, i represent individuals and j outcomes. For all those workers that changed employers (through employment or non-employment), the dependent variable takes the value of zero if the worker did not change occupation or industry and one if the worker did.

The vector $\mathbf{x}_i$ describes the explanatory variables. It includes variables which capture the effects of aggregate and local economic conditions through the aggregate unemployment rate, and the deviations of the regional unemployment rates from the aggregate unemployment rate in each quarter. The effects of workers' human capital through a quadratic on age, different skill categories and the duration of the job or unemployment spell. The skill categories are dummy variables that take the value of one if the worker has the corresponding skill level and zero otherwise. The high skilled category groups all those workers that have post school degrees, ranging from teaching qualifications to graduate studies. The medium skilled category groups all workers that achieved between a O-level or GCSE qualification to an A-level or equivalent qualification. The low skilled category groups all individuals with an educational attainment below O-levels or GCSE. For unemployed workers, the spell duration indicates the duration of unemployment and includes the eight categories mentioned above. For employed workers, this variable denotes the duration of employment with current employer in months. We also include a set of variables that measure further demographics such as a dummy for marital status,[41] the number of children, and a dummy for gender. We also consider dummies for full-time jobs and whether the job was temporary or permanent. We

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[40] In particular, 75% of workers who wanted a job are in these three categories, while 82% of those that did not want a job are in these categories. Among the inactive, those that want a job represent on average 30% of the non-participants, and those that do not want a job the remainder 70%.

[41] The classification of marital status before 2006Q2 has five options: (1) single, never married, (2) married, living with husband/wife, (3) married, separated from husband/wife, (4) divorced, and (5) widowed. We set the value of this variable is one if the respondents marital status is (2), otherwise the value of this variable is zero. The classification of marital status after 2006Q2 has nine options. The first five options are identical to the previous classification. The additional options are (6) A civil partner in a legally recognised Civil Partnership, (7) In a legally recognised Civil Partnership and separated from his/her civil partner, (8) Formerly a civil partner, the Civil Partnership now legally dissolved, and (9) A surviving civil partner: his/her partner having since died. Under the classification of marital status after 2006Q2, we set the value of "mar/cohab" to one if a respondent whose marital status is (2) or (6), and zero otherwise.

include dummies for employment status and whether the change of employer was for involuntary or for other reasons, where we take voluntary reasons as our baseline category. Finally, we include dummies for the methods of job search and whether non-participants declared they wanted a job or not. All dummies take the value of one if the respective worker-, job-, and search- characteristic is equal to the label of the dummy. Otherwise, the dummy takes the value of zero.

Appendix B. Supplementary data

Supplementary data associated with this paper can be found in the online version at http://dx.doi.org/10.1016/j.euro ecorev.2015.09.008.

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