

LABOUR MARKET FLOWS: ACCOUNTING FOR THE PUBLIC SECTOR ^{*}

Idriss Fontaine [†]

Université de Cergy-Pontoise

Ismael Galvez-Iniesta [‡]

Universidad Carlos III de Madrid

Pedro Gomes [§]

Birkbeck, University of London

Diego Vila-Martin [¶]

University of Amsterdam.

September 21, 2018

Abstract

For the period between 2003 and 2015, we document a number of facts about worker gross flows in France, the United Kingdom, Spain and the United States, focussing on the role of the public sector. Using the French, Spanish and UK *Labour Force Survey* and the US *Current Population Survey* data, we examine the size and cyclicity of the flows and transition probabilities between private and public employment, unemployment and inactivity. We examine the stocks and flows by gender, age and education. We decompose contributions of private and public job-finding and job-separation rates to fluctuations in the unemployment rate. Public-sector employment contributes 20 percent to fluctuations in the unemployment rate in France and UK but only 10 percent in Spain and United States. Private-sector workers would forgo 0.6 to 2.9 percent of their wage to have the same job security as public-sector workers.

JEL Classification: E24; E32; J21; J45; J60.

Keywords: Worker gross flows; job-finding rate; job-separation rate; public sector; public-sector employment.

^{*}We would like to thank Mike Elsby, José Ignacio Silva and Thepthida Sopraseuth for initial discussions and advice.

[†]Department of Economics (THEMA), Université de Cergy-Pontoise; E-mail: idriss-fontaine@u-cergy.fr or idriss.fontaine974@gmail.com.

[‡]Department of Economics, Universidad Carlos III de Madrid, Calle Madrid 126, 28903 Getafe, Madrid, Spain; E-mail: igalvez@eco.uc3m.es.

[§]Department of Economics, Mathematics and Statistics, Birkbeck, University of London, Malet Street, WC1E 7HX London, United Kingdom, E-mail: p.gomes@bbk.ac.uk.

[¶]Amsterdam School of Economics, P.O. Box 15867, 1001 NJ Amsterdam, The Netherlands, E-mail: diego.vila@student.uva.nl.

1 Introduction

In most European economies, around 20 percent of all workers are employed by the government. Governments face different constraints than private-sector firms and are not driven by profit maximization. Government employment and wage policies are driven by other objectives including: attaining budgetary targets (Poterba and Rueben, 1998; Gyourko and Tracy, 1989); implementing macroeconomic stabilization policy (Keynes, 1936; Holm-Hadulla *et al.*, 2010; Lamo *et al.*, 2013); redistributing resources (Alesina *et al.*, 2000; Alesina *et al.*, 1999; Wilson, 1982); or satisfying interest groups for electoral gains (Borjas, 1984; Matschke, 2003; Gelb *et al.*, 2000). As a consequence, public-sector labour markets might behave differently from their private-sector counterparts.

The objective of this paper is to establish a number of key facts about the French, Spanish and UK labour market flows by examining data from their *Labour Force Surveys* over the past 15 years. In so doing, we focus on the role played by the public sector. We chose these three countries because they are the largest European countries with sizable public sectors. Furthermore, although they have different labour market institutions, they have all faced pressures to reform their public sectors. For comparison with the literature, we also analyse US data based on the *Current Population Survey* (CPS). While we do not attempt to explain these facts, we believe that they are an important first step to foster theoretical research on the topic. They can help economists understand the characteristics of the public sector and its policies, as well as provide a guideline of the empirical features that models with a public sector should reproduce and help in the calibration or identification of key parameters. We show that public-sector labour markets do indeed behave differently than the private sector. The size of transition rates into and out of public-sector employment are different and its cyclical pattern as well. Furthermore, the government hires particularly women, college graduates and older workers, which creates asymmetric exposures to public-sector policies for different workers.

In the last decade in European countries, public-sector employment was a key policy variable. Following budgetary constraints, many countries imposed measures such as hiring freezes layoffs of public-sector workers, as well as wage cuts or freezes that affected the retention of these workers (Glasser and Watt, 2010). Given the policy role that public-sector employment played during the last decade, a new wave of research constructs search and matching models of unemployment to study the labour market effects of public-sector employment and wages. Examples include Hörner *et al.* (2007), Quadrini and Trigari (2007), Afonso and Gomes (2014), Gomes (2015, 2017), Michailat (2014), Burdett (2012), Bradley

et al. (2018), Albrecht *et al.* (2018), Bermperoglou *et al.* (2017) and Boeing-Reicher and Caponi (2017). Lying at the heart of these state-of-the-art models are the worker gross flows between private- and public-sector employment and non-employment.

However, the extensive literature that estimates and analyses worker gross flows has systematically ignored the role of the public sector. This literature has focused mainly on disentangling the relative importance of job-finding and job-separation rates in driving the unemployment rate. The most cited papers on the topic – Blanchard and Diamond (1990), Shimer (2012), Elsby *et al.* (2009) and Fujita and Ramey (2009) – study the US labour market, proposing different decompositions or examining the role of the time-aggregation bias. Also for the US, Borowczyk-Martins and Lalé (2018) distinguish between full-time and part-time employment, while Elsby *et al.* (2015) study the role of the participation margin. Smith (2011) proposes an out-of-steady-state decomposition and analyses the UK labour market. Gomes (2012) further analyses the UK labour market along other dimensions, such as education or labour force attachment, while Fujita (2010) concentrates on on-the-job search and job-to-job transition and Carrillo-Tudela *et al.* (2016) on the extent of worker reallocation across occupations and industries and their cyclicity. In two comparisons of the UK and the US, Razzu and Singleton (2016) study the fluctuations of unemployment among men and women, while Gomes (2015b) examines the role of conditional transition probabilities and how they depend on the frequency of the surveys. Other papers focussing on the UK include Elsby *et al.* (2011) and Elsby and Smith (2010).

Several studies examine other European labour markets. Petrongolo and Pissarides (2008) compare the relative importance of job-finding and job-separation rates across France, the United Kingdom, Spain and the United States. Silva and Vázquez-Grenno (2013) focus on the role of flows in and out of permanent and temporary employment in Spain. Baussola and Mussida (2014) study Italian gross flows, concentrating on unemployment gender gaps. Charlot *et al.* (2018) split between employment in abstract, routine and manual occupations in France and the US. Other works examining the French labour market include Hairault *et al.* (2012) and Fontaine (2016). Hertweck and Sigrist (2015) study the German labour market and Daouli *et al.* (2012) the Greek labour market during the crisis. Despite looking at worker flows from different angles, all the papers in this exhaustive list have ignored the duality between the private and the public sectors.

In Section 3, we provide evidence on the size and cyclicity of the flows between public and private employment, unemployment and inactivity. France and the UK have larger public sectors than either Spain or the US. Over the last business cycle, public-sector em-

ployment was pro-cyclical in France, countercyclical in the UK, and acyclical in Spain and the US.

In Section 4, we quantify how government hiring and separations have contributed to unemployment fluctuations. We show that ignoring these flows in unemployment decompositions can potentially bias the relative importance of job-finding and job-separation rates, although in our sample, this bias turned out to be small. We find a relative split of 80-20 percent of the contribution of private- and public-sector employment to fluctuations in the unemployment rate in France and the UK, and of 90-10 percent in Spain and the US. We performed a counterfactual analysis and show that since 2008, if governments had kept the same hirings and separations from the previous years, unemployment rate would have been lower, by up to 1 percentage point, in the European countries, but it would have been higher in the US. In our view, this finding reflects the different macroeconomic policies conducted by governments in response to the Great Recession, with a focus on austerity policies by European countries.

We document that jobs are safer in the public sector – aggregate job-separation rates are lower. In Section 5, we further investigate this result by using a multinomial logit model to estimate the differences in transition rates from employment to unemployment and inactivity from the two sectors, conditional on observable characteristics. The argument that public-sector jobs are safer is often used in policy discussions surrounding public-sector pay. However, while there are several papers estimating the wage differentials across sectors, there are no estimates of the value of the job-security.¹ We use a simple back-of-the-envelope calculation to find the percentage of their wage that private-sector workers would be willing to forgo to have the same job-separation probability as in the public sector. In our preferred scenario, risk-neutral workers would pay 0.6 to 1.6 percent of their wage for the same job security, which can be seen as a lower bound for the insurance value of public-sector employment. Risk-averse workers without any savings mechanism would pay 1.1 to 2.9 percent of their wage, which can be seen as an upper bound. The value of job safety in the public sector is equivalent to between 0.4 to 0.7 percent of total government spending in France and between 0.2 to 0.4 percent in the UK, Spain and the US.

¹Using micro level data, several papers find that, on average, the public sector pays higher wages than the private sector. Examples include: Katz and Krueger (1991) for the United States; Postel-Vinay and Turon (2007) or Disney and Gosling (1998) for the United Kingdom; and Christofides and Michael (2013), Castro, Salto, and Steiner (2013) and Giordano et al. (2011) for several European countries.

2 Preliminary concepts

2.1 Labour market dynamics

In order to analyse labour market dynamics, we use some fundamental equations that describe the evolution of the stock of the employed in the private and public sectors (P and G) and the stock of the unemployed U . The pool of the inactive is denoted by I . Adding the four pools gives us the working-age population W , while the sum of employment and unemployment corresponds to the labour force L . The unemployment rate is defined as $u = \frac{U}{L}$ and the participation rate as $p = \frac{L}{W}$.

Changes in private and public employment evolve according to the following equations:

$$\Delta P_{t+1} = \lambda_t^{GP}G_t + \lambda_t^{UP}U_t + \lambda_t^{IP}I_t - (\lambda_t^{PG} + \lambda_t^{PU} + \lambda_t^{PI})P_t, \quad (1)$$

$$\Delta G_{t+1} = \lambda_t^{PG}P_t + \lambda_t^{UG}U_t + \lambda_t^{IG}I_t - (\lambda_t^{GP} + \lambda_t^{GU} + \lambda_t^{GI})G_t, \quad (2)$$

where λ^{ij} is the transition probability between the pools indicated by the superscript. Similarly, for unemployment and inactivity:

$$\Delta U_{t+1} = \lambda_t^{PU}P_t + \lambda_t^{GU}G_t + \lambda_t^{IU}I_t - (\lambda_t^{UP} + \lambda_t^{UG} + \lambda_t^{UI})U_t, \quad (3)$$

$$\Delta I_{t+1} = \lambda_t^{PI}P_t + \lambda_t^{GI}G_t + \lambda_t^{UI}U_t - (\lambda_t^{IP} + \lambda_t^{IG} + \lambda_t^{IU})I_t. \quad (4)$$

The transition rate multiplied by the stock is equivalent to the total number of transitions. For each stock, the terms with a positive sign reflect the inflows from the three remaining pools, while the term with a negative sign corresponds to the outflows.

2.2 Data

The information about jobs sectors (public/private), individuals' position in the labor market, worker flows and associated transition rates are extracted from each country's representative labour market survey, from which official statistics are drawn: the French *Labour Force Survey* (FLFS), the UK *Labour Force Survey* (UKLFS), Spanish *Labour Force Survey* (SLFS) and the US *Current Population Survey* (CPS).

Since a redesign in 2003, the FLFS is conducted quarterly. The sample of the survey is a rotating panel composed of six waves. In each quarter, one sixth of the sample is renewed: the "oldest" wave leaves the sample, whereas a new wave enters. The survey provides a set of information about individuals' characteristics, such as their education, their labour market

status (constructed according to the definitions of the International Labour Organization) and their economic activity. The longitudinal structure of the FLFS allows us to match observations belonging to two consecutive surveys. We compute individuals' transitions and aggregate them to calculate the gross worker flows and transition rates in each quarter. Due to the structure of the database, at best, five sixths of the sample can be matched between two consecutive surveys. Panel attrition and non-response that reduce the size of the longitudinal sample, as well as sample fluctuations, may affect the estimation of labor market states (and so worker flows). In order to solve these statistical problems, Shimer (2012) and Silva and Vázquez-Grenno (2013) drop missing observations and reweight measured transitions by the missing-at-random method. We proceed differently: each longitudinal sample is reweighted by a method similar to the one proposed by Lundstrom and Sarndal (1999). The purpose is to equalize, according to some leading variables (labour market states in the first quarter; age pyramid by gender; household type; and education level), the structure of the longitudinal sample with the known population structure in period t . See Fontaine (2016) for details.²

The UKLFS is a quarterly survey of households living at private addresses in the United Kingdom. The panel samples around 60,000 households for five successive quarters. The sample is split into five waves. Every quarter, one wave of approximately 12,000 households leaves the survey and a new wave enters. See Gomes (2015a) for more details on the survey. Although the quarterly survey effectively starts in 1993, our baseline sample is restricted to the period between 2003:1 and 2016:4 to allow for a more straightforward comparison with the French survey.³ The Office for National Statistics already provides the census population longitudinal weights, which we use to construct the flows series.

Like its French counterpart, the SLFS is a quarterly representative survey in which the sample is divided into six waves. The SLFS samples about 65,000 households, which is equivalent to around 180,000 individuals. See Silva and Vázquez-Grenno (2013) for more details on the survey. Although the quarterly survey starts in 1999, for the main results we restrict our sample to the period between 2005:1 and 2015:4. The reason is that, before 2005, the Spanish Statistical Office implemented a significant methodological change regarding both the questionnaire and the data collection. As a consequence, it is not possible to link the time series of labour market transitions with the two different methodologies. As no longitudinal weights are provided, we follow the same procedure as the French survey to

²As Lundstrom and Sarndal (1999) demonstrate, this procedure can reduce sample fluctuations and the non-response bias and has been adopted by the French National Institute of Statistics and Economic Studies to correct non-response bias and sample fluctuations in the FLFS.

³Furthermore, the current ONS files exclude the April-Sept dataset for 2001 and the Autumn-Winter for 1996. We show in Appendix II the result of the unemployment decomposition for the full sample.

recalculate them.

Although our main interest is in European economies, for comparison with the rest of the literature, we provide evidence for the US, based on the CPS. The CPS surveys households for four consecutive months, omits them for eight months and then interviews them again for another four months. See Shimer (2012) for a description of the survey. In contrast to the European surveys, the CPS allows the researcher to compute the transition probabilities in the labour market at a monthly frequency. We extend the Shimer (2012) code, publicly available on his webpage. To avoid the breaks in the survey that are recurrent until 1995, we start our sample in 1996, but for comparison with the European countries, we report the results for the 2003-2017 period in the main text.

2.3 Definition of public jobs

In our view, the defining characteristic of the public-sector is that its goods or services are not sold, but are provided directly to the population. It uses the power of taxation to finance the production of public goods, rival or non-rival, and governmental services. There are two main government decisions that affect its employment level. First, governments decide the scope of the public sector – which goods and services they want to provide. Second, they decide whether to supply them directly by hiring workers – in-house production – or by outsourcing it to private sector firms. These decisions are usually the outcome of a political process and vary drastically across countries. As a consequence, the extent of the operation of the public sector in different industries varies. It is important to bear in mind that, in this paper, we do not focus on particular industries, i.e. public administration, but the entire sphere of public-sector employment, even if it involves different weights on particular industries. Given this conceptual view, we exclude from our definition of public-sector employment, public enterprises, or state-owned enterprises, that provide various private goods and services for sale and usually operate on a commercial basis.

The distinction between public- and private-sector jobs is based on a self-reported variable, which is in accordance with how official statistics are drawn. During the survey, the interviewer asks the individual to classify his employer. In the UK, we include the following categories in our definition of public-sector employment : i) Central Government, Civil Service; ii) Local government or council (incl. police, fire services and local authority controlled schools or colleges); iii) University or other grant-funded educational establishment; iv) Health authority or NHS trust; and v) Armed forces. We exclude from our definition every private organization, as well as: i) Public company; ii) Nationalised industry or state

corporation; iii) Charity, voluntary organisation or trust; and iv) other organisation. A similar definition is used for France.⁴ For Spain, the survey asks directly whether respondents work for the public or the private sector. For the United States, the definition of public sector is working for the government (federal, state or local government).

The shortcoming of a such declarative variable is that it could be subject to misclassification of the sector of work. Misreporting of the sector is not a serious problem in computing the overall stock of public and private sector employment, but it might overstate the transitions from public to private sector (and vice versa). Given that, for the unemployment decomposition in Section 4, we compute a time-aggregation bias correction; the overstating of flows between the two sectors can introduce noise or bias in all transition rates. A similar problem exists for the flows in between unemployment and inactivity and was addressed by Elsby *et al.* (2015). To solve this problem, we check whether the transitions between the sectors are spurious by controlling for the tenure of jobs. We validate a direct transition between the two sectors only when the respondent states that he has been working for the same employer for less than three months. Bradley *et al.* (2018) use a similar method. We consider a substantial percentage of flows between public and private sector as spurious. In France, the UK and Spain, 35, 65 and 85 percent of the flows, respectively are spurious.

Unfortunately, the CPS does not report the tenure on the job, so we cannot correct for spurious transitions for the United States; therefore, we have to be more careful in the interpretation of the US flows. When we perform the unemployment decomposition, we have performed a robustness check on the time-aggregation bias correction by assuming that all the recorded flows are spurious (shown in Appendix).

3 Worker gross flows

3.1 Average gross flows

Figure 1 summarizes the average quarterly (monthly) worker flows over the 2003-2015 period for the three European countries (United States). It reports the stocks of workers in thousands (t) and as a percentage of the working-age population (p), as well as the number

⁴We include: i) État; ii) Collectivités territoriales; iii) Hôpitaux publics; and iv) Sécurité sociale. We exclude: i) Particulier; ii) Entreprise publique; and iii) Entreprise privée. In the case of France, we construct a second measure of public employment. It is based on the declarative variable, but it is corrected by checking that the employer effectively belongs to the public/private sector. More specifically, with all information about the employer, a matching with the French official file SIRENE is done. As the latter is computable only for the 2003Q1-2012Q3 period, our preferred measure of public employment for France is the one based on the declarative variable. We present sensitivity of our results to this choice in Appendix II.

of people that change status every quarter (month) as a percentage of the working-age population (p) and as a transition probability or hazard rate (h). We restrict our analysis to the working-age population (16 to 64 years old). The public sector employs 17.1 percent of the working-age population in the UK, 13.6 percent in France, 12.2 percent in the US and 7.8 percent in Spain. It represents 24, 21, 16 and 16 percent of total employment, respectively.

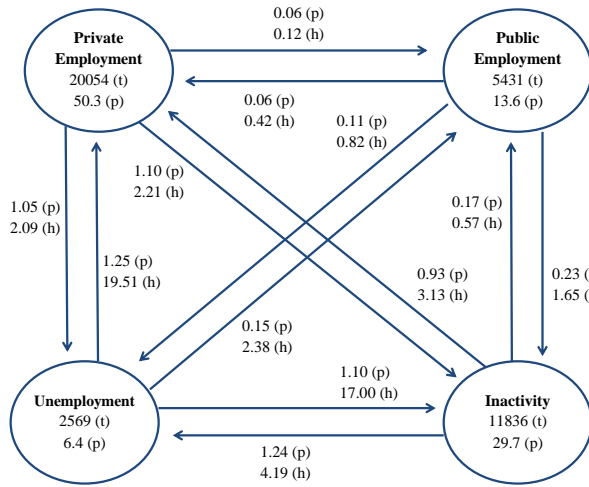
The main difference between the two sectors is their turnover. Labour turnover, between employment and non-employment, is lower in the public sector. In each quarter in the UK and France, flows in and out of private-sector employment represent around eight percent of its stock, while for the public sector, they are around 4.5 percent of its stock. In the United States, monthly turnover represents seven percent in the private sector and 4.6 percent in the public. In Spain, the turnover is larger, with 15.6 percent in the private sector and 9.8 percent in the public sector.

Fewer people separate from the public sector. The probability of moving from employment to unemployment is more than two times higher if working in the private sector in the four countries. It is almost three times in the UK, where the probability is 1.56 percent in the private sector and only 0.54 in the public sector. In all countries, the probability of moving from employment to inactivity is around 30 percent higher in the private relative to the public sector. Fewer separations imply that there are fewer hires. In the three European countries, while roughly 20 percent of the unemployed find a job in the private sector each quarter, only two to three percent find one in the public sector. In the United States, each month, 20.5 percent of the unemployed find a job in the private sector, while only 1.8 percent find a public-sector job.

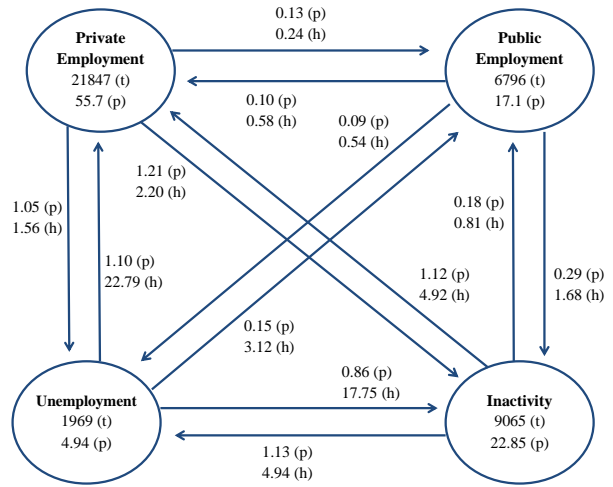
When leaving public-sector jobs to non-employment, workers are more likely to withdraw from the labor force. In France, 67 percent of outflows from the public sector (to non-employment) are directed to non-participation. The corresponding statistic for the private sector amounts to 51 percent. The finding is stronger in the UK and the US, where more than 70 percent of public-sector separations are to inactivity, but weaker in Spain, at 52 percent. Likewise, returns to public jobs from non-participation are also more frequent. In the three European countries, more than 50 percent of new hires in the public sector come from inactivity, whereas in the private sector, that number is less than 50 percent. In Section 5, we use a multinomial logit model to reevaluate these differences in separation probabilities between sectors, controlling for observable characteristics.

There are few direct transitions between employment in the two sectors. Each quarter in the UK, 0.24 percent of private-sector workers switch sector without a measured spell of

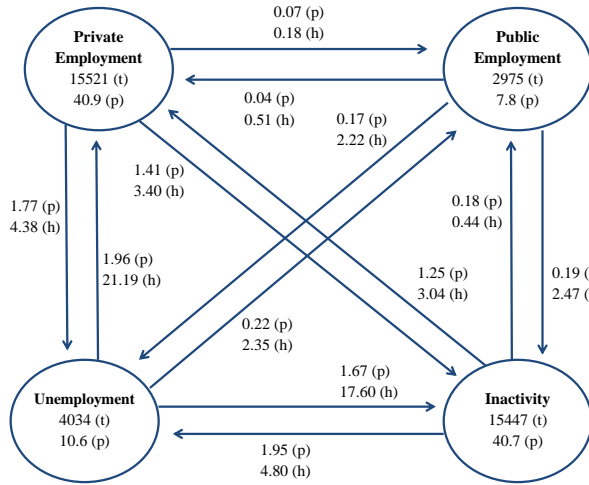
Figure 1: Average worker flows, 2003-2015



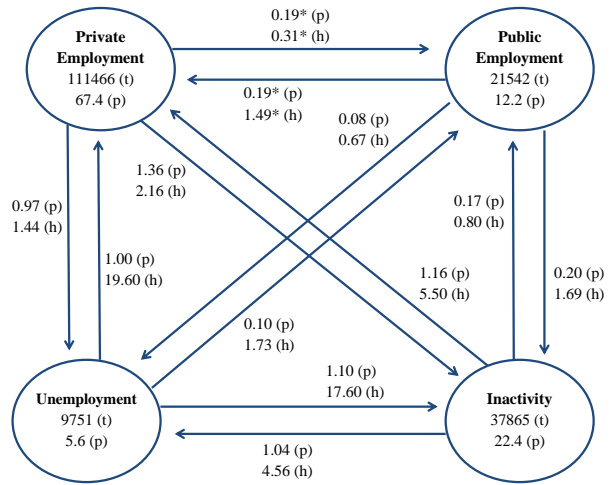
(a) France, quarterly flows



(b) UK, quarterly flows



(c) Spain, quarterly flows



(d) US, monthly flows

Note: the worker stocks and flows are expressed as total number of people in thousands (t), as a percentage of the working-age population (p) or as a hazard rate (h). Data extracted from the French, UK and Spanish Labour Force Survey, and the CPS. * For the US, flows between private and public employment were not corrected for spurious transitions.

unemployment. This represents less than 30 percent of all inflows into the public sector. In France and Spain, these flows are even smaller. Each quarter, only 16 percent of the new hires in this sector come directly from private employment. Understanding the importance of the direct transitions across the two sectors has implications for the theoretical literature on the effects of public-sector employment. While Bradley *et al.* (2018) model the direct transitions across the two sectors, most of the literature – including Gomes (2017) or Albrecht *et al.* (2018) – ignores these. We find that, although transitions between the two sectors are not negligible, most of the inflow into public-sector employment comes from non-employment.

The industries having the highest share of public-sector employment varies by country. In France and the UK, public-sector employment represents 85-90 percent of total employment in “Public administration and defence.” With around 75-80 percent of public-sector employment, “Education” is the sector with the second-highest fraction of public-sector employment. “Health and social work” has also a very high number of public-sector workers, but they represent only 55 percent of the total workers in the industry in the UK and 36 percent in France. Other industries where the public sector is relevant include “Water supply, sewerage, waste”, “Arts, entertainment and recreation” and “Extraterritorial organizations” (see table in Appendix I). In the SLFS, the industries “Public Administration, education and health activities” are not disaggregated, but within this group, 73 percent of employment is in the public sector. In the US, only 35 percent of employment in “Educational and health services” is in the public sector, that also but it accounts for 100 percent of employment in “Public administration” and “Armed forces”.

3.2 Disaggregated worker flows

The tables in Appendix III show the average stock and flows of different subgroups of workers, disaggregated by gender, education and age. Public-sector employment is particularly relevant for women. On average, 16.3 and 22.3 percent of all women are working in the public sector in France and in the UK, respectively. However, given than women’s labour market participation is lower than men’s, public-sector employment corresponds to 27 and 33 percent of total employment for women in the two countries. For Spain and the US, the gender differences are smaller. The Spanish and US public sectors hire 20 percent of all working women. In the four countries, the probability of a woman finding a job in the public sector is twice as high as for men.

The public sector hires predominantly workers with tertiary education. The French public sectors employs 23 percent of the population with tertiary education, 12 percent of people

with secondary education and only nine percent of people with only primary education. In the UK, these numbers are 31, 14 and eight percent. In Spain, these are 20.0, 5.6 and 1.6 percent, similar to the 22, nine and 2.4 percent in the US. Public-sector employment of college graduates represents more than a quarter of their employment in France, Spain and the US and an extraordinary 38 percent in the UK.

Job-finding rates are increasing and job-separation rates are decreasing in education in both sectors. In France, the fraction of the job-finding rate accounted for by the public sector increases from ten percent for primary-educated workers to 13 percent for college graduates. In the other countries, the differences are larger. This fraction increases from eight to 23 percent in the UK, from eight to 16 percent in Spain and from three to 19 percent in the US. In the US, the public sector does not play any role in the labour market for primary-educated workers, but it accounts for one fifth of all new hires of college graduates.

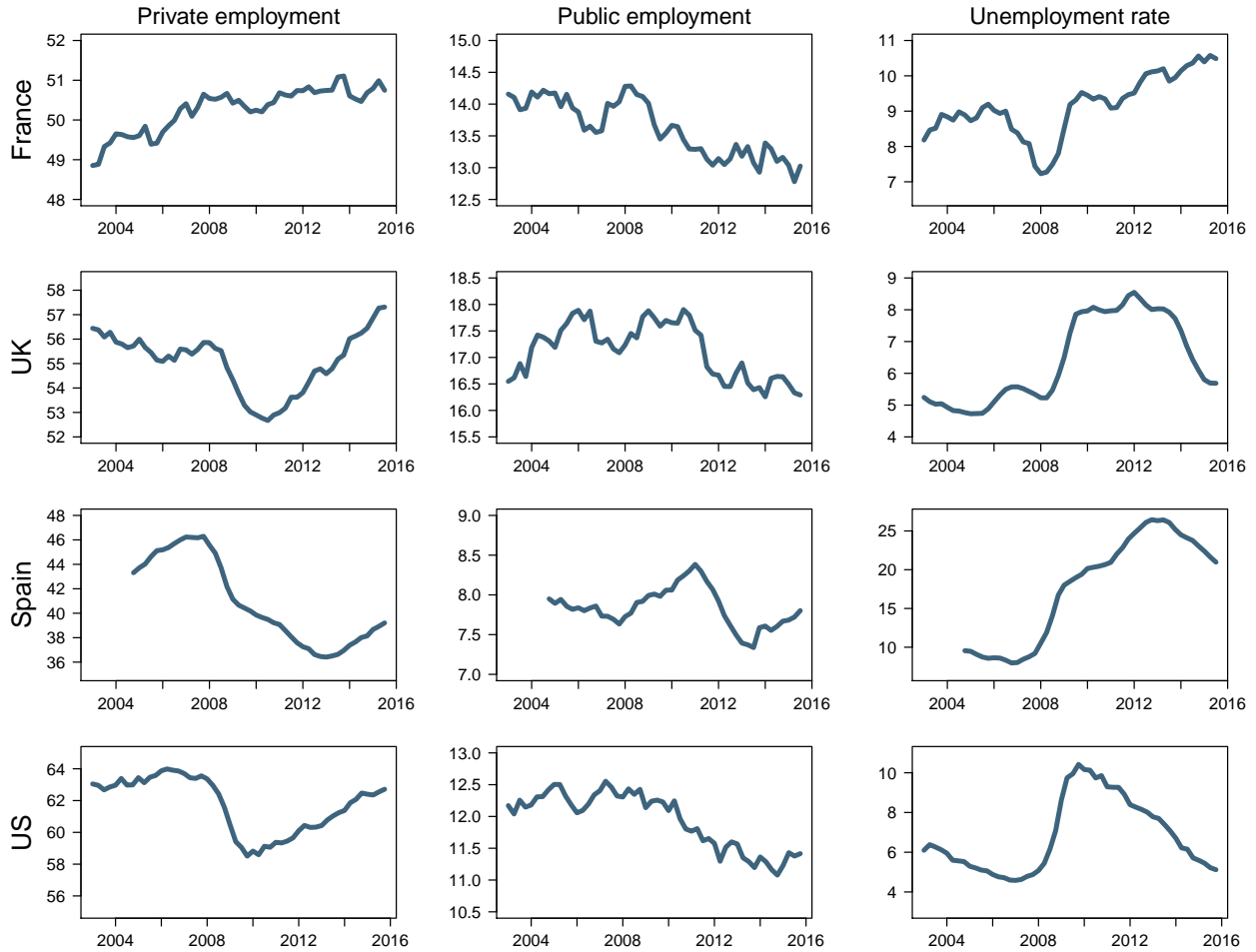
The public sector hires few young workers. Out of all employed workers aged 15 to 24, the public sector accounts for only 13 percent in France, 11 percent in the UK and about seven percent in Spain and the US. In France and the UK, most public-sector employment is concentrated on prime-age workers. The French and UK's public sectors employ 17.4 and 20.4 percent, respectively, of all workers aged 25-49. However, as a fraction of total employment, the public sector is more significant for older workers (age 50-64), accounting for 24 and 27 percent of their employment. This means that, in the private sector, older workers leave the labour force at a faster pace. This age profile is even stronger in Spain and the US, where the public sector employs around 15 percent of prime-age employed workers and 22 percent of older employed workers.

3.3 Evolution of labour market stocks and flows

Figure 2 displays the evolution of the public and private employment rates and the unemployment rate, while Figure 3 shows the transition probabilities between unemployment and employment in both sectors. All the gross worker series were previously seasonally adjusted. The graphs with the remaining transition probabilities are shown in Appendix I.

Our sample covers the period of the Great Recession. In France, from 2003 until 2008, the unemployment rate fell to seven percent. After that, it increased regularly until it was above ten percent by the end of 2015. In the UK, prior to the Great Recession, the unemployment rate was stable at five percent. In 2008, it increased sharply, hit its peak in 2012 at 8.5 percent and has fallen since. In Spain, the unemployment rate increased from less than ten

Figure 2: Labor market stock

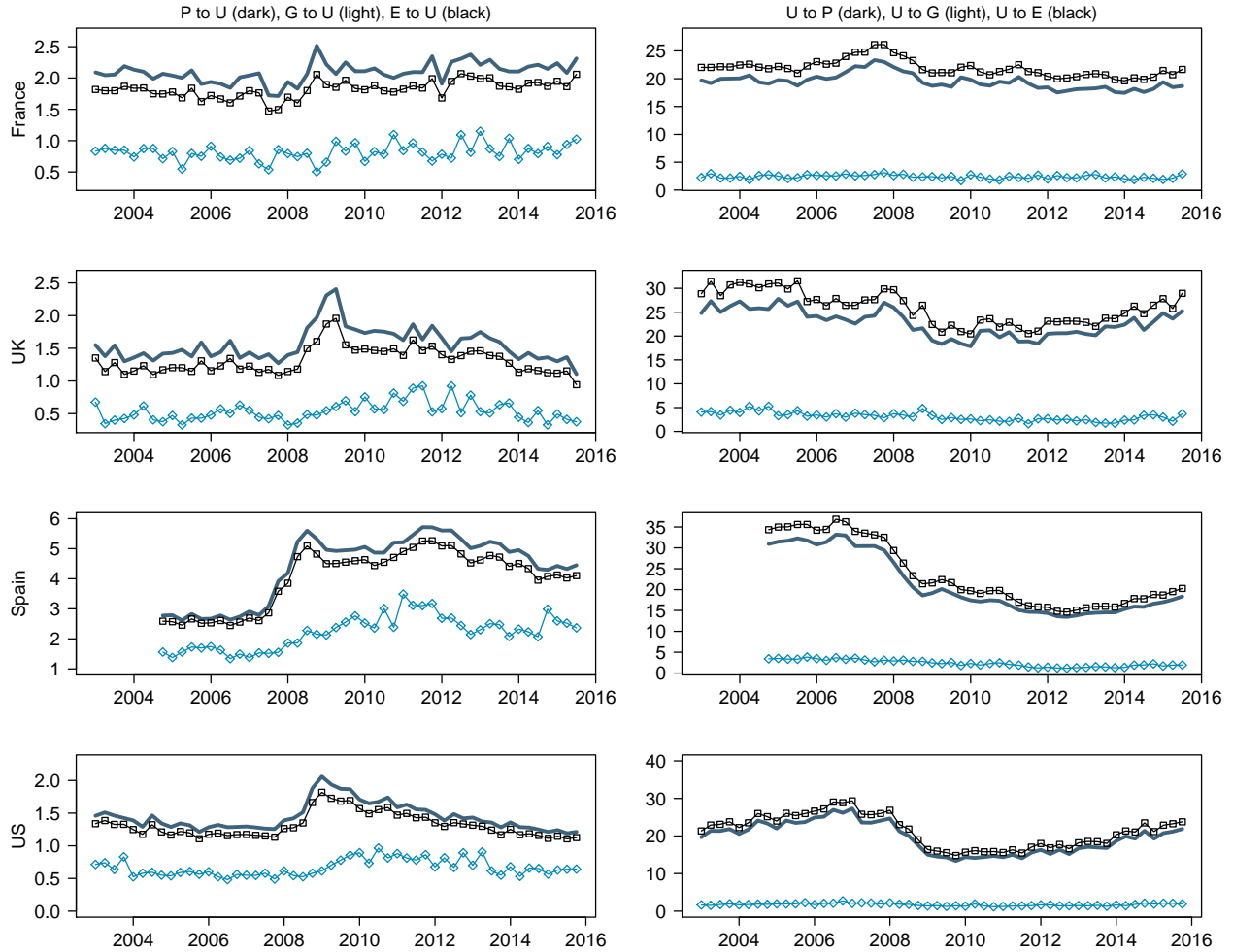


Note: private- and public-sector employment are expressed in percentage of the working-age population. The unemployment rate is in percentage of the labour force.

percent before 2008 to 25 percent in 2013. In the US, the unemployment rate increased sharply between 2008 and 2010, but then began to decline, reaching pre-crisis levels by the end of the sample.

One can observe that the size of the public sector diminished in all countries in the last years of the sample. In France, starting in 2008, it decreased by 300,000 workers - 1 percentage point of the working-age population. This means that the government did not carry a countercyclical policy. On the contrary, in the UK, the government initially increased the number of public-sector workers between 2008 and 2010, by 1 percentage point of the working-age population. The reduction of public-sector employment started only after 2010, with a decline equivalent to two percentage points of the working-age population - equivalent

Figure 3: Transition rates between employment and unemployment.



to half a million workers. This sharp reduction in public-sector employment since 2010 was achieved mainly with increases in outflows. Compared to the first half of the sample, there were more five thousand workers that moved to unemployment and 7.5 thousand that move to inactivity from public employment in each quarter.

In Spain, from its peak in 2011, public employment fell by 400,000 workers in less than three years (1 percent of the working-age population), recovering half by the end of the sample period. The job-separation rate to unemployment increased from 1.5 percent in the beginning of the sample and reached 3.5 percent in 2011. Also, the job-finding rate in the public sector fell from 3.5 percent at the beginning of the sample to 1.5 percent at the end. In the US, public-sector employment declined as a fraction of the working-age population between 2008 and 2016

3.4 Cyclicity of worker flows

To have a more precise measure of the cyclicity of the hazard rate, we run an ordinary least squares regression of the log of each transition rate on a linear trend and the unemployment rate. This follows Baker (1992), who undertakes a similar procedure to analyse the cyclical movements of unemployment duration. The results are shown in Table 1.⁵ The table also shows the cyclicity of several measures of the public-sector employment stock.

The regression of different measures of stocks of public-sector employment confirms the differences in cyclicity across the four countries, over the last recession. When we measure public-sector employment in levels (logs) or as a fraction of the working-age population, it is procyclical in France, countercyclical in the UK and acyclical in Spain and the US. Naturally, when we measure as a fraction of total employment or private employment, as the denominator is very procyclical, it makes the ratio more countercyclical.

Table 1: Cyclical variation of public-sector employment stock and hazard rates

	France		UK		Spain		US	
<i>Stock of public-sector employment</i>								
$\log G$	-0.015*	(-3.78)	0.012*	(3.96)	-0.001	(-0.54)	0.003*	(3.68)
$\frac{G}{W}$	-0.179*	(-3.73)	0.152*	(3.29)	0.003	(0.32)	-0.000	(-0.03)
$\frac{G}{P+G}$	-0.113	(-1.74)	0.499*	(8.03)	0.217*	(12.72)	0.209*	(16.56)
$\frac{G}{P}$	-0.179	(-1.72)	0.856*	(7.98)	0.306*	(12.62)	0.297*	(16.52)
<i>Hazard rates</i>								
$P \rightarrow U$	0.056*	(3.94)	0.099*	(10.92)	0.037*	(4.20)	0.070*	(20.70)
$G \rightarrow U$	0.081**	(2.36)	0.147*	(8.22)	0.035*	(4.51)	0.068*	(8.88)
$P \rightarrow I$	0.013	(1.03)	-0.016*	(-3.00)	-0.043*	(-5.14)	-0.027*	(-13.15)
$G \rightarrow I$	0.031	(1.23)	0.016	(1.82)	0.016**	(2.08)	-0.020*	(-4.15)
$U \rightarrow P$	-0.078*	(-8.69)	-0.082*	(-16.25)	-0.051*	(-10.41)	-0.106*	(-41.92)
$U \rightarrow G$	-0.078**	(-2.49)	-0.122*	(-6.25)	-0.045*	(-5.42)	-0.094*	(-11.92)
$I \rightarrow P$	-0.036*	(-3.19)	-0.082*	(-15.34)	-0.059*	(-7.37)	-0.049*	(-24.35)
$I \rightarrow G$	-0.023	(-0.80)	-0.066*	(-4.74)	-0.040*	(-2.94)	-0.037*	(-7.20)
$U \rightarrow I$	0.021	(1.27)	-0.059*	(-8.07)	-0.024*	(-4.96)	0.103*	(34.40)
$I \rightarrow U$	0.142*	(8.35)	0.072*	(17.91)	0.009	(1.29)	0.102	(43.47)
$P \rightarrow G$	-0.169*	(-3.10)	-0.113*	(-5.59)	-0.048*	(-4.35)	-0.012	(-2.42)
$G \rightarrow P$	-0.128*	(-2.27)	-0.100*	(-7.06)	-0.024*	(-4.96)	0.001	(0.24)

*Note: the cyclicity of the hazard rates is the coefficient on unemployment rate in a regression of the series in logs on a time trend and the unemployment rate. The cyclicity of the stock is the coefficient on unemployment rate in a regression of the indicated measure on a time trend and the unemployment rate. T-statistics are in brackets. * denotes significant at 1% and ** significant at 5%. The sample is between 2003:1 and 2016:4.*

⁵Appendix I contains similar table with the results with the gross flows as a fraction of the working-age population.

The hazard rates into and out of public-sector employment are very cyclical, with magnitudes similar to those of its private sector counterpart. The separation rates from employment in both the public and private sectors to unemployment are strongly countercyclical, while the job-finding rates are strongly procyclical. The hazard rates between the two sectors are also strongly procyclical, except in the US, where, as mentioned before, we could not correct these rates for spurious transitions. In expansions, there are more direct transitions between the two sectors. In all countries, inflows into employment from inactivity (public or private) are moderately procyclical. We now analyse in more detail the importance of inflows and outflows into public-sector employment for unemployment fluctuations.

4 The role of the public sector in driving unemployment

4.1 Why does the public sector matter?

To understand the effects of ignoring the public sector when decomposing unemployment fluctuations, consider the following example of an economy with a public sector that has extremely low turnover. By this, we mean a separation rate λ^{GU} very close to zero, as well as the hiring rate λ^{UG} . There are also no movements between public and private sector. This scenario translates into a public sector with fixed size \bar{G} , unresponsive to the economic cycle. If one were to do a standard two-state decomposition, between total employment (E) and (U), the measured job-finding and job-separation rates would be:

$$\lambda^{UE} = \lambda^{UP},$$

$$\lambda^{EU} = \frac{N^{PU}}{P + \bar{G}} = \frac{\lambda^{PU}}{1 + \frac{\bar{G}}{P}},$$

where N^{PU} is the total number private sector workers that lost their jobs. We get the second equality by dividing both the numerator and denominator by P . Notice that the presence of the public sector would not affect the job-finding rate, but it would reduce the job-separation rate by a factor of $(1 + \frac{\bar{G}}{P})$. This can be seen clearly in Figure 3 - the overall job-finding rate is the sum of the job-finding rates in the two sectors, but the job-separation rate is a weighted average of the sectoral job-separation rates. The main problem for the unemployment decomposition is that, in a scenario with fixed public-sector employment, the ratio $\frac{\bar{G}}{P}$ will have a cyclical pattern. Consider a recession driven simultaneously by a decrease in job-finding and an increase in job-separation from the private sector. As $\frac{\bar{G}}{P}$ goes

up, λ^{PU} would go up by less than the separation rate in the private sector, so one would underestimate the true contribution of separations.

The role of the public sector is more complex than this example shows because, in reality, government policies do have a cyclical pattern. As we have seen, there be a procyclical public-sector employment, as in France, countercyclical, as in the UK, and acyclical, as in Spain. Furthermore, whether this cyclicity happens because the government increases or decreases hirings in recessions, or because there are fewer or more separations, could either reinforce or mitigate this bias in the unemployment decomposition.

4.2 Unemployment decompositions

The starting point for all unemployment decompositions is the equation of the steady-state unemployment u_t^{ss} . With four states, the equilibrium unemployment is a function of all 12 transition probabilities. See Appendix II for the exact formula and the comparison between equilibrium and actual unemployment in the four countries. We perform two decomposition methods, one based on Shimer (2012) and the other on Fujita and Ramey (2009). In this section, all the transition probabilities were previously corrected for time-aggregation bias using the methodology applied by Shimer (2012). Other exercises, such as longer sample, alternative variables, no detrending, 3-states decomposition, and a non-steady-state decomposition, are shown in Appendix II.

Table 2 displays the importance of each transition probability for the four countries and the two methodologies. The bottom part of the table provides the relative split of the contribution of different rates to fluctuations in the unemployment rate. Out of the total contribution of flows in and out of employment, 20 percent are attributed to the public sector in France and the UK, while only ten percent in Spain and there US. Out of these, the inflows to public employment are more important than the outflows, with a relative split of around 70-30.

Consistent with the literature, private sector job-finding rate is more important than its job-separation rate, with a rough 60-40 split. In Appendix II, we show the usual three-state decomposition. Given the cyclicity of the stocks and transition probabilities in this sample, accounting for the public sector barely changes the relative importance of job-finding and job-separation rates in France, but it matters marginally for the UK, where the ratio of public to private employment is more strongly countercyclical.

As in Elsby *et al.* (2011) or Hertweck and Sigrist (2015), we perform the unemployment decomposition for different sub-groups of the population, based on gender, age and education.

Table 2: 4-states unemployment decompositions

	Shimer decomposition				Fujita & Ramey decomposition			
	France	UK	Spain	US	France	UK	Spain	US
$P \rightarrow U$	0.22	0.21	0.27	0.22	0.23	0.20	0.24	0.21
$G \rightarrow U$	0.03	0.05	0.03	0.01	0.03	0.05	0.03	0.01
$P \rightarrow I$	-0.01	-0.02	-0.02	-0.02	-0.01	-0.02	-0.02	-0.02
$G \rightarrow I$	0.02	0.01	0.01	0.00	0.02	0.01	0.01	0.00
$U \rightarrow P$	0.36	0.36	0.43	0.40	0.37	0.34	0.47	0.40
$U \rightarrow G$	0.08	0.11	0.07	0.04	0.08	0.10	0.08	0.04
$I \rightarrow P$	0.07	0.08	0.07	0.05	0.08	0.08	0.07	0.05
$I \rightarrow G$	0.02	0.02	-0.01	0.01	0.02	0.02	-0.01	0.01
$I \rightarrow U$	0.18	0.08	0.06	0.12	0.20	0.08	0.04	0.11
$U \rightarrow I$	0.01	0.10	0.11	0.14	0.01	0.09	0.10	0.14
$P \rightarrow G$	0.02	0.02	0.00	0.00	0.02	0.01	0.00	0.00
$G \rightarrow P$	-0.01	-0.01	0.00	0.00	0.00	-0.01	0.00	0.00
Relative contributions (sum to 100)								
Private employment vs. Public employment								
	81-19	77-23	90-10	91-9	80-20	78-22	89-11	91-9
Public job-finding rate vs. Public job-separation rate								
	76-24	68-32	69-31	73-27	74-26	68-32	75-25	77-23
Private job-finding rate vs. Private job-separation rate								
	62-38	63-37	61-39	65-35	61-39	63-37	67-33	65-35
Job-finding rate vs. Job-separation rate [3-states]								
	62-38	64-36	62-38	68-32	61-39	60-40	66-33	65-35

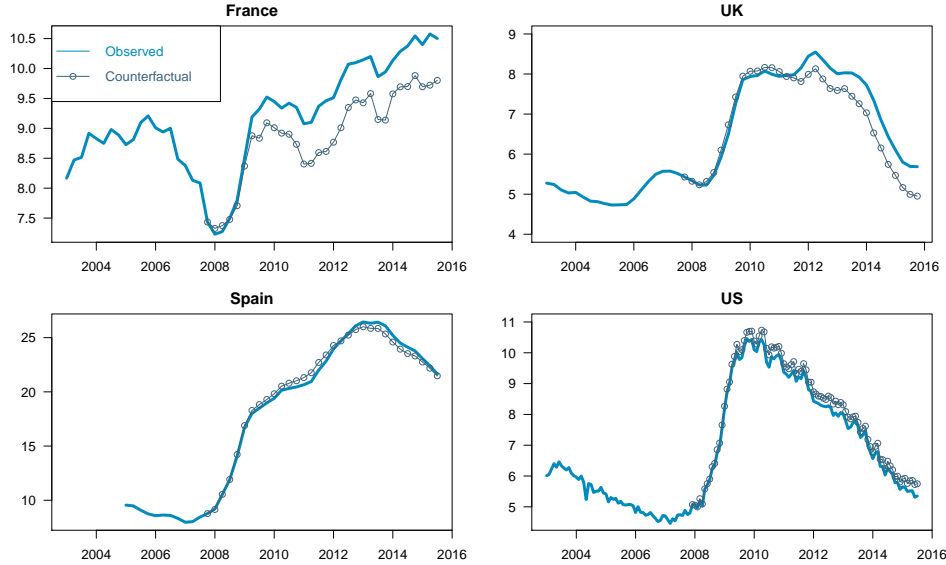
Note: the gross flows series are previously seasonally adjusted using the X13 Census programme and the transition probabilities are corrected for time-aggregation bias using the methodology applied by Shimer (2012). The series are then detrended with an HP filter with smoothing parameter of 100000.

We show the complete tables in Appendix III. In general, the contribution of the public sector to fluctuations in unemployment is proportional to its size. In France and the UK, the transition rate in and out of public-sector employment contributes to around 30 percent of women’s unemployment, compared to less than ten percent of the male unemployment rate. In the European countries, the public sector accounts for a larger fraction of fluctuations in the unemployment rate of prime-age workers, with 24, 26 and 12 percent for France, UK and Spain. Finally, the public sector accounts for more than 40 percent of the fluctuation in the unemployment rate of college graduates in the three European countries.

4.3 Unemployment during the Great Recession: a counterfactual

While the previous sub-section is based on an analysis of the transition rates, we now perform an alternative analysis based on the level of worker gross flows. From the first quarter of 2008, we calculate what the unemployment rate would have been if the number of people hired and separated from the public sector had been equal to the average of the sample until

Figure 4: Counterfactual unemployment rate



2007. We assume that the number of people that transited between the other three states (private-sector employment, unemployment and inactivity) are equal to the actual ones.

Figure 4 shows the actual and counterfactual unemployment rates. In France, from 2010 onwards, the unemployment rate would have 0.7 percentage points lower if the hirings and separations in the public sector had been kept constant. In the UK, since 2012, the unemployment rate would have fallen faster if the government had not reduced public-sector employment. The difference is 0.4 percentage points. Confirming the results from the previous section, the role of the public sector was smaller in Spain and the US. Spain’s public-sector employment policy mitigated both the increase in unemployment until 2013 and its decline after that. The US is the only country that would have had a higher unemployment rate without a change in policy, although by only 0.1 percentage point. While the government employment component of American Recovery and Reinvestment Act of 2009 contributed to reduce unemployment, the government employment component of the austerity policies followed by European countries generated higher unemployment.

5 How safe are public-sector jobs?

The argument that public-sector jobs are safer is often used in policy discussions over public-sector wages. According to Gomes (2015a), the optimal design of the public-sector wage schedule should take job security into account. Safer jobs raise a job’s expected duration of a job and reduce the expected time spent in unemployment. Thus, the government

should offer lower wages in order to keep the value of a public-sector job in line with that of the private-sector job. Hence, the estimation of the differences in job-loss probabilities between the two sectors is extremely relevant from a policy perspective, but to the best of our knowledge, there are no available estimates of value of the job safety that government provides.

5.1 Conditional job-separation rates

The evidence on the average gross flows provided in Section 3 suggests that jobs in the public sector are indeed safer than those in the private sector. However, we also documented a significant amount of heterogeneity along gender, education and age, so the lower aggregate job-separation rates might be due, in part, to composition effects. In this section, using a multinomial logit model, we estimate the probabilities of transitioning out of employment conditional on observable characteristics. Conditional on being employed, a worker can keep his job, become unemployed or become inactive. We consider, staying employed as the base outcome and compute the probabilities of becoming unemployed or inactive as:

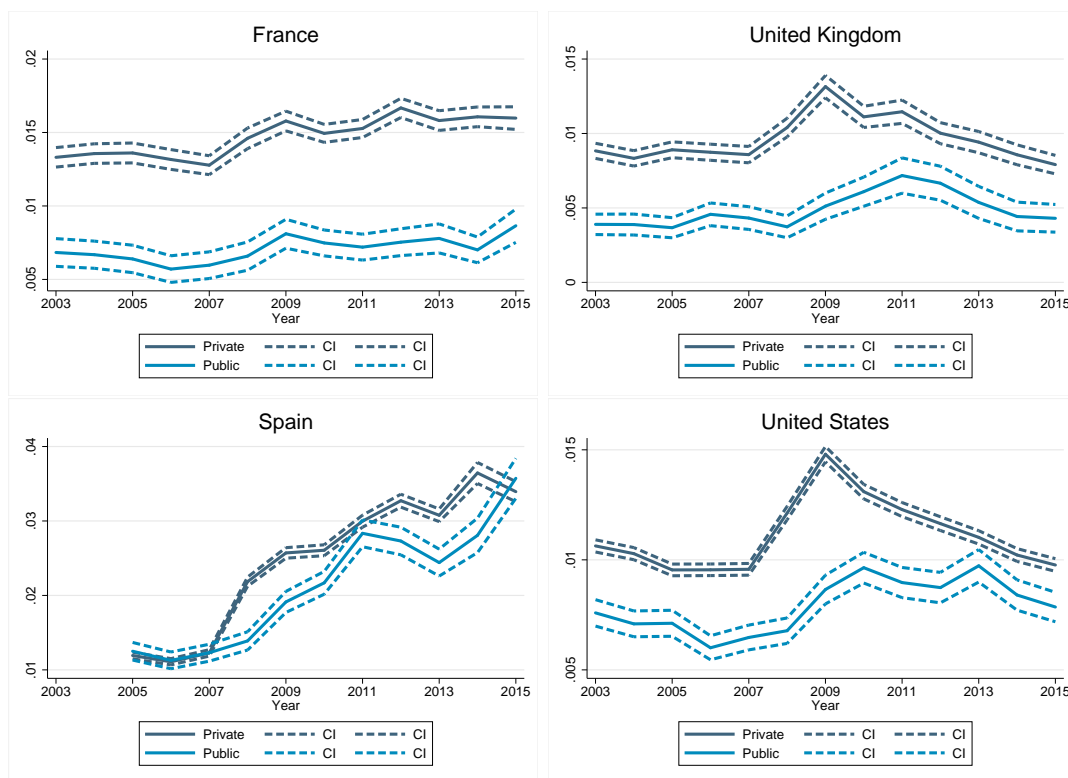
$$\lambda_i^U = \frac{\exp(x_i\beta_U)}{1 + \exp(x_i\beta_U) + \exp(x_i\beta_I)}, \quad (5)$$

$$\lambda_i^I = \frac{\exp(x_i\beta_I)}{1 + \exp(x_i\beta_U) + \exp(x_i\beta_I)}, \quad (6)$$

where x_i includes, as control variables, dummies for education, region, gender, occupation and age. It also includes year dummies and year dummies interacted with being previously employed in the public sector. Using the estimates, we are able to compute the evolution of the predicted transition probabilities in both sectors over time, for an employee with the average characteristics in the economy. Figure 5 shows the predicted probability of moving to unemployment.

There are still large differences in the probability of moving to unemployment in the two sectors, even controlling for observable characteristics. However, they are smaller than the difference in unconditional separation rates, suggesting that a significant part is due to composition effects. These differences are particularly large in France and the UK, where the job-separation rates are twice as high in the private sector. The differences are smaller in the United States, where the probability of moving to unemployment is 50 percent higher in the private sector, and even smaller in Spain, where it is only 15 percent higher. In all countries, job-separation rates in the private sector increased in the first years of the crisis.

Figure 5: Transition probability from employment to unemployment, by sector



Note: Based on estimation of equations A10 and A10 using a multinomial logit. For France, there were 1,634,340 observations and a pseudo R-squared of 0.092. For the UK, there were 1,417,683 observations and a pseudo R-squared of 0.077. For Spain, there were 1,989,672 observations and a pseudo R-squared of 0.090. For the US, there were 7,593,719 observations and a pseudo R-squared of 0.068. For France, the UK and Spain, the transition rate was quarterly, while in the US, it was monthly. We used as controls regional, gender, age, education and occupation dummy variables. The predicted probability is calculated based on an individual with the average characteristics of the employed population. The sample covers 2003-2015 (2005-2015 for Spain). The dashes lines report the 95 percent confidence interval on the prediction.

However, they also increased in the public sector, but in later years, thus reducing the gap with the private sector by the end of the sample. In Appendix IV, we show the predicted probabilities of moving to inactivity, but for the transition to inactivity difference between the two sectors is small in all countries – between 10 to 16 percent higher – and, in general, the confidence intervals overlap.

5.2 The value of safety in the public sector: a back-of-the-envelope calculation

What do these differences represent? We use a metric to perform a back-of-the-envelope calculation, based on the Bellman equation of employment and unemployment, stipulated

by search models in continuous time:

$$rV^e = \frac{w^{1-\sigma}}{1-\sigma} - \delta(V^e - V^u), \quad (7)$$

$$rV^u = \frac{(z \times w)^{1-\sigma}}{1-\sigma} + f(V^e - V^u), \quad (8)$$

where the V^e and V^u are the value of employment or unemployment, w the wage rate, z the flow value of unemployment expressed as a replacement rate of the wage, f the job-finding rate, δ the job separation rate, σ the degree of risk aversion and r the discount rate. Using these two equations, we can calculate the value of a lower job-separation rate. The exercise is to calculate what fraction of their wage private-sector workers would be willing to give up to have the same job-separation rate as public-sector workers.

We consider two cases. In the first case, workers are risk-neutral ($\sigma = 0$), meaning that the value from job security comes only from spending a smaller fraction of time unemployed. This provides a lower bound on the value of job security. In the second case, we consider risk-averse workers ($\sigma = 2$) with no method of savings, which we interpret as an upper bound.

Using the two equations, we calculate $V^e - V^u$ and substitute back in equation 7 in order to get the value of employment as a function of wage, separation rate, job-finding rate, unemployment replacement rate, risk aversion and interest rate. For two different separation rates, δ^1 and δ^2 , the ratio of wages that equate the value of employment is given by:

$$\frac{w^2}{w^1} = \left[\frac{(r + \delta^2 + f)(r + \delta^1 \times z^{1-\sigma} + f)}{(r + \delta^1 + f)(r + \delta^2 \times z^{1-\sigma} + f)} \right]^{\frac{1}{1-\sigma}}, \quad (9)$$

which, under risk neutrality, collapses to:

$$\frac{w^2}{w^1} = \frac{(r + \delta^2 + f)(r + \delta^1 \times z + f)}{(r + \delta^1 + f)(r + \delta^2 \times z + f)}. \quad (10)$$

The ratio of the two wages depends on the value of unemployment – in particular, how bad it is relative to employment replacement rate) and how persistent it is (job-finding rate). Notice that when the replacement rate is 1, the four terms cancel out, meaning that workers would not be willing to sacrifice any wage for a lower job-separation rate. Naturally, if the flow value on unemployment is exactly the same as the value of working, differences in job-separation rates do not matter.

For the back-of-the-envelope calculation, we have five scenarios for the value of unem-

Table 3: Back-of-the-envelope calculation on public-sector job-security premium

	Scenario for value of unemployment					Government budget		
	Very low	Low	Medium	High	Very high	(medium scenario)		
	$z = 0.3$	$z = 0.3$	$z = 0.5$	$z = 0.7$	$z = 0.7$	Millions	% of GDP	% of Gov Spending
	$f = \min$	$f = \text{mean}$	$f = \text{mean}$	$f = \text{mean}$	$f = \max$			
Lower bound: risk neutrality ($\sigma = 0$)								
<i>France</i>	2.5%	2.2%	1.6%	0.9%	0.8%	4443 (€)	0.20	0.39
<i>UK</i>	1.6%	1.2%	0.9%	0.6%	0.4%	1484 (£)	0.08	0.20
<i>Spain</i>	1.3%	0.9%	0.6%	0.4%	0.3%	747 (€)	0.07	0.17
<i>US</i>	1.6%	0.9%	0.6%	0.2%	0.2%	11184 (\$)	0.06	0.18
Upper bound: risk aversion ($\sigma = 2$) and no insurance								
<i>France</i>	6.9%	6.3%	2.9%	1.3%	1.1%	8241 (€)	0.38	0.72
<i>UK</i>	4.6%	3.7%	1.6%	0.7%	0.6%	2843 (£)	0.15	0.39
<i>Spain</i>	3.0%	2.3%	1.1%	0.5%	0.3%	1310 (€)	0.12	0.30
<i>US</i>	4.2%	2.5%	1.1%	0.3%	0.2%	21127 (\$)	0.12	0.34

Note: The first five columns of table report the fraction of the wage that a private-sector worker is willing to forgo to have the same conditional job-separation rate as a public-sector worker in each country, depending on the replacement rate and job-finding rate. The discount rate r is set to 0.005 for France, the UK and Spain and to 0.0017 for the US. We calculate the budgetary value of job-security based on 2015 data on wage compensation of government workers, GDP and total government spending provided by AMECO and FRED datasets.

ployment, created with different values for the replacement rate ($z = 0.3$, $z = 0.5$ and $z = 0.7$) and for the job-finding rate (the mean, minimum and maximum of the sample for each country). The results are in the Table 3, using the average conditional rates in Figure 5.

The lower bound of the value of job security varies between 0.2 and 2.5 percent of the wage for this range of realistic scenarios across the four countries, and the upper bound varies between 0.2 and 6.9 percent of the wage. For the medium scenario for the value of unemployment, workers would value this job security between 1.6 and 2.9 percent for France, 0.9 to 1.6 percent for the UK and 0.6 to 1.1 percent for Spain and the US. We redo the exercise using the unconditional job-separation rates in Figure 1, as well for the different education levels, and show them in Appendix IV.⁶

To have an alternative metric, we get national accounts data from AMECO and FRED datasets on “Compensation of employees: general government” for 2015. The compensation to government employees represents, respectively, 12.8, 9.1, 11.1 and 10.3 percent of GDP

⁶Using the unconditional rates, the job-security premium is roughly double from the baseline numbers. In France, the UK and the US, workers with less education are willing to pay more for the job safety of the public sector. On the other hand, the Spanish public sector has a lower separation rate for only college graduates.

in France, the UK, Spain and the US. The numbers from national accounts will bias the size of the public-sector wage bill downward, because they only account for a subset of the total number of public-sector workers. Using the medium value of unemployment scenario and risk neutrality, the value of a lower job-separation rate is equivalent to between 0.06 to 0.2 percent of GDP, or, alternatively, 0.2 to 0.4 percent of total government spending. The upper bound is roughly double: between 0.12 to 0.38 percent of GDP or 0.3 to 0.72 percent of total government spending.

This exercise provides only an interval for the value of job-security in the public sector, as we are considering two extreme scenarios. In the lower bound, with risk-neutral workers, the value arises from differences in expected duration of the match. In the upper bound, we do not allow any self-insurance mechanism. A more precise answer would require considering several insurances mechanisms, but that would require a more complicated framework. We leave such calculations for future work.

6 Conclusion

The objective of this paper was to establish a number of key facts about public- and private-sector labour market flows. It provides a picture of a wide range of information about worker gross flows from different angles, improving our understanding of the workings of these two labour markets. The main findings of this paper can be summarised as follows:

- In France and the UK, the public sector represents 21 and 23 percent of total employment, respectively. Spain and the US have smaller public sectors, representing 16 percent of total employment.
- There is 30 to 50 percent less turnover in the public sector relative to the private sector.
- In each quarter (month in the US), the probability of a worker losing his job is 2-3 times higher in the private sector. Part of the difference is due to composition effects.
- In each quarter (month in the US), an unemployed worker has a 20 percent probability of finding a job in the private sector and only a two to three percent chance of finding a public-sector job.
- There are few direct transitions between the public and private sectors: 70 to 85 percent of the new hires in the public sector come from non-employment.

- The French and UK public sectors accounts for around 30 percent of total employment of women. The Spanish and US public sectors account for 20 percent. In all countries, the probability of women finding a job in the public sector is twice as high as for men.
- Public sectors hire predominantly college graduates, accounting for between 25 and 40 percent of their employment. The public sector is not relevant for workers with only a primary education.
- The public sector represents a larger fraction of employment of older workers, accounting for 25 percent of their employment in France and the UK and 22 in Spain and the US. The public sector hires few young workers.
- Since 2005, public-sector employment has been countercyclical in the UK, procyclical in France and acyclical in Spain and the US.
- Public-sector employment explains 20 percent of the fluctuations in the unemployment rate in France and the UK, but only ten percent in Spain and the US.
- Public-sector employment explains a larger fraction of the fluctuations in unemployment rate of women, college graduates and older workers.
- Public-sector employment policies contributed to higher unemployment rate in France and UK between 2010 and 2015, by 0.7 and 0.4 respectively.
- Private-sector workers would be willing to forgo 0.6 to 2.9 percent of their wage to have the same job security as in the public sector.

This paper is starting point of a larger research agenda to study the effects of public-sector employment using structural models, focussing on the heterogeneity across education (Chassamboulli and Gomes, 2018), gender (Gomes and Kuehn, 2018) and age (Gomes and Wellschmied, 2018).

References

- AFONSO, A., AND P. GOMES (2014): “Interactions between private and public wages,” *Journal of Macroeconomics*, 39(PA), 97–112.
- ALBRECHT, J., M. ROBAYO-ABRIL, AND S. VROMAN (2018): “Public-Sector Employment in an Equilibrium Search and Matching Model,” *Economic Journal*, Forthcoming.

- ALESINA, A., R. BAQIR, AND W. EASTERLY (2000): “Redistributive Public Employment,” *Journal of Urban Economics*, 48(2), 219–241.
- ALESINA, A., S. DANNINGER, AND M. ROSTAGNO (1999): “Redistribution Through Public Employment: The Case of Italy,” NBER Working Papers 7387, National Bureau of Economic Research, Inc.
- BAKER, M. (1992): “Unemployment Duration: Compositional Effects and Cyclical Variability,” *American Economic Review*, 82(1), 313–21.
- BAUSSOLA, M., AND C. MUSSIDA (2014): “Transitions in the Labour Market: Discouragement Effect and Individual Characteristics,” *LABOUR*, 28(2), 209–232.
- BERMPEROGLOU, D., E. PAPPA, AND E. VELLA (2017): “The Government Wage Bill and Private Activity,” *Journal of Economic Dynamics and Control*, Forthcoming.
- BLANCHARD, O. J., AND P. DIAMOND (1990): “The cyclical behavior of the gross flows of U.S. workers,” *Brookings Papers on Economic Activity*, 21(2), 85–156.
- BOEING-REICHER, C., AND V. CAPONI (2017): “Public wages, public employment, and business cycle volatility: Evidence from U.S. metro areas,” Discussion paper.
- BORJAS, G. J. (1984): “Electoral Cycles and the Earnings of Federal Bureaucrats,” *Economic Inquiry*, 22(4), 447–59.
- BOROWCZYK-MARTINS, D., AND E. LALÉ (2018): “The Rise of Part-time Employment,” Discussion paper.
- BRADLEY, J., F. POSTEL-VINAY, AND H. TURON (2018): “Public sector wage policy and labour market equilibrium: a structural model,” *Journal of the European Economic Association*, Forthcoming.
- BURDETT, K. (2012): “Towards a theory of the labor market with a public sector,” *Labour Economics*, 19(1), 68–75.
- CARRILLO-TUDELA, C., B. HOBIJN, P. SHE, AND L. VISSCHERS (2016): “The extent and cyclicity of career changes: Evidence for the U.K.,” *European Economic Review*, 84(C), 18–41.
- CASTRO, F., M. SALTO, AND H. STEINER (2013): “The gap between public and private wages: new evidence for the EU,” European Commission Economic Papers 508.

- CHARLOT, O., I. FONTAINE, AND T. SOPRASEUTH (2018): “The cyclicality of worker flows and job polarization: evidence from French and US data,” Discussion paper.
- CHASSAMBOULLI, A., AND P. GOMES (2018): “Public-sector pay and human capital accumulation,” Discussion paper.
- CHRISTOFIDES, L., AND M. MICHAEL (2013): “Exploring the public-private sector wage gap in European countries,” *IZA Journal of European Labor Studies*, 2(15).
- DAOULI, J., M. DEMOUSSIS, N. GIANNAKOPOULOS, AND N. LAMPROPOULOU (2015): “The Ins and Outs of Unemployment in the Current Greek Economic Crisis,” *South-Eastern Europe Journal of Economics*, 13(2), 177–196.
- DISNEY, R., AND A. GOSLING (1998): “Does it pay to work in the public sector?,” *Fiscal Studies*, 19(4), 347–374.
- ELSBY, M., AND J. SMITH (2010): “A Great Recession in the UK Labour Market : A Transatlantic Perspective,” *National Institute Economic Review*, 214, R1–R12.
- ELSBY, M., J. SMITH, AND J. WADSWORTH (2011): “The role of worker flows in the dynamics and distribution of UK unemployment,” *Oxford Review of Economic Policy*, 27(2), 338–363.
- ELSBY, M. W., B. HOBIJN, AND A. SAHIN (2015): “On the importance of the participation margin for labor market fluctuations,” *Journal of Monetary Economics*, 72(C), 64–82.
- ELSBY, M. W., R. MICHAELS, AND G. SOLON (2009): “The ins and outs of cyclical unemployment,” *American Economic Journal: Macroeconomics*, 1(1), 84–110.
- FONTAINE, I. (2016): “French Unemployment Dynamics: a Three-State Approach,” *Revue d’Economie Politique*, 126(5), 835–869.
- FUJITA, S. (2010): “An empirical analysis of on-the-job search and job-to-job transitions,” Discussion paper.
- FUJITA, S., AND G. RAMEY (2009): “The Cyclicality of Separation and Job Finding Rates,” *International Economic Review*, 50(2), 415–430.
- GELB, A., J. B. KNIGHT, AND R. H. SABOT (1991): “Public Sector Employment, Rent Seeking and Economic Growth,” *Economic Journal*, 101(408), 1186–1199.

- GIORDANO, R., D. DEPALO, M. COUTINHO PEREIRA, B. EUGÉNE, E. PAPAPETROU, J. J. PÉREZ, L. REISS, AND M. ROTER (2011): “The public sector pay gap in a selection of Euro area countries,” European Central Bank Working Paper 1406.
- GLASSNER, V., AND A. WATT (2010): “Cutting wages and employment in the public sector: Smarter fiscal consolidation strategies needed,” *Intereconomics: Review of European Economic Policy*, 45(4), 212–219.
- GOMES, P. (2012): “Labour market flows: Facts from the United Kingdom,” *Labour Economics*, 19(2), 165–175.
- (2015a): “Optimal public sector wages,” *Economic Journal*, 125, 1425–1451.
- (2015b): “The importance of frequency in estimating labour market transition rates,” *IZA Journal of Labor Economics*, 4(1), 1–10.
- (2017): “Heterogeneity and the public sector wage policy,” *International Economic Review*, Forthcoming.
- GOMES, P., AND Z. KUEHN (2018): “You’re the one that I want! Public Employment and women’s labour market outcomes,” Discussion paper.
- GOMES, P., AND F. WELLSCHMIED (2018): “Public-sector employment over the life cycle,” Discussion paper.
- GYOURKO, J., AND J. TRACY (1989): “The Importance of Local Fiscal Conditions in Analyzing Local Labor Markets,” *Journal of Political Economy*, 97(5), 1208–31.
- HAIRAULT, J.-O., T. LE BARBANCHON, AND T. SOPRASEUTH (2015): “The cyclicalities of the separation and job finding rates in France,” *European Economic Review*, 76(C), 60–84.
- HERTWECK, M. S., AND O. SIGRIST (2015): “The ins and outs of German unemployment: a transatlantic perspective,” *Oxford Economic Papers*, 67(4), 1078–1095.
- HOLM-HADULLA, F., K. KAMATH, A. LAMO, J. J. PÉREZ, AND L. SCHUKNECHT (2010): “Public wages in the euro area - towards securing stability and competitiveness,” European Central Bank Occasional Paper 112.
- HÖRNER, J., L. R. NGAI, AND C. OLIVETTI (2007): “Public enterprises and labor market performance,” *International Economic Review*, 48(2), 363–384.
- KATZ, L. F., AND A. B. KRUEGER (1991): “Changes in the Structure of Wages in the Public and Private Sectors,” NBER Working Papers 3667.

- KEYNES, J. M. (1936): *The General Theory of Employment, Interest and Money*. Macmillan, 14th edition, 1973.
- LAMO, A., J. J. PÉREZ, AND L. SCHUKNECHT (2013): “Are government wages interlinked with private sector wages?,” *Journal of Policy Modeling*, 35(5), 697–712.
- LUNDSTROM, S., AND C.-E. SARNDAL (1999): “Calibration as a Standard Method for Treatment of Nonresponse,” *Journal of Official Statistics*, 15(2), 305–327.
- MATSCHKE, X. (2003): “Are There Election Cycles in Wage Agreements? An Analysis of German Public Employees,” *Public Choice*, 114(1-2), 103–35.
- MICHAILLAT, P. (2014): “A theory of countercyclical government multiplier,” *American Economic Journal: Macroeconomics*, 6(1).
- PETRONGOLO, B., AND C. A. PISSARIDES (2008): “The Ins and Outs of European Unemployment,” *American Economic Review*, 98(2), 256–62.
- POSTEL-VINAY, F., AND H. TURON (2007): “The Public Pay Gap in Britain: Small Differences That (Don’t?) Matter,” *Economic Journal*, 117(523), 1460–1503.
- POTERBA, J. M., AND K. S. RUEBEN (1998): “Fiscal Institutions and Public Sector Labor Markets,” NBER Working Papers 6659, National Bureau of Economic Research, Inc.
- QUADRINI, V., AND A. TRIGARI (2007): “Public employment and the business cycle,” *Scandinavian Journal of Economics*, 109(4), 723–742.
- RAZZU, G., AND C. SINGLETON (2016): “Gender and the business cycle: An analysis of labour markets in the US and UK,” *Journal of Macroeconomics*, 47(PB), 131–146.
- SHIMER, R. (2012): “Reassessing the Ins and Outs of Unemployment,” *Review of Economic Dynamics*, 15(2), 127–148.
- SILVA, J., AND J. VÁZQUEZ-GRENNO (2013): “The ins and outs of unemployment in a two-tier labor market,” *Labour Economics*, 24(C), 161–169.
- SMITH, J. C. (2011): “The Ins and Outs of UK Unemployment,” *Economic Journal*, 121(552), 402–444.
- WILSON, J. (1982): “The optimal public employment policy,” *Journal of Public Economics*, 17(2), 241–258.

COMPANION APPENDIX

Labour market flows: Accounting for the public sector Idriss Fontaine, Ismael Galvez-Iniesta, Pedro Gomes and Diego Vila-Martin

I - Extra material: Section 3

- Figure A1: Individual transition rates, France
- Figure A2: Individual transition rates, UK
- Figure A3: Individual transition rates, Spain
- Figure A4: Individual transition rates, US
- Table A1: Most representative public sector industries (France and UK)
- Table A2: Cyclical variation of labour market flows gross rates

II - Extra material: Section 4

- Figure A5: Equilibrium and actual unemployment rate
- Table A3: Three states unemployment decomposition
- Table A4: Four states decomposition, no detrending
- Table A5: Four states decomposition, alternative variable and sample
- Table A6: Elsby et al. (2015) non-steady state decomposition, 4-states
- Figure A6: Counterfactual exercise: France
- Figure A7: Counterfactual exercise: UK
- Figure A8: Counterfactual exercise: Spain
- Figure A9: Counterfactual exercise: US

III - Extra material: Different subgroups

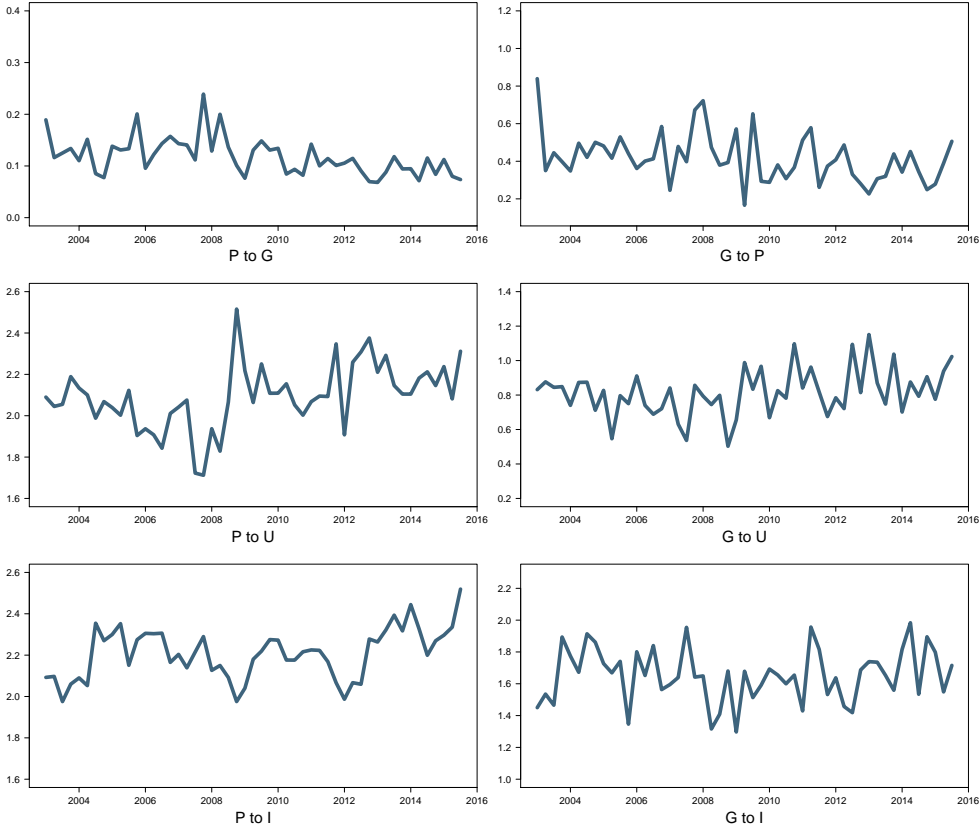
- Table A7: Average quarterly worker flows, France, Subgroups
- Table A8: Average quarterly worker flows, UK, Subgroups
- Table A9: Average quarterly worker flows, Spain, Subgroups
- Table A10: Average quarterly worker flows, US, Subgroups
- Table A11: Four states decomposition, different sub-groups, France
- Table A12: Four states decomposition, different sub-groups, UK
- Table A13: Four states decomposition, different sub-groups, Spain
- Table A14: Four states decomposition, different sub-groups, US

IV - Extra material: Section 5

- Figure A10: Transition probability from employment to inactivity
- Table A15: Public-sector job-security premium, unconditional job-separation rates
- Table A16: Public-sector job-security premium, different education groups

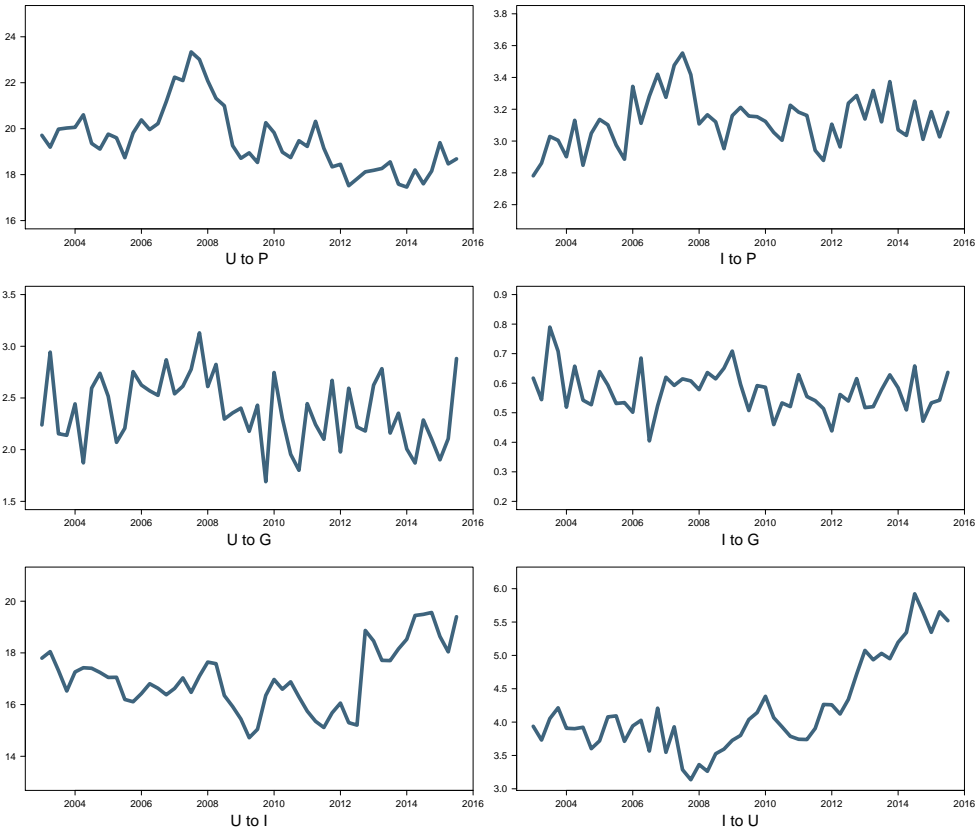
I - Extra material: Section 3

Figure A1: Individual transition rates, France



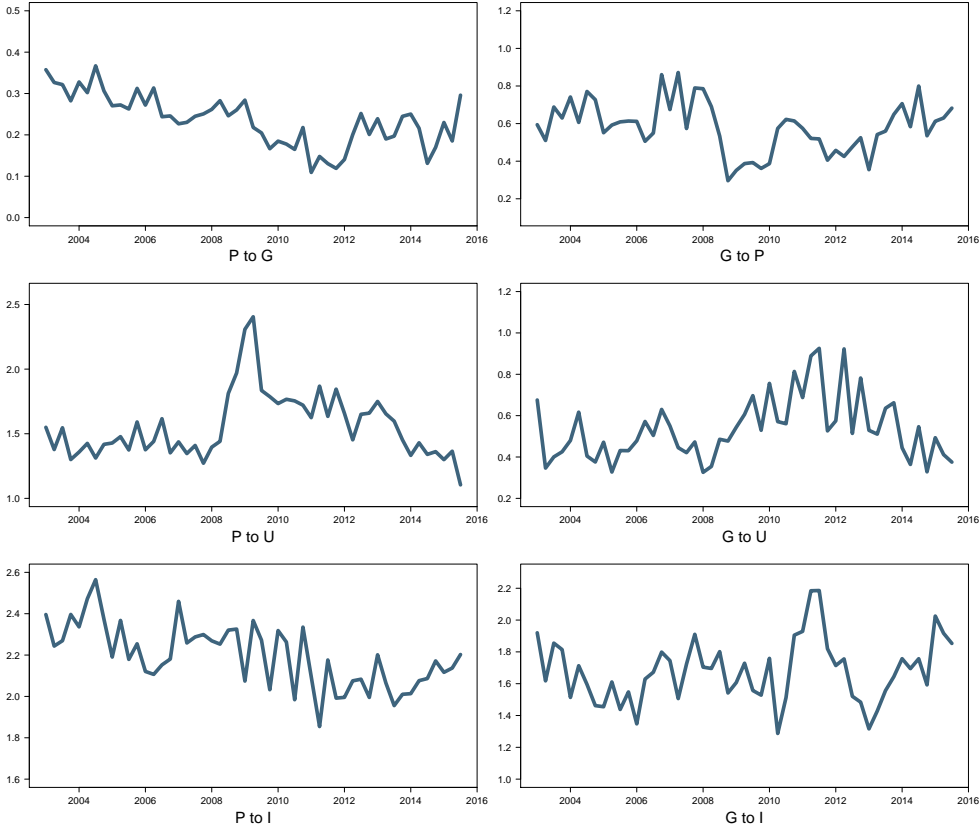
Source: French Labour Force Survey.

Figure A1 (cont): Individual transition rates, France



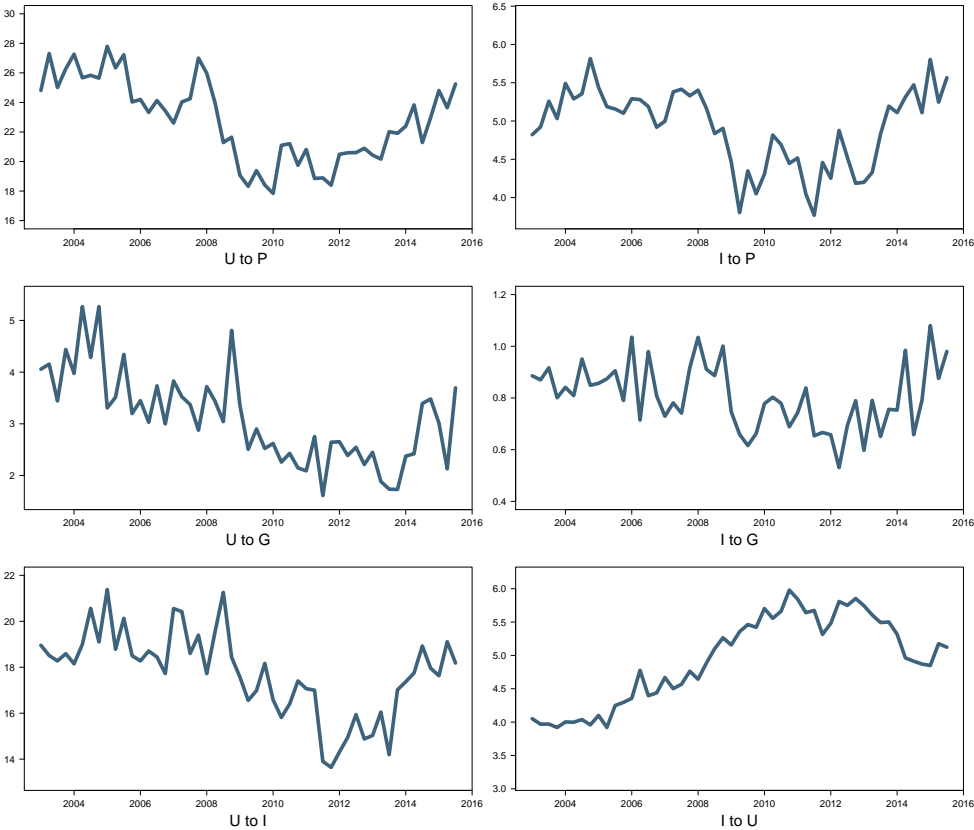
Source: French Labour Force Survey.

Figure A2: Individual transition rates, UK



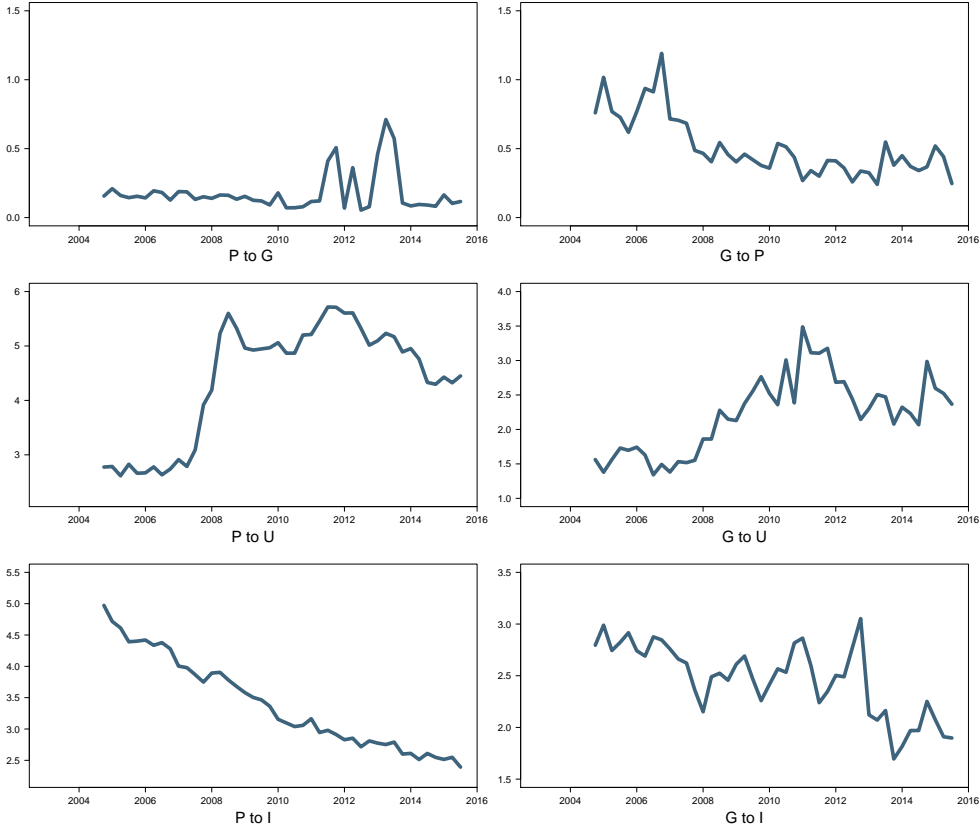
Source: UK Labour Force Survey.

Figure A2 (cont): Individual transition rates, UK



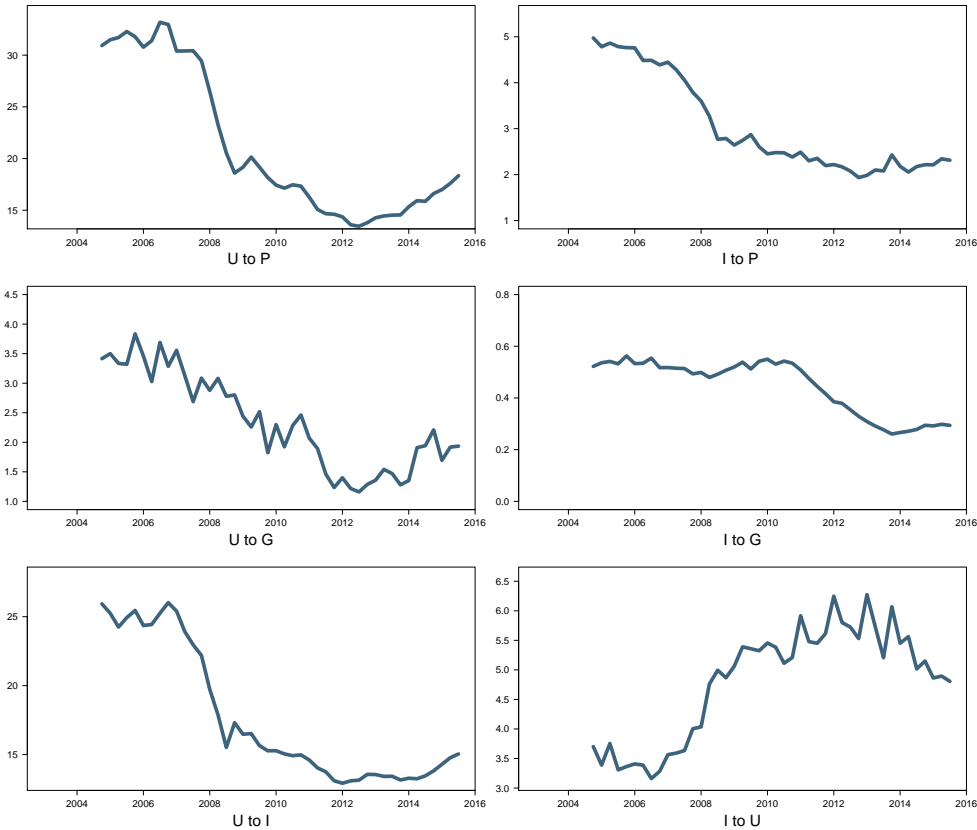
Source: UK Labour Force Survey.

Figure A3: Individual transition rates, Spain



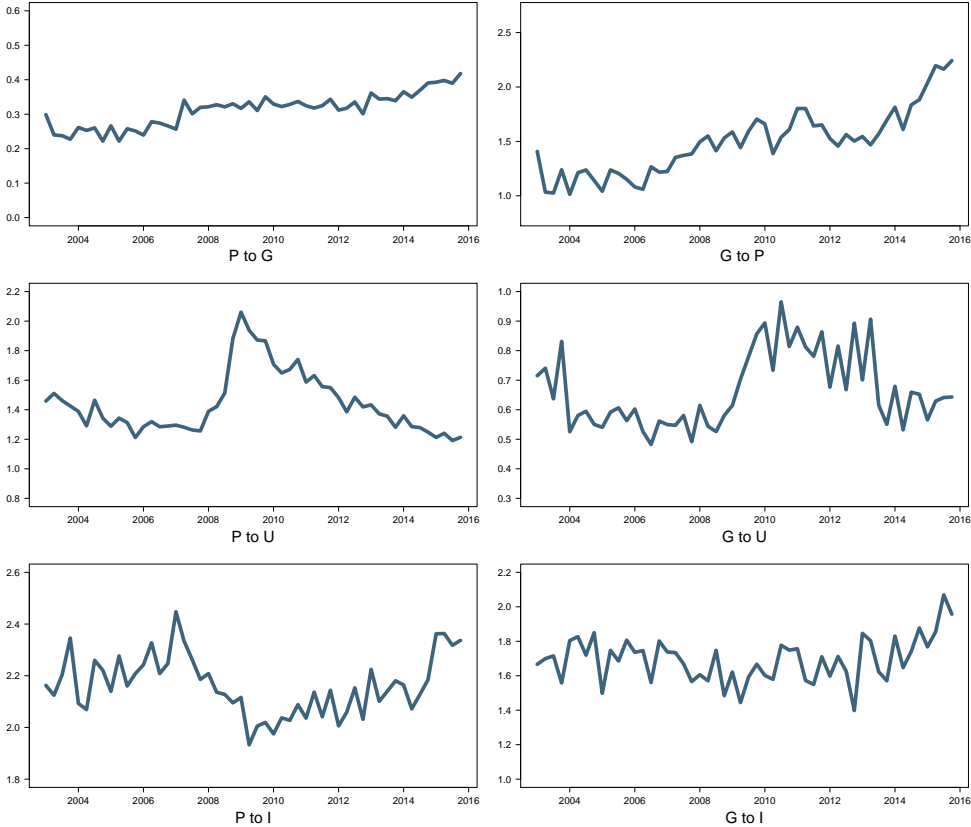
Source: Spanish Labour Force Survey.

Figure A3 (cont): Individual transition rates, Spain



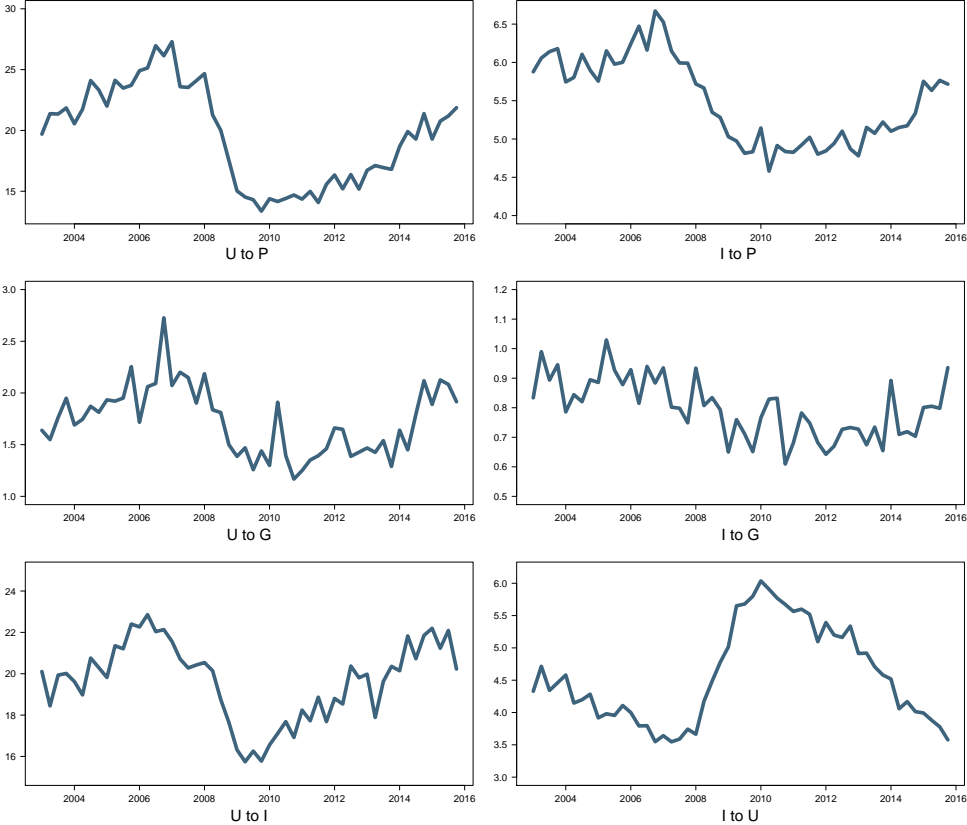
Source: Spanish Labour Force Survey.

Figure A4: Individual transition rates, US



Source: Current Population Survey.

Figure A4 (cont): Individual transition rates, US



Source: Current Population Survey.

Table A1: Most representative public sector industries, thousands

Industry	France		UK	
	Private sector	Public sector	Private sector	Public sector
E Water supply, sewerage, waste	155	34 (18%)	166	42 (20%)
O Public administration and defence	275	2220 (89%)	282	1585 (85%)
P Education	423	1471 (78%)	739	2363 (76%)
Q Health and social work	2291	1299 (36%)	1691	2035 (55%)
R Arts, entertainment and recreation	308	74 (19%)	571	142 (20%)
U Extraterritorial organisations	12	8 (67%)	20	23 (52%)

Note: For the UK, it is the average number of workers between 2009 and 2016. For France, it is the average number of workers between 2008 and 2015. The fraction of public-sector employment is in brackets. For both the UK and France, all the remaining industries have less than 10 percent of public-sector employment industries (A Agriculture, forestry and fishing; B Mining and quarrying; C Manufacturing; D Electricity, gas, air cond supply; F Construction, G Wholesale, retail, repair of vehicle; H Transport and storage; I Accommodation and food services; J Information and communication; K Financial and insurance activities; L Real estate activities; M Prof, scientific, technical activ.; N Admin and support services; S Other service activities; T Households as employers).

Table A2: Cyclical variation of labour market flows gross rates

	France		UK		Spain		US	
<i>Rates</i>								
$P \rightarrow U$	0.050*	(3.48)	0.081*	(8.55)	0.021**	(2.23)	0.054*	(15.93)
$G \rightarrow U$	0.065	(1.73)	0.132*	(5.96)	0.045*	(3.72)	0.069*	(8.99)
$P \rightarrow I$	0.007	(0.54)	-0.035*	(-6.38)	-0.059*	(-6.75)	-0.042*	(-20.56)
$G \rightarrow I$	0.015	(0.59)	0.000	(0.02)	-0.027**	(-2.30)	-0.019*	(-4.06)
$U \rightarrow P$	0.036*	(2.90)	0.050*	(5.63)	0.023*	(4.58)	0.041*	(15.59)
$U \rightarrow G$	0.035	(1.09)	0.010	(0.52)	0.029*	(3.16)	0.053*	(6.81)
$I \rightarrow P$	-0.043*	(-3.90)	-0.073*	(-12.53)	-0.058*	(-7.36)	-0.043*	(-21.09)
$I \rightarrow G$	-0.030	(-1.03)	-0.057*	(-4.04)	-0.039*	(-2.96)	-0.032*	(-6.08)
$U \rightarrow I$	0.134*	(7.70)	0.073*	(9.84)	0.005	(0.66)	0.103*	(34.40)
$I \rightarrow U$	0.135*	(7.81)	0.081*	(18.85)	0.010	(1.59)	0.102*	(43.47)
$P \rightarrow G$	-0.175	(-3.21)	-0.132*	(-6.35)	-0.065*	(-5.61)	-0.012**	(-2.42)
$G \rightarrow P$	-0.144**	(-2.12)	-0.100*	(-7.06)	-0.067*	(-4.93)	0.001	(0.24)

Note: the cyclicity of the series is the coefficient on unemployment rate in a regression of the flows as percentage of the working-age population in logs on a time trend and the unemployment rate. T-statistics are in brackets. * denotes significant at 1% and ** significant at 5%. The sample is between 1993:2 and 2010:4.

II - Extra material: Section 4

Equilibrium unemployment with four-states transitions

In steady-state, there are no changes in the stocks so we set equations (1)-(4) to zero. Normalizing the working-age population to 1, we can substitute $I^{ss} = 1 - P^{ss} - G^{ss} - U^{ss}$, and write a system of the remaining states in matrix form

$$A \times \begin{pmatrix} P^{ss} \\ G^{ss} \\ U^{ss} \end{pmatrix} = B$$

where

$$A = \begin{pmatrix} (\lambda^{PG} + \lambda^{PU} + \lambda^{PI} + \lambda^{IP}) & (\lambda^{IP} - \lambda^{GP}) & (\lambda^{IP} - \lambda^{UP}) \\ (\lambda^{IG} - \lambda^{PG}) & (\lambda^{GP} + \lambda^{GU} + \lambda^{GI} + \lambda^{IG}) & (\lambda^{IG} - \lambda^{UG}) \\ (\lambda^{IU} - \lambda^{PU}) & (\lambda^{IU} - \lambda^{GU}) & (\lambda^{UP} + \lambda^{UG} + \lambda^{UI} + \lambda^{IU}) \end{pmatrix}$$

and

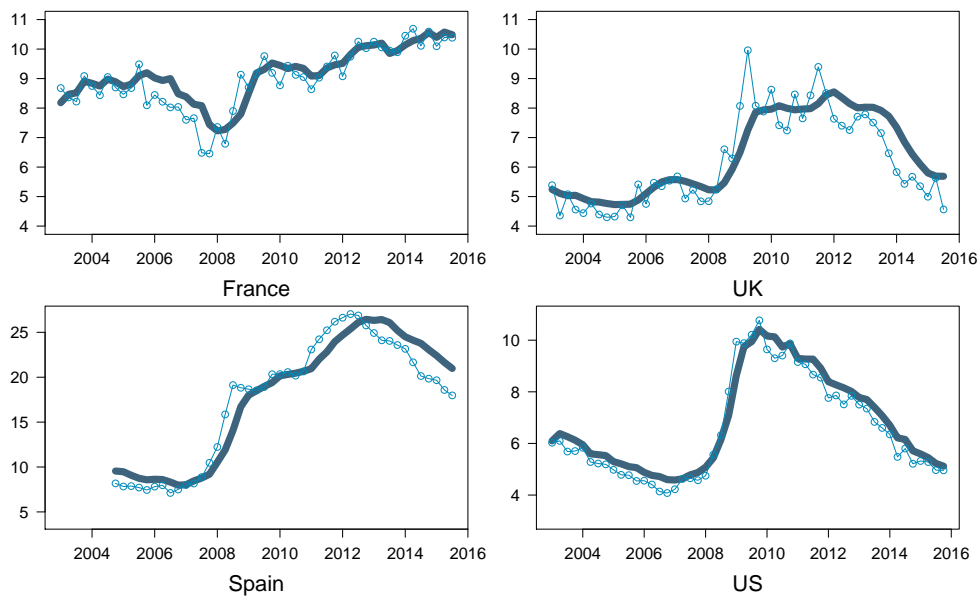
$$B = \begin{pmatrix} \lambda^{IP} \\ \lambda^{IG} \\ \lambda^{IU} \end{pmatrix}$$

The solution of this system is then given by:

$$\begin{pmatrix} P^{ss} \\ G^{ss} \\ U^{ss} \end{pmatrix} = A^{-1} \times B$$

To calculate the unemployment rate we need to compute $\frac{U^{ss}}{P^{ss} + G^{ss} + U^{ss}}$.

Figure A5: Unemployment rate (blue lines) and its steady state counterpart (red lines)



Continuous time-aggregation bias correction

We can record the transitions rates λ^{ij} in a 4×4 discrete time Markov transition matrix with columns summing to 1. Let μ denote a diagonal matrix of eigenvalues and p the matrix with corresponding eigenvectors of the discrete transition matrix. Suppose now that the transitions occur in a continuous time environment. Let $\tilde{\lambda}$ be the 4×4 continuous time Markov transition matrix that records in the off-diagonal the Poisson continuous arrival rate, $\tilde{\lambda}^{ij}$ from state $i \in \{P, G, U, I\}$ to state $j \neq i$. We can retrieve the continuous time transition matrix from the limit of the discrete transition matrix:

$$\tilde{\lambda}_m = \lim_{\Delta \rightarrow 0} \frac{p\mu^\Delta p^{-1} - I}{\Delta} \quad (\text{A1})$$

Table A3: Three-states unemployment decompositions

	Shimer				Fujita & Ramey			
	France	UK	Spain	US	France	UK	Spain	US
$E \rightarrow U$	0.27	0.27	0.30	0.21	0.29	0.28	0.27	0.23
$E \rightarrow I$	-0.01	-0.04	-0.02	-0.01	-0.01	-0.03	-0.02	-0.02
$U \rightarrow E$	0.44	0.47	0.49	0.44	0.45	0.42	0.53	0.42
$I \rightarrow E$	0.09	0.11	0.07	0.17	0.10	0.13	0.07	0.06
$I \rightarrow U$	0.18	0.09	0.06	0.12	0.20	0.06	0.04	0.12
$U \rightarrow I$	0.01	0.10	0.11	0.17	0.00	0.09	0.10	0.16
Relative contribution								
Job-finding vs Job separation	62-38	64-36	62-38	68-32	61-39	60-40	66-33	65-35

Note: the gross flows series are previously seasonally adjusted using the X13 Census programme and the transition probabilities are corrected for time aggregation bias using the methodology applied by Shimer (2012). The series are then detrended with an HP filter with smoothing parameter of 100000.

Table A4: Shimer's 4-states unemployment decompositions, no detrending

	France	UK	Spain	US
$P \rightarrow U$	0.20	0.18	0.18	0.11
$G \rightarrow U$	0.04	0.05	0.03	0.01
$P \rightarrow I$	0.02	-0.02	-0.08	-0.03
$G \rightarrow I$	0.02	0.01	-0.01	0.00
$U \rightarrow P$	0.35	0.35	0.51	0.43
$U \rightarrow G$	0.07	0.11	0.09	0.04
$I \rightarrow P$	0.04	0.06	0.11	0.07
$I \rightarrow G$	0.03	0.02	0.01	0.01
$I \rightarrow U$	0.28	0.09	0.05	0.10
$U \rightarrow I$	-0.03	0.10	0.13	0.10
$P \rightarrow G$	0.02	0.02	-0.01	0.00
$G \rightarrow P$	-0.01	-0.01	0.00	0.01
Relative contributions (sum to 100)				
Private employment vs. Public employment				
	78-22	74-26	87-13	89-11
Public job-finding rate vs. Public job-separation rate				
	64-36	69-31	75-25	80-20
Private job-finding rate vs. Private job-separation rate				
	64-36	66-34	74-26	80-20

Note: the gross flows series are previously seasonally adjusted using the X13 Census programme and the transition probabilities are corrected for time aggregation bias using the methodology applied by Shimer (2012).

Table A5: 4-states unemployment decompositions, alternative variable and sample

	Shimer			Fujita & Ramey		
	France	UK	US	France	UK	US
$P \rightarrow U$	0.22	0.21	0.20	0.23	0.20	0.20
$G \rightarrow U$	0.03	0.05	0.02	0.04	0.05	0.02
$P \rightarrow I$	-0.02	-0.02	-0.01	-0.02	-0.02	-0.01
$G \rightarrow I$	-0.01	0.01	0.00	0.00	0.01	0.00
$U \rightarrow P$	0.38	0.36	0.41	0.39	0.34	0.41
$U \rightarrow G$	0.12	0.11	0.06	0.12	0.10	0.05
$I \rightarrow P$	0.07	0.08	0.05	0.08	0.08	0.04
$I \rightarrow G$	0.01	0.02	0.01	0.01	0.02	0.01
$I \rightarrow U$	0.13	0.08	0.11	0.13	0.08	0.10
$U \rightarrow I$	0.05	0.10	0.15	0.05	0.09	0.15
$P \rightarrow G$	0.02	0.02	0.00	0.02	0.01	0.00
$G \rightarrow P$	-0.01	-0.01	0.00	-0.01	-0.01	0.00
Relative contributions (sum to 100)						
Private employment vs. Public employment						
	80-20	76-24	88-12	79-21	87-13	89-11
Public job-finding rate vs. Public job-separation rate						
	80-20	69-31	75-25	75-25	67-33	71-29
Private job-finding rate vs. Private job-separation rate						
	63-37	63-37	67-33	63-37	63-37	67-33

Note: for France we use the variable SIRENE, for the UK the full sample since 1996 and for the US we consider the flows P-G and G-P to be zero before computing the time aggregation bias. The gross flows series are previously seasonally adjusted using the X13 Census programme and the transition probabilities are corrected for time aggregation bias using the methodology applied by Shimer (2012). The series are then detrended with an HP filter with smoothing parameter of 100000.

Table A6: Elsby et al. (2015) non-steady state decomposition, 4-states

	Elsby et al. (2015) non-steady state decomposition			
	France	UK	Spain	US
$P \rightarrow U$	0.20	0.20	0.24	0.20
$G \rightarrow U$	0.03	0.05	0.02	0.01
$P \rightarrow I$	-0.03	-0.01	0.00	-0.02
$G \rightarrow I$	0.01	0.01	0.01	0.00
$U \rightarrow P$	0.36	0.33	0.45	0.45
$U \rightarrow G$	0.10	0.07	0.05	0.04
$I \rightarrow P$	0.01	0.03	0.04	0.04
$I \rightarrow G$	0.00	0.00	0.00	0.00
$I \rightarrow U$	0.19	0.06	0.08	0.14
$U \rightarrow I$	0.17	0.22	0.18	0.16
$P \rightarrow G$	0.00	0.00	0.00	0.00
$G \rightarrow P$	0.00	0.00	0.00	0.00
Relative contributions (sum to 100)				
Private employment vs. Public employment				
	79-21	80-20	90-10	94-6
Public job-finding rate vs. Public job-separation rate				
	77-23	58-42	71-29	80-20
Private job-finding rate vs. Private job-separation rate				
	64-36	62-38	65-35	69-31

Note: the gross flows series are previously seasonally adjusted using the X13 Census programme and the transition probabilities are corrected for time-aggregation bias using the methodology applied by Shimer (2012). Series are “smoothed” with a 3-order moving average for France, UK and Spain, and a 9-order moving average for the US.

Figure A6: Counterfactual exercise, France

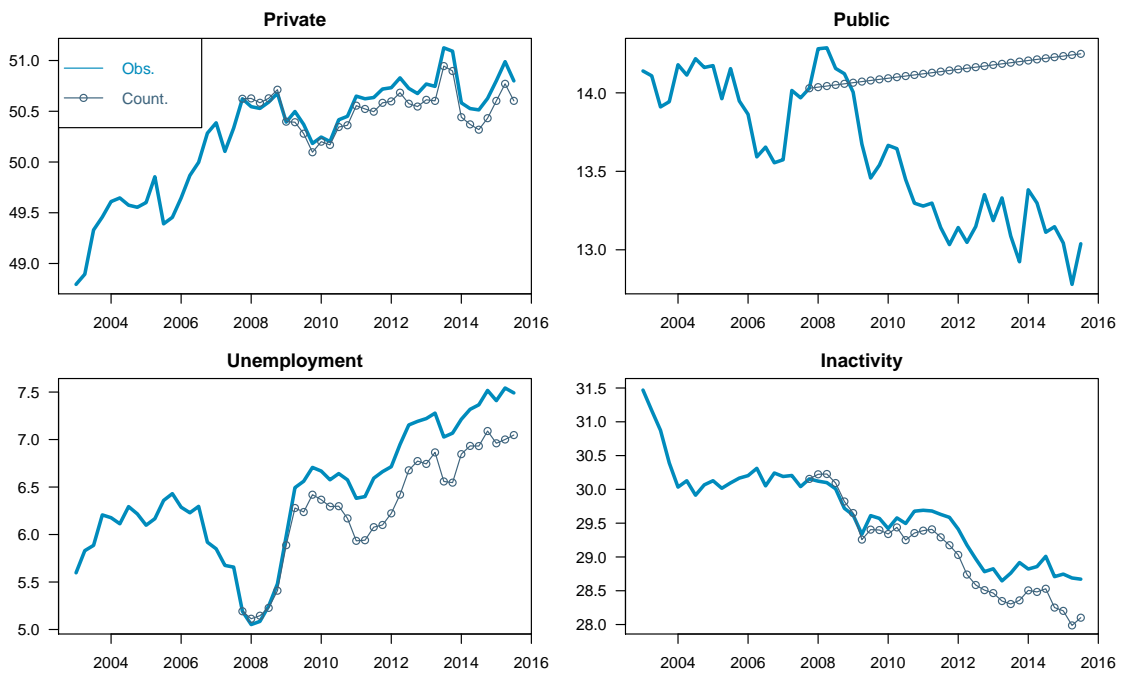


Figure A7: Counterfactual exercise, UK

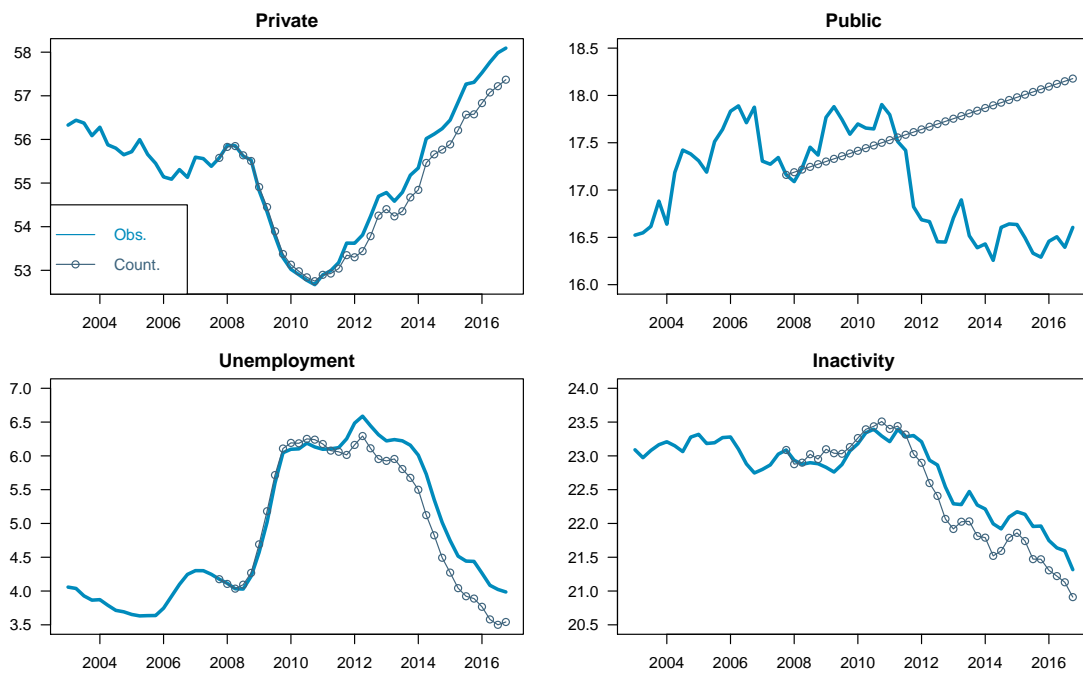


Figure A8: Counterfactual exercise, Spain

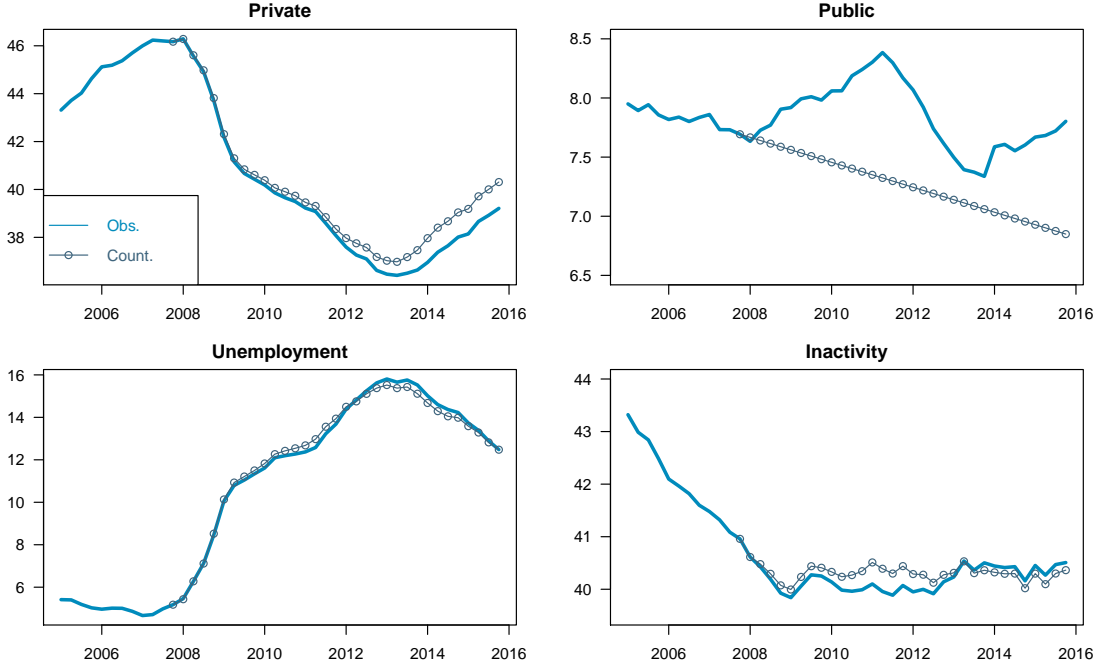
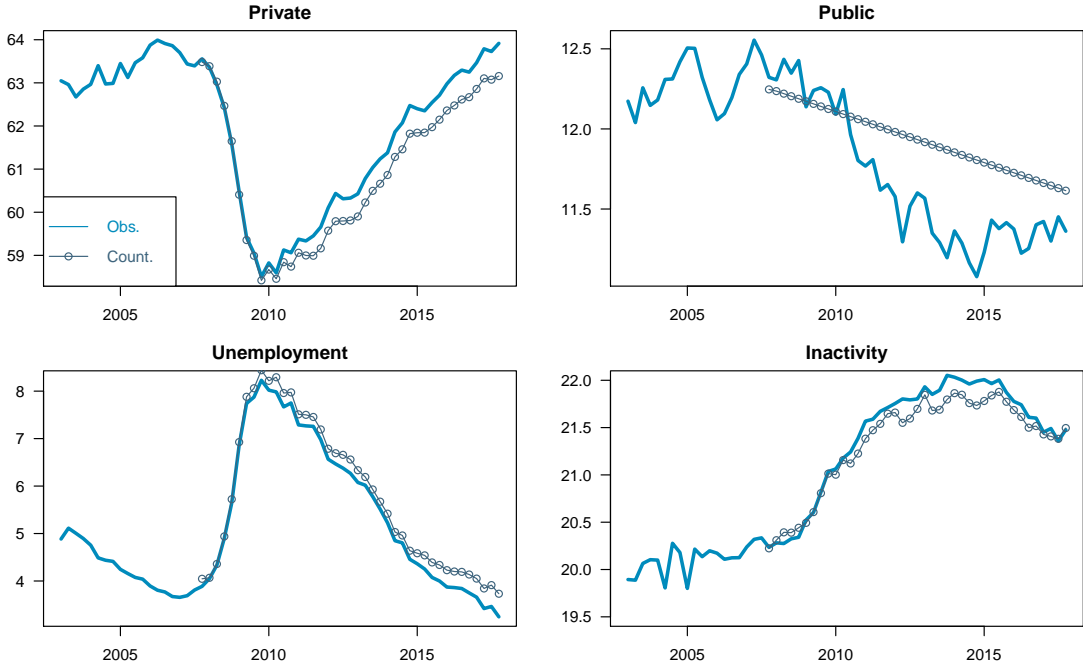


Figure A9: Counterfactual exercise, US



III - Extra material: Different subgroups

Table A7: Average quarterly worker flows, France 2003-2015

	Men		Women		15-24		25-49		50-64		Primary		Secondary		Tertiary									
	(t)	(p)	(t)	(p)	(h)	(t)	(h)	(p)	(t)	(p)	(h)	(t)	(p)	(h)	(t)	(p)	(h)							
Stocks																								
<i>P</i>	11295	57.59	-	8758	43.18	-	1910	25.41	-	13258	64.09	-	4886	41.71	-	3510	41.05	-	10637	50.35	-	5906	57.48	-
<i>G</i>	2127	10.85	-	3303	16.30	-	296	3.94	-	3600	17.40	-	1534	13.13	-	607	7.06	-	2491	11.81	-	2331	22.90	-
<i>U</i>	1295	6.59	-	1274	6.28	-	617	8.21	-	1516	7.33	-	435	3.70	-	728	8.67	-	1335	6.31	-	506	4.93	-
<i>I</i>	4897	24.97	-	6939	34.24	-	4694	62.44	-	2313	11.18	-	4829	41.46	-	3678	43.22	-	6668	31.54	-	1489	14.68	-
Flows																								
<i>P</i> → <i>U</i>	230	1.17	2.04	190	0.94	2.17	116	1.55	6.10	252	1.22	1.90	52	0.44	1.05	91	1.07	2.62	235	1.11	2.21	94	0.91	1.58
<i>G</i> → <i>U</i>	17	0.08	0.78	28	0.14	0.83	12	0.16	4.19	26	0.13	0.73	6	0.05	0.38	8	0.10	1.41	23	0.11	0.93	13	0.12	0.54
<i>P</i> → <i>I</i>	208	1.06	1.84	235	1.16	2.69	135	1.79	7.06	172	0.83	1.30	136	1.17	2.81	96	1.13	2.76	250	1.18	2.35	97	0.94	1.63
<i>G</i> → <i>I</i>	31	0.16	1.44	59	0.29	1.79	22	0.30	7.52	30	0.14	0.83	38	0.33	2.50	13	0.15	2.20	48	0.23	1.91	29	0.29	1.27
<i>U</i> → <i>P</i>	260	1.32	20.26	239	1.18	18.83	146	1.95	23.93	301	1.45	19.92	51	0.44	11.78	102	1.20	14.02	274	1.30	20.76	122	1.20	24.34
<i>U</i> → <i>G</i>	21	0.10	1.60	40	0.20	3.17	18	0.24	2.98	36	0.17	2.37	7	0.06	1.61	10	0.12	1.37	33	0.15	2.48	18	0.18	3.61
<i>I</i> → <i>P</i>	169	0.86	3.45	202	0.99	2.91	190	2.53	4.05	134	0.65	5.81	47	0.40	0.97	65	0.76	1.77	222	1.05	3.33	83	0.82	5.59
<i>I</i> → <i>G</i>	23	0.12	0.47	45	0.22	0.65	33	0.44	0.71	25	0.12	1.09	9	0.08	0.18	6	0.07	0.17	39	0.19	0.59	23	0.22	1.52
<i>U</i> → <i>I</i>	195	0.99	14.96	243	1.20	19.08	118	1.58	19.11	229	1.11	15.05	91	0.77	20.87	136	1.63	18.76	230	1.08	17.11	72	0.70	14.19
<i>I</i> → <i>U</i>	214	1.09	4.37	282	1.39	4.07	170	2.27	3.63	248	1.20	10.70	78	0.66	1.63	142	1.70	3.92	267	1.26	3.99	87	0.85	5.80
<i>P</i> → <i>G</i>	8	0.04	0.07	15	0.08	0.18	8	0.11	0.42	14	0.07	0.11	2	0.01	0.03	2	0.03	0.07	13	0.06	0.12	8	0.08	0.14
<i>G</i> → <i>P</i>	9	0.05	0.43	13	0.07	0.40	6	0.08	2.13	14	0.07	0.38	3	0.02	0.17	2	0.03	0.38	11	0.05	0.45	9	0.09	0.40

Note: France Labour Force Survey.

Table A8: Average quarterly worker flows, UK 2003-2015

	Men		Women		15-24		25-49		50-64		Primary		Secondary		Tertiary									
	(t)	(p)	(h)	(p)	(h)	(t)	(p)	(h)	(t)	(p)	(h)	(t)	(p)	(h)	(t)	(p)	(h)							
Stocks																								
<i>P</i>	12976	66.21	-	8872	44.43	-	3714	52.10	-	12990	60.48	-	5143	46.93	-	3015	44.41	-	10755	61.16	-	5732	50.40	-
<i>G</i>	2341	11.95	-	4455	22.32	-	471	6.61	-	4382	20.40	-	1944	17.74	-	523	7.69	-	2447	13.88	-	3450	30.48	-
<i>U</i>	1123	5.71	-	830	4.14	-	783	10.90	-	876	4.07	-	293	2.66	-	461	6.86	-	859	4.86	-	289	2.52	-
<i>I</i>	3166	16.14	-	5808	29.11	-	2175	30.39	-	3232	15.05	-	3567	32.66	-	2771	41.04	-	3546	20.10	-	1861	16.60	-
Flows																								
<i>P</i> → <i>U</i>	215	1.09	1.66	124	0.62	1.41	124	1.74	3.34	160	0.75	1.24	55	0.50	1.06	62	0.91	2.07	176	1.00	1.65	69	0.60	1.20
<i>G</i> → <i>U</i>	16	0.08	0.67	21	0.10	0.46	9	0.13	1.93	18	0.08	0.41	9	0.08	0.47	3	0.05	0.63	14	0.08	0.60	14	0.12	0.41
<i>P</i> → <i>I</i>	210	1.07	1.62	270	1.35	3.05	158	2.22	4.26	153	0.72	1.18	168	1.53	3.27	91	1.34	3.01	259	1.48	2.41	95	0.84	1.67
<i>G</i> → <i>I</i>	34	0.17	1.44	80	0.40	1.81	17	0.24	3.70	36	0.17	0.83	60	0.55	3.10	12	0.18	2.33	41	0.23	1.69	49	0.43	1.42
<i>U</i> → <i>P</i>	259	1.32	23.67	179	0.89	22.17	194	2.71	25.54	190	0.88	22.22	54	0.49	18.73	73	1.08	16.16	210	1.19	25.55	90	0.78	31.66
<i>U</i> → <i>G</i>	21	0.11	2.00	37	0.19	4.71	18	0.25	2.43	31	0.14	3.77	9	0.08	3.27	6	0.09	1.34	23	0.13	2.85	26	0.23	9.70
<i>I</i> → <i>P</i>	186	0.95	5.91	259	1.30	4.46	245	3.43	11.43	122	0.57	3.76	80	0.73	2.25	78	1.15	2.84	255	1.45	7.28	86	0.76	4.66
<i>I</i> → <i>G</i>	22	0.11	0.69	51	0.26	0.88	27	0.38	1.24	29	0.13	0.88	17	0.16	0.49	6	0.09	0.23	31	0.18	0.89	33	0.29	1.82
<i>U</i> → <i>I</i>	152	0.78	13.86	190	0.95	23.49	146	2.04	18.90	140	0.65	16.47	57	0.51	19.64	84	1.25	18.47	166	0.94	19.61	44	0.39	15.65
<i>I</i> → <i>U</i>	201	1.02	6.32	248	1.24	4.27	233	3.24	10.63	165	0.77	5.12	51	0.47	1.44	109	1.61	3.93	222	1.26	6.20	60	0.52	3.33
<i>P</i> → <i>G</i>	19	0.10	0.15	33	0.16	0.37	17	0.25	0.47	28	0.13	0.22	6	0.05	0.12	4	0.06	0.13	27	0.15	0.25	22	0.20	0.39
<i>G</i> → <i>P</i>	15	0.08	0.66	24	0.12	0.54	10	0.15	2.21	22	0.10	0.51	7	0.06	0.36	3	0.05	0.60	17	0.10	0.70	18	0.16	0.51

Note: UK Labour Force Survey.

Table A9: Average quarterly worker flows, Spain 2005-2015

	Men		Women		15-24		25-49		50-64		Primary		Secondary		Tertiary						
	(t)	(p)	(t)	(p)	(t)	(p)	(t)	(p)	(t)	(p)	(t)	(p)	(t)	(p)	(t)	(p)					
Stocks																					
<i>P</i>	9072	48.81	-	6438	33.11	-	1199	27.50	-	10921	61.01	-	3272	40.55	-	8434	48.25	-	4941	52.87	-
<i>G</i>	1388	7.47	-	1589	8.17	-	82	1.89	-	1908	10.66	-	964	11.95	-	982	5.62	-	1875	20.06	-
<i>U</i>	2100	11.30	-	1951	10.04	-	729	16.71	-	2621	14.64	-	698	8.65	-	2446	13.99	-	839	8.98	-
<i>I</i>	6004	32.30	-	9448	48.60	-	2321	53.24	-	2446	13.67	-	3136	38.87	-	5591	31.99	-	1698	18.17	-
Flows																					
<i>P</i> → <i>U</i>	388	2.09	4.28	285	1.47	2.97	108	2.49	9.04	481	2.69	4.41	83	1.03	2.55	5.14	2.38	4.93	148	1.58	2.99
<i>G</i> → <i>U</i>	29	0.16	2.10	38	0.19	2.37	8	0.18	9.73	48	0.27	2.51	11	0.13	1.11	8	0.07	6.41	32	0.18	3.25
<i>P</i> → <i>I</i>	229	1.23	2.53	304	1.56	4.71	104	2.39	8.70	261	1.46	2.39	131	1.63	4.02	126	1.12	5.89	305	1.74	3.61
<i>G</i> → <i>I</i>	27	0.15	1.95	46	0.24	2.92	10	0.23	12.17	36	0.20	1.87	23	0.28	2.36	11	0.10	9.18	32	0.18	3.21
<i>U</i> → <i>P</i>	412	2.22	19.65	332	1.71	17.02	137	3.14	18.79	528	2.95	20.14	80	0.99	11.44	109	0.98	14.26	457	2.61	18.69
<i>U</i> → <i>G</i>	34	0.18	1.61	48	0.25	2.48	10	0.23	1.38	60	0.33	2.28	13	0.16	1.85	9	0.08	1.16	38	0.22	1.57
<i>I</i> → <i>P</i>	189	1.02	3.15	280	1.44	2.97	137	3.14	5.90	224	1.25	9.15	91	1.13	2.89	94	0.84	1.16	276	1.58	4.93
<i>I</i> → <i>G</i>	23	0.12	0.38	46	0.24	0.49	14	0.32	0.61	37	0.21	1.51	16	0.19	0.50	10	0.10	0.13	29	0.17	0.52
<i>U</i> → <i>I</i>	241	1.30	11.47	395	2.04	20.28	148	3.40	20.32	334	1.86	12.74	151	1.87	21.62	135	1.20	17.60	385	2.20	15.74
<i>I</i> → <i>U</i>	276	1.49	4.60	462	2.38	4.89	208	4.76	8.94	383	2.14	15.64	149	1.85	4.75	147	1.31	1.80	447	2.56	8.00
<i>P</i> → <i>G</i>	8	0.05	0.09	10	0.05	0.16	4	0.09	0.34	14	0.08	0.13	3	0.04	0.10	3	0.02	0.12	7	0.04	0.09
<i>G</i> → <i>P</i>	7	0.04	0.52	7	0.04	0.52	4	0.08	4.38	11	0.06	0.56	3	0.04	0.34	3	0.03	2.55	7	0.04	0.69

Note: Spanish Labour Force Survey.

Table A10: Average monthly worker flows, US 1996-2017

	Men		Women		15-24		25-49		50-64		Primary		Secondary		Tertiary					
	(t)	(p)	(h)	(p)	(t)	(h)	(t)	(p)	(t)	(h)	(t)	(p)	(h)	(t)	(p)	(t)	(p)			
Stocks																				
<i>P</i>	55996	68.18	-	53121	57.82	-	21444	57.85	-	27799	56.65	-	7941	58.81	-	76023	63.62	-	26855	62.99
<i>G</i>	8624	10.51	-	12420	13.52	-	1692	4.56	-	7699	15.86	-	337	2.48	-	10732	8.99	-	9162	21.76
<i>U</i>	4474	5.38	-	3905	4.22	-	2842	7.60	-	1696	3.35	-	889	6.57	-	6623	5.48	-	1189	2.73
<i>I</i>	13206	15.93	-	22525	24.44	-	11231	29.99	-	11780	24.13	-	4338	32.14	-	26354	21.91	-	5389	12.52
Flows																				
<i>P</i> → <i>U</i>	879	1.07	1.58	643	0.70	1.21	547	1.48	2.56	746	0.85	1.25	203	1.50	2.57	1224	1.02	1.61	185	0.43
<i>G</i> → <i>U</i>	48	0.06	0.56	90	0.10	0.72	35	0.09	2.05	67	0.08	0.59	5	0.04	1.44	87	0.07	0.81	43	0.10
<i>P</i> → <i>I</i>	1004	1.22	1.79	1401	1.53	2.64	1161	3.13	5.40	870	0.99	1.45	263	1.95	3.31	1893	1.58	2.49	322	0.75
<i>G</i> → <i>I</i>	119	0.14	1.38	239	0.26	1.92	105	0.28	6.27	141	0.16	1.24	13	0.10	4.10	223	0.19	2.08	118	0.28
<i>U</i> → <i>P</i>	961	1.17	23.13	768	0.84	20.89	700	1.90	25.77	811	0.92	21.72	223	1.64	25.79	1382	1.16	22.41	218	0.51
<i>U</i> → <i>G</i>	55	0.07	1.33	103	0.11	2.79	43	0.12	1.58	75	0.09	2.02	6	0.04	0.71	98	0.08	1.60	52	0.12
<i>I</i> → <i>P</i>	858	1.04	6.63	1211	1.32	5.41	1056	2.85	9.59	741	0.84	5.77	251	1.86	5.78	1609	1.34	6.18	281	0.65
<i>I</i> → <i>G</i>	98	0.12	0.75	198	0.22	0.89	97	0.26	0.88	123	0.14	0.96	14	0.10	0.31	183	0.15	0.71	99	0.23
<i>U</i> → <i>I</i>	769	0.93	17.69	895	0.97	23.33	731	1.96	25.94	681	0.77	17.57	194	1.43	22.39	1344	1.11	20.76	174	0.40
<i>I</i> → <i>U</i>	711	0.86	5.39	854	0.93	3.79	728	1.95	6.55	616	0.70	4.76	182	1.34	4.18	1251	1.04	4.74	177	0.41
<i>P</i> → <i>G</i>	135	0.16	0.24	197	0.21	0.37	71	0.19	0.33	175	0.20	0.29	10	0.08	0.13	204	0.17	0.27	114	0.26
<i>G</i> → <i>P</i>	123	0.15	1.41	179	0.19	1.43	64	0.17	3.80	156	0.18	1.38	10	0.07	3.13	184	0.15	1.72	106	0.24

Note: US Current Population Survey .

Table A11: Unemployment decompositions of subgroups, France

	Shimer								
	All	Men	Women	15-24	25-49	50-64	Primary.	Secondary	Tertiary
$P \rightarrow U$	0.22	0.37	0.12	0.26	0.21	0.21	0.34	0.24	0.22
$G \rightarrow U$	0.03	0.02	0.05	0.04	0.04	0.00	0.05	0.00	0.00
$P \rightarrow I$	-0.01	-0.01	0.02	0.00	0.05	0.08	0.07	-0.01	0.05
$G \rightarrow I$	0.02	0.02	0.02	0.00	0.08	0.01	0.04	0.01	0.10
$U \rightarrow P$	0.36	0.28	0.42	0.41	0.37	0.16	0.33	0.36	0.24
$U \rightarrow G$	0.08	0.04	0.13	0.07	0.06	0.08	0.01	0.13	0.14
$I \rightarrow P$	0.07	0.06	0.07	0.05	0.07	0.09	0.02	0.06	0.001
$I \rightarrow G$	0.02	0.00	0.05	0.00	0.04	-0.01	-0.01	0.02	0.11
$I \rightarrow U$	0.18	0.16	0.12	0.03	0.10	0.30	0.08	0.15	0.13
$U \rightarrow I$	0.01	0.03	0.01	0.09	-0.01	0.03	0.04	0.02	0.04
$P \rightarrow G$	0.02	0.01	0.02	0.01	0.02	0.00	0.01	0.01	0.00
$G \rightarrow P$	-0.01	0.00	-0.01	0.00	-0.01	0.00	0.00	0.00	-0.01

Note: the gross flows series are previously seasonally adjusted using the X13 Census programme and the transition probabilities are corrected for time aggregation bias using the methodology applied by Shimer (2012). The series are then detrended with an HP filter with smoothing parameter of 100000.

Table A12: Unemployment decompositions of subgroups, UK

	Shimer								
	All	Men	Women	15-24	25-49	50-64	Primary.	Secondary.	Tertiary
$P \rightarrow U$	0.25	0.28	0.10	0.16	0.26	0.14	0.27	0.30	0.20
$G \rightarrow U$	0.06	0.03	0.07	0.05	0.08	0.03	-0.02	0.05	0.02
$P \rightarrow I$	-0.01	0.00	0.01	-0.01	-0.01	0.05	0.01	0.03	0.01
$G \rightarrow I$	0.01	0.01	0.01	0.01	0.00	0.02	-0.02	0.02	0.01
$U \rightarrow P$	0.34	0.42	0.35	0.47	0.36	0.32	0.50	0.39	0.35
$U \rightarrow G$	0.07	0.05	0.11	0.05	0.10	0.09	0.03	0.02	0.25
$I \rightarrow P$	0.11	0.09	0.08	0.08	0.05	0.09	0.08	0.06	0.01
$I \rightarrow G$	0.03	0.01	0.05	0.02	0.04	0.02	0.00	0.02	0.00
$I \rightarrow U$	0.06	0.03	0.05	0.06	0.02	0.06	0.01	0.00	0.08
$U \rightarrow I$	0.09	0.09	0.12	0.09	0.11	0.15	0.10	0.09	0.09
$P \rightarrow G$	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00
$G \rightarrow P$	-0.02	-0.01	-0.02	-0.01	-0.02	0.00	0.01	-0.01	-0.02

Note: the gross flows series are previously seasonally adjusted using the X13 Census programme and the transition probabilities are corrected for time aggregation bias using the methodology applied by Shimer (2012). The series are then detrended with an HP filter with smoothing parameter of 100000.

Table A13: Unemployment decompositions of subgroups, Spain

	Shimer								
	All	Men	Women	15-24	25-49	50-64	Primary.	Secondary.	Tertiary
$P \rightarrow U$	0.27	0.31	0.21	0.20	0.29	0.25	0.32	0.29	0.14
$G \rightarrow U$	0.03	0.03	0.03	0.00	0.02	0.04	0.01	0.01	0.14
$P \rightarrow I$	-0.02	0.00	-0.06	0.00	-0.01	0.00	-0.02	-0.02	-0.01
$G \rightarrow I$	0.01	0.00	0.03	-0.01	0.01	0.03	0.00	0.00	0.05
$U \rightarrow P$	0.43	0.43	0.46	0.54	0.43	0.33	0.36	0.46	0.30
$U \rightarrow G$	0.07	0.04	0.10	0.02	0.09	0.09	0.03	0.04	0.15
$I \rightarrow P$	0.07	0.05	0.10	0.12	0.04	0.05	0.07	0.07	0.04
$I \rightarrow G$	-0.01	0.01	-0.05	0.01	-0.01	-0.09	-0.02	-0.01	0.01
$I \rightarrow U$	0.06	0.04	0.09	0.04	0.05	0.14	0.11	0.06	0.06
$U \rightarrow I$	0.11	0.08	0.12	0.09	0.11	0.14	0.12	0.11	0.09
$P \rightarrow G$	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
$G \rightarrow P$	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00

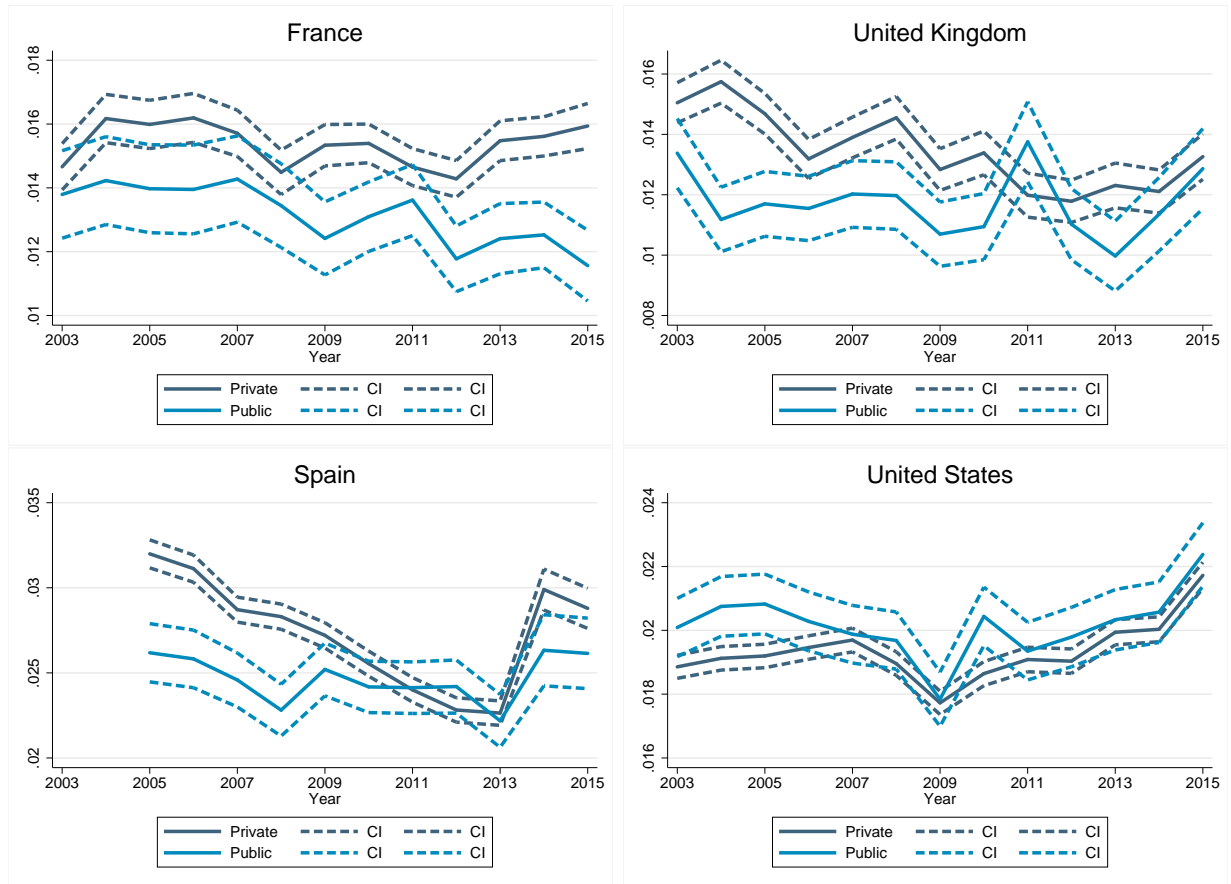
Note: the gross flows series are previously seasonally adjusted using the X13 Census programme and the transition probabilities are corrected for time aggregation bias using the methodology applied by Shimer (2012). The series are then detrended with an HP filter with smoothing parameter of 100000.

Table A14: Unemployment decompositions of subgroups (1996-2017), US

	Shimer								
	All	Men	Women	15-24	25-49	50-64	Primary.	Secondary.	Tertiary
$P \rightarrow U$	0.21	0.26	0.12	0.13	0.26	0.22	0.21	0.22	0.23
$G \rightarrow U$	0.02	0.02	0.03	0.02	0.02	0.03	0.00	0.01	0.04
$P \rightarrow I$	-0.02	0.01	-0.01	0.01	0.00	0.00	0.01	-0.01	0.01
$G \rightarrow I$	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.02
$U \rightarrow P$	0.42	0.42	0.41	0.50	0.41	0.32	0.50	0.43	0.34
$U \rightarrow G$	0.05	0.04	0.05	0.02	0.04	0.09	0.01	0.04	0.10
$I \rightarrow P$	0.05	0.04	0.06	0.08	0.02	0.03	0.02	0.05	0.01
$I \rightarrow G$	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02
$I \rightarrow U$	0.11	0.09	0.12	0.08	0.08	0.11	0.03	0.11	0.10
$U \rightarrow I$	0.15	0.11	0.18	0.14	0.14	0.16	0.17	0.14	0.13
$P \rightarrow G$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$G \rightarrow P$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: the gross flows series are previously seasonally adjusted using the X13 Census programme and the transition probabilities are corrected for time aggregation bias using the methodology applied by Shimer (2012). The series are then detrended with an HP filter with smoothing parameter of 100000.

Figure A10: Transition probability from employment to inactivity, by sector



Note: Based on estimation of equations and using a multinomial logit. For France there were 1,634,340 observations and a pseudo R-squared of 0.092. For UK there were 1,417,683 observations and a pseudo R-squared of 0.077. For Spain there were 1,989,672 observations and a pseudo R-squared of 0.090. For US there were 7,593,719 observations and a pseudo R-squared of 0.068. For France, UK and Spain the transition rate is quarterly, while in the US it is monthly. We used as controls regional, gender, age, education and occupation dummy variables. The predicted probability is calculated based on an individual with the average characteristics of the employed population. The dash lines report the 95 percent confidence interval on the prediction.

Table A15: Public-sector job-security premium, unconditional job-separation rates

	Scenario for value of unemployment					Government budget (medium scenario)		
	Very low	Low	Medium	High	Very high	Millions	% of GDP	% of Gov Spending
	$z = 0.3$ $f = \min$	$z = 0.3$ $f = \text{mean}$	$z = 0.5$ $f = \text{mean}$	$z = 0.7$ $f = \text{mean}$	$z = 0.7$ $f = \max$			
Lower bound: risk neutrality ($\sigma = 0$)								
<i>France</i>	4.0%	3.6%	2.5%	1.5%	1.3%	7161 (€)	0.33	0.63
<i>UK</i>	3.2%	2.5%	1.8%	1.1%	0.9%	3094 (£)	0.16	0.42
<i>Spain</i>	7.4%	5.2%	3.6%	2.1%	1.5%	4336 (€)	0.40	0.99
<i>US</i>	3.6%	2.0%	1.4%	0.6%	0.4%	26714 (\$)	0.15	0.43
Upper bound: risk aversion ($\sigma = 2$) and no insurance								
<i>France</i>	10.5%	9.7%	4.6%	2.1%	1.8%	12963 (€)	0.59	1.13
<i>UK</i>	9.1%	7.3%	3.4%	1.5%	1.3%	5896 (£)	0.31	0.79
<i>Spain</i>	14.8%	11.9%	6.0%	2.8%	2.0%	7196 (€)	0.67	1.64
<i>US</i>	9.5%	5.9%	2.7%	0.7%	0.5%	50011 (\$)	0.28	0.80

Note: The first five columns of table reports the fraction of the wage that a private sector worker is willing to forgo to have the same unconditional job-separation rate as a public sector worker in each country, depending on the replacement rate and job-finding rate. The discount rate r is set to 0.005 for France, UK and Spain and to 0.0017 in the US. We calculate the budgetary value of job-security based on 2015 data on wage compensation of government workers, GDP and total government spending provided by AMECO and FRED datasets.

Table A16: Public-sector job-security premium, different education groups

Country	Scenario for value of unemployment				
	Very low $z = 0.3$ $f = \min$	Low $z = 0.3$ $f = \text{mean}$	Medium $z = 0.5$ $f = \text{mean}$	High $z = 0.7$ $f = \text{mean}$	Very high $z = 0.7$ $f = \max$
Primary educated workers					
France	2.9%-7.2%	2.6%-6.6%	1.8%-3.2%	1.1%-1.5%	1.0%-1.3%
UK	3.4%-9.1%	1.9%-5.5%	1.3%-2.5%	0.8%-1.1%	0.6%-0.8%
Spain	-	-	-	-	-
US	2.8%-5.8%	1.2%-3.3%	0.9%-1.6%	0.3%-0.4%	0.2%-0.3%
Secondary educated workers					
France	2.4%-7.0%	2.1%-6.0%	1.5%-2.8%	0.9%-1.2%	0.7%-1.0%
UK	1.7%-4.8%	1.1%-3.2%	0.8%-1.4%	0.5%-0.6%	0.4%-0.5%
Spain	-	-	-	-	-
US	2.2%-5.6%	1.3%-3.6%	0.9%-1.6%	0.4%-0.4%	0.2%-0.3%
Tertiary educated workers					
France	2.1%-6.2%	1.8%-5.2%	1.2%-2.4%	0.7%-1.0%	0.6%-0.9%
UK	1.0%-3.1%	0.7%-2.2%	0.5%-1.0%	0.3%-0.4%	0.2%-0.3%
Spain	2.1%-5.2%	1.2%-3.4%	0.8%-1.6%	0.5%-0.7%	0.3%-0.5%
US	0.7%-2.0%	0.4%-1.2%	0.3%-0.5%	0.1%-0.1%	0.1%-0.1%

Note: The table reports the lower and upper bound of fraction of the wage that a private sector worker is willing to forgo to have the same unconditional job-separation rate as a public sector worker in each country, depending on the replacement rate and job-finding rate. The discount rate r is set to 0.005 for France, UK and Spain and to 0.0017 in the US.