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You're the One That I Want! Public Employment and Women's Labor Market Outcomes

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ABSTRACT

You're the One That I Want!
Public Employment and Women's Labor
Market Outcomes*

In most countries, the public sector hires disproportionally more women than men. We document gender differences in employment, transition probabilities, hours, and wages in the public and private sector using microdata for the United States, the United Kingdom, France, and Spain. We then build a search and matching model where men and women decide if to participate and if to enter private or public sector labor markets. We calibrate our model separately to the four countries. Running counterfactual experiments, we quantify whether the selection of women into the public sector is driven by: (i) lower gender wage gaps and thus relatively higher wages for women in the public sector, (ii) possibilities of better conciliation of work and family life for public sector workers, (iii) greater job security in the public compared to the private sector, or (iv) intrinsic preferences for public sector occupations. We find that, quantitatively, women's higher public sector wage premia and their preferences for working in the public sector explain most of the selection. We calculate the monetary value of public sector job security and work-life balance premia, for both men and women, and we estimate how higher public sector wages and employment affect male and female unemployment, inactivity rates, and wages differently.

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1 Introduction

The public sector is a large employer. In OECD countries, public sectors account for between 10 and 35 percent of total employment. Also, the public sector tends to hire significantly more women than men. Figure 1 displays the fraction of women out of all workers in the public sector, as well as the fraction of women out of all workers in the total economy for 20 OECD countries. Women's share in public employment is larger than their share in total employment. With the exception of Greece and Luxembourg, the majority of public sector workers are women, their share reaching 70% in Sweden. Despite the importance of the public sector for women's employment, there exist few analyses of the reasons behind the over-representation of women in the public sector or the implications this has for female labor market outcomes.

We use microdata to document several facts which are common for the United States, the United Kingdom, France, and Spain regarding gender differences in employment, transition probabilities, hours, and wages in the public and private sector. We find a gender bias in public employment that persists across age groups, regions, levels of education as well as over time. This gender bias is also robust to excluding health care and education from public employment, and it is present in two thirds of the 3-digit occupations that are common across the public and private sector. Regarding transition probabilities, we estimate that the probability of moving from employment to inactivity is higher for women, and we find this probability to be significantly lower for public sector workers. We also provide evidence that gender wage gaps and working hours are lower in the public sector.

Motivated by these empirical findings, we build a search and matching model where men and women decide if to participate and if to enter private or public sector labor markets. Through the lens of our model, we view the gender bias in public employment as driven by supply, meaning that it is not the government that acts explicitly to hire more women, but it is women that choose the public sector more so than men. Our objective is to better understand this selection, in particular, how much of it is explained by public sector job characteristics that are related to management, organization and human resource practices in the public sector.

We calibrate our model separately to the four countries, using statistics from our empirical analysis to identify the model's key parameters. Running counterfactual experiments, we quantify how much of the selection of women into the public sector is driven by: (i) lower gender wage gaps and thus relatively higher wages for women in the public sector (estimated directly from the data), (ii) possibilities of better conciliation of work and family life for public

Figure 1: Share of women in the public sector and total economy
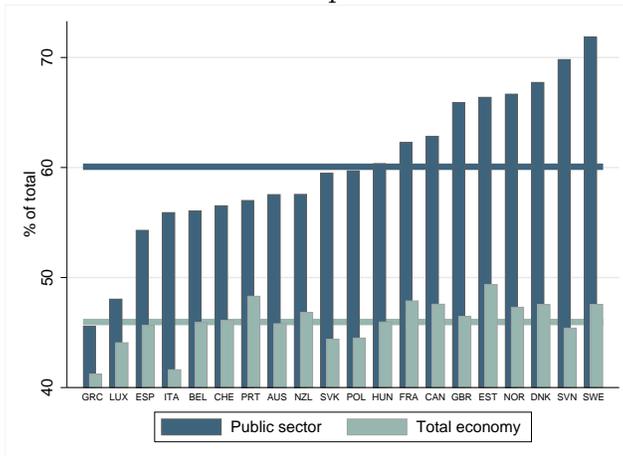
sector workers (identified based on differences in flows from private and public employment to inactivity), (iii) greater job security in the public compared to the private sector (derived from differences in flows from private and public employment to unemployment), or (iv) intrinsic preferences for public sector activities (identified as a residual). We find that women's preferences explain 20 percent of the gender bias in France, 45 percent in Spain, 80 percent in the US, and 95 percent in the UK. The remaining bias is explained by differences in public and private sector characteristics, in particular relatively higher wages for female public sector workers that explain around 30 percent in the US and Spain and 50 percent in France. Only for France and Spain, do we find work-life balance to be an important driver that explains 20 to 30 percent of the gender bias. Higher job security in the public sector actually reduces the gender bias because it is valued more by men than by women.

These last results however do not stand in contrast to men and women valuing better work-life balance and increased job security provided by public sector employment, which is something we can quantify within our framework. In particular, we calculate how much of their wages private sector workers would be willing to sacrifice to face the same job separation rates or working hours as workers in the public sector. We find that the work-life balance premium is very high in Spain (25 to 36 percent), high in France and the UK (7 to 15 percent) and lower in the US (7 to 9 percent). In all countries, the job security premium is much lower, ranging from 1-2 percent in the US and the UK to 3-4 percent in France and Spain, countries with higher unemployment rates. Regarding gender differences, we find that women are willing to pay more for work-life balance, while men are willing to pay more for job security. This last result is due to the fact that women have, in general, a higher opportunity cost of working and lower wages, and hence job losses are more painful for men.

Even though female labor force participation has increased remarkably over the past decades, gender gaps in participation and employment still persist. In the US, the UK, France, and Spain participation rates of prime age women are 10 percentage points lower compared to those of men. Furthermore, women continue to earn lower wages. Many different explanations for persisting gender gaps in the labor market have been proposed and tested.[1] However, one aspect that most of this literature has overlooked so far is the particular role of public sector employment for female labor market outcomes and hence for gender gaps in employment, participation, and wages. Two of the most influential surveys on female employment by Killingsworth and Heckman [1986] and Blundell and Macurdy [1999] do not even mention this sector that employs such a large share of all working women. This is a serious omission because public sector labor markets operate very differently from private labor markets. In particular, the public sector does not face the same competitive forces and constraints as private firms, and its employment and wage policies are tailored to a range of different objectives.[2]

To the best of our knowledge there are only two exhaustive empirical studies – Gornick and Jacobs [1998] and Anghel, de la Rica, and Dolado [2011] – which explicitly address the gender bias in public employment. Both studies consider cross-country data, and while several of their findings are country dependent, each point to one aspect that seems to hold across different countries. Gornick and Jacobs [1998] establish that women face lower gender wage gaps in the public compared to the private sector and suggest that this might be due to a more compressed distribution of public sector wages. Anghel, de la Rica, and Dolado [2011] find that unemployed and inactive women are much more likely to search for public sector jobs than their male counterparts. Other studies regarding public employment and gender tend to focus on one particular country or can be characterized as mostly descriptive. Rosen's [1996] study on the expansion of the Swedish public sector is maybe one of the first to highlight the strong gender bias in public employment. His analysis reveals that between 1963 and 1993 employment of women in local government increased fourfold while that of men only doubled. Kolberg [1991] stresses that the expansion of the Scandinavian welfare state and increased public sector employment has led to more women participating in the

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[1] Ranging from gendered education choices which lead to men and women working in differently compensated industries (Gemici and Wiswall [2014]), to maternity and institutional aspects like availability of child care and possibility of working part time (Del Boca [2002]), to maternity and better paid jobs in industries with inflexible working hours (Goldin [2014]), to behavioral gender differences showing that women shy away from competition (Manning and Saidi [2010]), to differences in time spent on household chores (Albanesi and Olivetti [2009]).

[2] For instance, attaining budgetary targets (Poterba and Rueben [1995], Gyourko and Tracy [1989]), redistributing resources (Alesina et al [2000] and [2001]) or satisfying interest groups for electoral gains (Borjas [1984], Matschke [2003]).

labor market, and according to Adserà [2004] higher fertility rates in Scandinavian countries are partly due to the higher share of women in stable public sector jobs. In line with this finding, Pertold-Gebicka, Pertold, and Datta Gupta [2016] highlight that after the birth of their first child, Danish women tend to switch from the private to the public sector, even accepting wage losses. For France, Italy, and the UK, Lucifora and Meurs [2006] find that for women, wages in the public sector are always higher compared to the private sector while for men in the upper part of the distribution the public-private wage gap turns negative. Controlling for the endogenous selection of workers into the Spanish public sector, Hospido and Moral-Bonito [2016] on the other hand estimate a positive public sector wage premium for both men and women along the entire distribution.

The literature on the intersection of public sector employment and female labor market outcomes is thus limited to empirical works, with the exception of a recent paper by Bradley, Postel-Vinay and Turon [2017].[3] In this paper, the authors set up a general model of public sector employment, but they calibrate it for different markets segmented by gender and education and hence ignore the interaction of women and men in the labor market. Focusing on the effect that public sector hirings have for private sector employment the authors also abstain from modeling individuals' participation decisions. However, given the importance of women's transitions from and to inactivity, it seems natural to extend the decision space to include non-participation when explicitly incorporating women into a search and matching model. Modeling non-participation goes back to Pissarides [1990] Chapter 6, but has since then been advanced by Garibaldi and Wasmer [2005], Pries and Rogerson [2009], Krusell et al [2011], Haefke and Reiter [2011] and Albanesi and Şahin [2013]. However, none of these models specifies a public sector. Hence, to the best of our knowledge we are the first to propose a theoretical framework that combines both, public sector employment and female labor market decisions, and that allows for the study of the effect of the gender bias in public employment on female labor market outcomes. The remainder of this paper is organized as follows: The next section presents our empirical analysis. Sections 3 and 4 present the model and its calibration. In Section 5 we use our model to carry out counterfactual experiments, and Section 6 concludes.

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[3]Separately the topics (i) female labor market outcomes and (ii) public sector employment have generated a large body of theoretical literature. Regarding (i) the focus has been on aspects such as child care costs (e.g. Attanasio et al [2010]), parental leaves (e.g. Erosa et al [2010]) divorce risk (e.g. Fernández and Wong [2014]), or welfare states (e.g. Greenwood et al [2000]), but none considers the effects of public sector employment. Regarding (ii), theoretical models tend to emphasize aggregate labor market effects, in particular the effects on private wages and the crowding out of private employment (see e.g. Finn [1998] in an RBC model or Gomes [2015] in a search and matching model).

2   Empirical analysis

We carry out an empirical analysis regarding the role of public sector employment for labor market outcomes of men and women. In particular, we analyze gender differences in employment, transition probabilities to unemployment and inactivity, hours, and wages in the public and private sector. We focus on four countries: the United States, the United Kingdom, France, and Spain. We choose these countries because their sizable public sectors encompass different industries and employ distinct hiring processes, and because these large economies have different labor market institutions and gender policies. This guarantees that common findings across these four countries are likely to be intrinsic characteristics of the public sector and not driven by country specificities. Our analysis is based on microdata and in particular, for each country, we use the representative labor force survey from which official statistics are drawn: the French *Labour Force Survey* (FLFS), the UK *Labour Force Survey* (UKLFS), the Spanish *Labour Force Survey* (SLFS) and the US *Current Population Survey* (CPS). The CPS is conducted on a monthly basis while the other three surveys are carried out every quarter.

The four surveys include individuals' demographic characteristics, as well as information on individuals' labor force status, sector of employment, occupation, industry of employment, weeks worked and hours per week worked. We restrict our sample to individuals aged 16 to 64. For calculating stocks of unemployed, employed, and inactive individuals we use averages from 2003 to 2018 (for longer time series see Appendix A). The distinction between public and private sector jobs is based on a self-reported variable regarding each individual's employer. We define public sector employment in a way that is consistent with each country's official statistics. For the US, the public sector includes individuals who work for the government (further disaggregated into Federal, State or Local government). In the UK, we include the following categories into our definition of public sector employment: i) Central Government, Civil Service; ii) Local government or council (including police, fire services and local authority controlled schools or colleges); iii) University or other grant-funded educational establishments; 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.[4] A similar definition is used for France, including i) État; ii) Collectivités territoriales; iii) Hôpitaux publics; and iv) Sécurité sociale and excluding: i)

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[4]As in Fontaine et al. [2018], we exclude public owned companies because they sell their goods and services and thus face market forces. Including them into private sector employment, together with non-profit institutions tends to reduce the observed differences between the two sectors.

Particulier; ii) Entreprise publique; and iii) Entreprise privée. For Spain, the survey asks directly whether respondents work for the public or the private sector; for more details on the methodology see Fontaine et al. [2018].

2.1 Gender bias in the public sector

Table 1 reports the accounting definition used in this paper. We denote the size of the employment pool by e, and e_m and e_f respectively are the number of men and women in total employment. In terms of sectors, an additional subscript g refers to the government/public sector while subscript p refers to the private sector. Hence for example $e_{g,f}$ indicates the stock of employed female workers in the public sector. The top two graphs of Figure 2 display what we call the raw statistics: the share of public sector employment by gender (calculated by row) and the share of women in sectoral employment (calculated by column) respectively.

Table 1: Accounting definition

	Public sector	Private sector	Total
Women	$e_{g,f}$	$e_{p,f}$	e_f
Men	$e_{g,m}$	$e_{p,m}$	e_m
Total	e_g	e_p	e

Note: Government (g), private (p), women (f), men (m).

The size of the public sector varies across countries, and is larger in the UK and France with public sector employment representing around 22 percent of total employment, and it is smaller in the US and Spain where it represents 16 percent of total employment. Despite differences in the size of the public sector, in all countries the share of public sector employment is larger for women who are the majority of all public sector workers.

Based on the two-by-two matrix in Table 1 we construct two indicators for the gender bias in public employment. The first indicator rg is the ratio of public employment shares, defined as the public sector employment share for women over the public sector employment share for men. The second indicator rf is the ratio of women's employment shares, defined as the share of women out of all public sector workers over the share of women out of all private sector workers. Formally:

$$rg = \frac{\frac{e_{g,f}}{e_f}}{\frac{e_{g,m}}{e_m}}, \qquad rf = \frac{\frac{e_{g,f}}{e_g}}{\frac{e_{p,f}}{e_p}}.$$

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Figure 2: Different measures for the gender bias in public employment

The two bottom graphs of Figure 2 display these two indicators for all four countries. In the case of perfect gender symmetry across sectors, both indicators would take on a value of 1. However, for the four countries the ratio of public employment shares lies above 1.4, and the ratio of women's employment shares lies above 1.2, indicating that public employment is clearly biased towards women.

A natural explanation for the gender bias in public employment could be that certain types of jobs that are predominately carried out by the government could be preferred by women. However, as the two top graphs of Figure 3 reveal, for the US, the UK, and France, once we exclude health care and education, while somewhat lower, women's public

Figure 3: Robustness: Gender bias in public employment across industries and occupations

Industries

3-digit Occupations
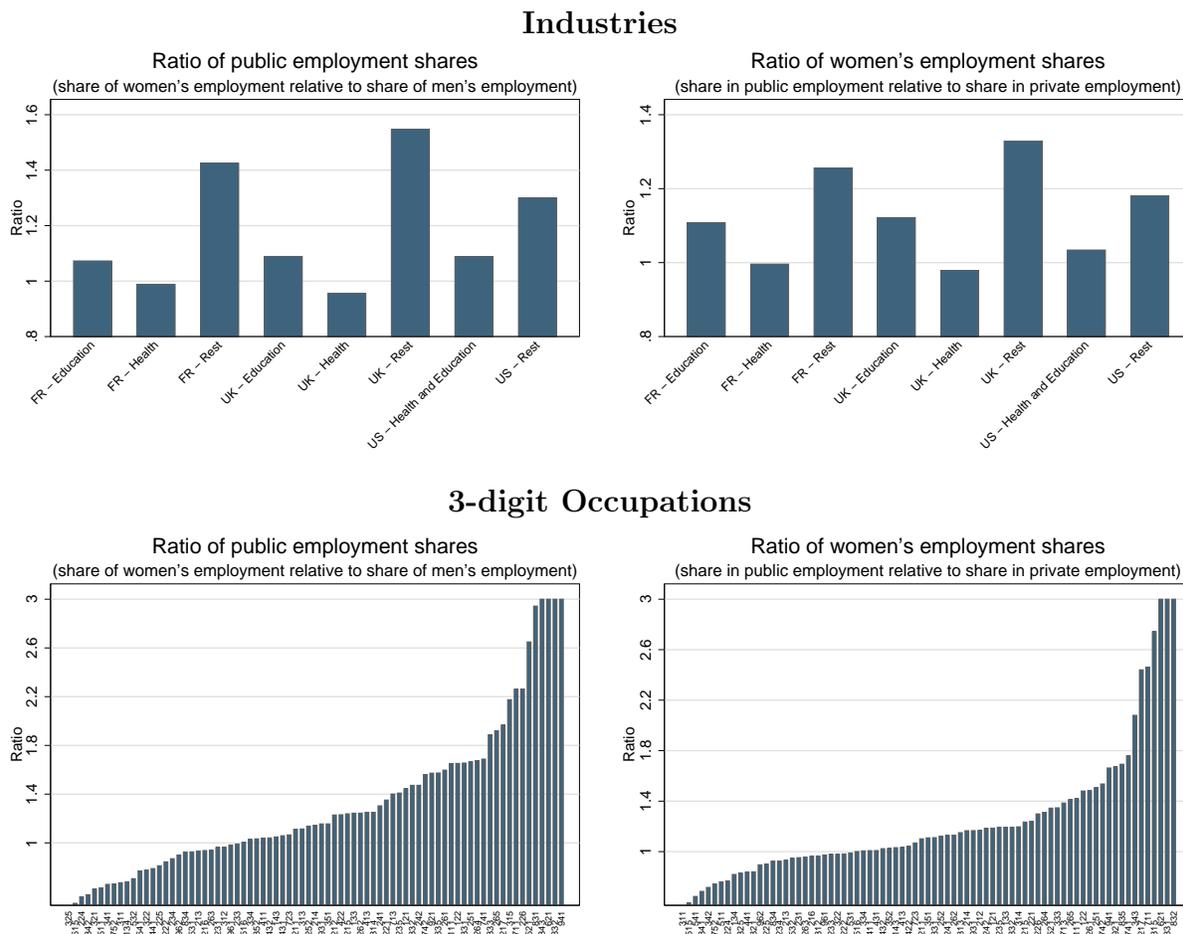
Note: the 1st panel uses the French and the UK Labour Force Survey and the CPS (2003-2018). The 2nd panel shows CPS data, average between 1996 and 2017. 3-digit occupations that have an overall share of public sector employment between 0.05 and 0.95. The ratios were capped at 3 for readability.

employment is still 20-50% higher than men's.[5] Interestingly enough, as Figure A.1 in Appendix A shows, the gender bias is less pronounced within public health care and public education compared to other branches of public employment.

Along similar lines, but only for the US, we are also able to analyze the gender composition of public sector jobs based on a 3-digit ISCO-08 occupational classification.[6] We consider only occupations with non-trivial public and private sector employment, i.e. occupations

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[5]Unfortunately, the Spanish LFS does not allow for a disaggregation of public employment by industry.

[6]The CPS occupational code is based on the 2010 Census 4-digit occupational classification. We use a cross-walk in order to classify occupations based on the 3-digit ISCO-08. This occupational classification has several advantages: First, it provides clear guidelines for grouping occupations. Secondly, it provides a harmonized classification across countries.

Figure 4: Public Employment Shares Ratio, Regional Variation
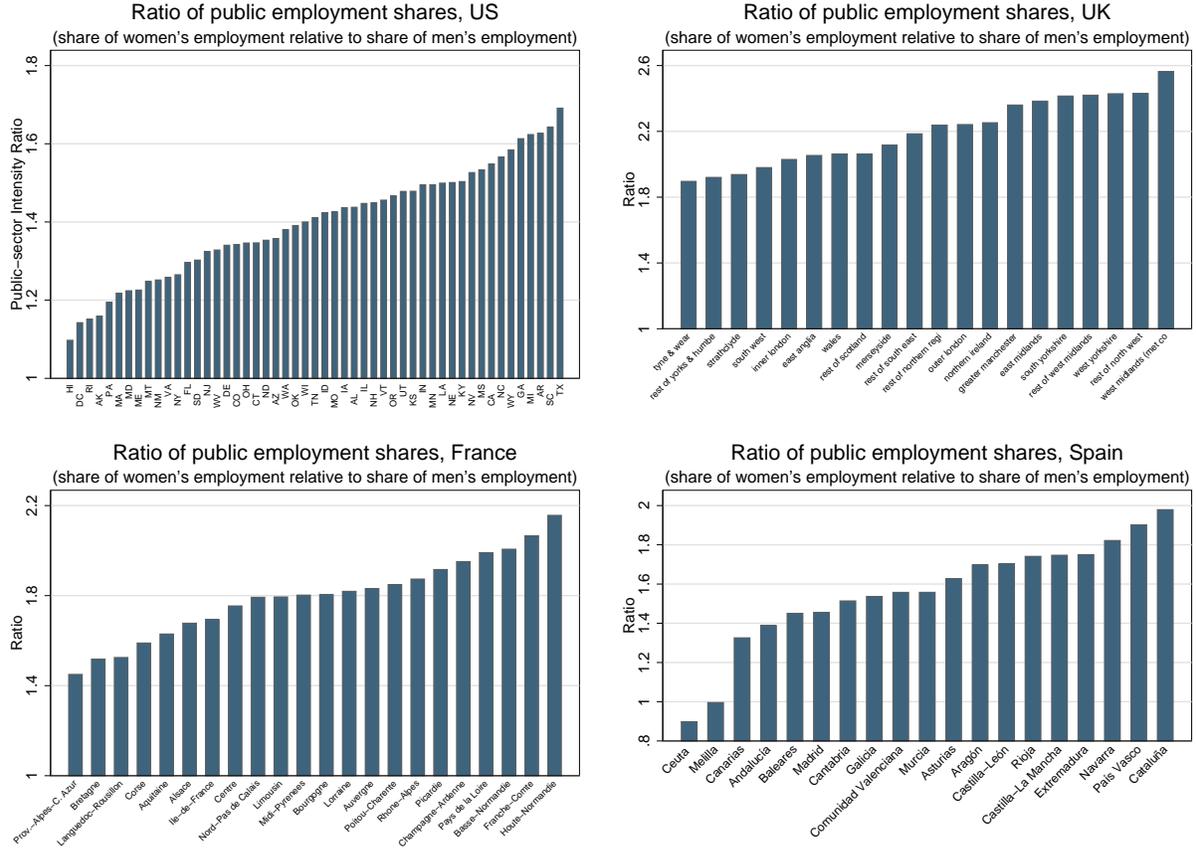
Note: For the United States the data is taken from the CPS (2003-2018), for the United Kingdom from the UK Labour Force Survey (2003-2018), for France from the French Labour Force Survey (2003-2017) and for Spain from the Spanish Labour Force Survey (2003-2018).

for which the share of public sector employment in total employment is larger than 5% and smaller than 95%.[7] We find that two-thirds of these occupations display ratios of public employment shares and ratios of women's employment shares that are larger than 1; see bottom graphs of Figure 3. As Figure A.1 in Appendix A shows, this result is again robust to using the raw measures instead of the indicators. Overall, we observe quite some variability in the gender bias in public employment across industries and occupations, which seems to indicate that women's preferences for certain jobs and industries matter. However, our statistics also show that this variability alone cannot account for the entire gender bias in

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[7]This implies that some top-paid occupations are excluded (such as manufacturing, mining, construction, and distribution managers; architects, planners, surveyors and designers) as well as some low-paid jobs (such as domestic, hotel and office cleaners and helpers, vehicle, window, laundry and other hand cleaning workers, waiters and bartenders).

public employment. Hence, in our model while gender differences in preferences for public sector jobs will play a key role, we will also add additional explanations related to sectoral differences in job characteristics (wages, job security, work-life balance) and test for the importance of each one of them.

To pin down some of the model's key parameters in our calibration we make use of the regional variation in the gender bias in public employment, displayed in Figure 4. The ratio of public employment shares is larger than one in all US states, varying between 1.1 and 1.7. The picture is similar for the other three countries. The only exception are two regions in Spain – Ceuta and Melilla – characterized by a strong presence of the armed forces due to their location on the African continent. Our findings by regions are also robust to using the alternative indicator or the raw measures for the gender bias in public employment; see Figures A.2 and A.3 in Appendix A.

To further check the robustness of our findings we also display the two indicators for the gender gap in public employment over time and by workers' age groups and levels of education; see Figures A.7 to A.15 in Appendix A. Both indicators seem to be persistent over time, even though they fell around the time of the great recession, most likely driven by large changes in private sector employment. Regarding workers' age groups, both ratios are close to 1 for very young workers, but they jump around age 20 and remain relatively constant over the lifecycle. Finally, the gender bias in public employment is present across all levels of education and particularly strong among primary and tertiary educated workers.

2.2 Stocks and flows by gender

To characterize gender differences in transition probabilities we calculate stocks and flows of men and women between states of employment in each sector, unemployment, and inactivity. These are crucial statistics for identifying the parameters of our model.[8] Table 2 summarizes the key statistics, and Figure B.1 in Appendix B provides a graphical representation of these numbers together with all transition rates.

In all four countries, women's inactivity rates are more than 10 percentage points higher than those of men. In the US and the UK the male unemployment rate is higher than the female rate, but the opposite is true for Spain and France. On average 16.3 and 22.3 percent of all women work in the public sector, in France and in the UK respectively. In Spain and the US, differences by gender are smaller. The Spanish and the US public sector hire 8 and

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[8]Providing estimates of these worker flows is, in itself, an important contribution to the literature that has mainly focused on stocks.

Table 2: Labor market stocks and hazard rates by gender

Targets	US		UK		France		Spain	
	Men	Women	Men	Women	Men	Women	Men	Women
Stocks								
Private emp.	0.672	0.574	0.667	0.454	0.585	0.441	0.498	0.334
Public emp.	0.102	0.133	0.118	0.222	0.108	0.165	0.069	0.080
Unemployed	0.057	0.044	0.054	0.040	0.069	0.064	0.105	0.097
Inactive	0.169	0.249	0.162	0.284	0.238	0.330	0.329	0.490
Rates								
Unemployment	0.067	0.059	0.064	0.056	0.090	0.096	0.156	0.190
Inactivity	0.169	0.249	0.162	0.284	0.238	0.330	0.329	0.490
Transition probabilities								
$P \to U$	0.0161	0.0121	0.0151	0.0132	0.0203	0.0217	0.0417	0.0437
$P \to I$	0.0189	0.0274	0.0159	0.0295	0.0187	0.0269	0.0245	0.0450
$G \to U$	0.0060	0.0076	0.0064	0.0045	0.0079	0.0083	0.0203	0.0227
$G \to I$	0.0148	0.0200	0.0144	0.0179	0.0142	0.0180	0.0191	0.0274

Note: French, Spanish, UK Labour Force Surveys and the CPS (2003-2018). The transition probabilities report the probability of an employed worker to be unemployed or inactive in the following quarter (month in the US).

13 percent of all women respectively. These numbers are different from the ones previously reported that only considered employed workers. Public sector workers have a much lower probability of becoming inactive or unemployed compared to private sector workers. While the probability of dropping out of the labor force is much higher for women compared to men, it is much lower for women working in the public compared to the private sector. The probability of an employed woman to withdraw from the labor force is 40 to 65 percent higher if she works in the private compared to the public sector. We use these differences in hazard rates from public and private employment to inactivity, for men and women, to identify differences in work-life balance between sectors.

However, the lower probability of exiting the labor force from a public compared to a private sector job could potentially be due to composition effects. In particular, the public sector hires more educated and older workers compared to the private sector. To take this into account, we estimate the probabilities of leaving employment conditional on observable characteristics using a multinomial logit model (see Appendix B for details on this estimation). Figure B.2 in Appendix B visualizes the results from this estimation. In all four countries, the probability of dropping out of the labor force is higher for women than for men. For women in all three European countries, however this probability is lower if they work in the public compared to the private sector. In the US, the difference for women across sectors is almost insignificant. This conditional analysis also shows that in all four countries,

the probability of moving to unemployment is lower for public compared to private sector workers. This difference in job security across sectors is highest in France, followed by the UK and Spain, and lowest in the US.

2.3 Wage premium and working hours

Finally, we also analyze gender differences in wages and hours worked in the public and private sector. To estimate public sector wage premia for men and women and to calculate the private sector wage gap, we run wage regressions using microdata for the three European countries from the 2002, 2006, 2010, and 2014 *Structure of Earnings Survey*. For the US, we obtain information on individuals' income and income components from the CPS March Supplement for the years 1996 to 2018. In particular, we regress log gross yearly earnings on individual characteristics such as gender, age, and education, and job characteristics such as occupation, tenure, indicators for holding a part-time job and for working in the public sector as well as an interaction term between being female and holding a public sector job. We also control for region and year fixed effects.

Panel A in Table 3 displays the results from this estimation for each of the four countries. All columns (2) display the most complete specification that also controls for individuals' occupation (2-digits). In all countries but France, for women, working in the public sector is associated with 7-6% higher gross yearly earnings compared to working in the private sector. For men these premia are much smaller, ranging from 0-4% in Spain and the UK, to being negative in the US and France. While women also face lower earnings in the public compared to the private sector in France, they face a lower discount (-5%) compared to men (-11%). Regarding private sector wages, women face 16-31% lower wages compared to men. We estimate the largest private sector gender wage gap in the US, followed by Spain and the UK. The gender wage gap in the private sector is lowest in France.

We use the same data to estimate if and by how much, individuals in the public sector work fewer hours compared to those in the private sector. To this end, we regress the log of working hours on similar individual and job characteristics as before (gender, age, education, occupation, tenure, part-time dummy, and an indicator for working in the public sector). Again we also control for year and region fixed effects. Results from this estimation are displayed in panel B of Table 3. Once more we focus on all columns (2) containing the most complete specification of our regressions. Individuals holding full time jobs in the public sector work between 3-5% fewer hours compared to similar individuals holding full time jobs in the private sector.

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Table 3: Public sector wage and hours premium and private sector gender wage gap

	US		UK		France		Spain	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Panel A: wage regressions								
Public sector wage premium								
Men	-0.017***	-0.053***	-0.006	0.038***	-0.155***	-0.117***	-0.001	0.002
	(-5.46)	(-16.38)	(-1.75)	(11.36)	(-60.83)	(-0.30)	(-0.44)	(0.62)
Women	-0.031***	0.059***	0.083***	0.059***	-0.066***	-0.054***	0.090***	0.069***
	(-10.80)	(19.88)	(29.71)	(21.97)	(-26.40)	(-22.55)	(36.88)	(28.65)
Gender wage gap								
Private	-0.360***	-0.314***	-0.199***	-0.177***	-0.193***	-0.163***	-0.235***	-0.214***
	(-206.20)	(-164.45)	(-86.52)	(-76.24)	(-105.59)	(-91.22)	(-182.29)	(-163.18)
Controls								
Demographic	X	X	X	X	X	X	X	X
Region and year	X	X	X	X	X	X	X	X
Part-time	X	X	X	X	X	X	X	X
Tenure (quadratic)			X	X	X	X	X	X
Occupation		X		X		X		X
Observations	1,117,845	1,117,845	625,869	625,869	593,950	593,950	876,274	876,274
R-squared	0.426	0.481	0.498	0.550	0.419	0.487	0.566	0.599
Panel B: hours regressions								
Public sector hours premium								
Public-sector	0.008***	-0.025***	-0.048***	-0.038***	-0.036***	-0.028***	0.013***	-0.046***
	(5.88)	(-25.01)	(-31.83)	(-34.61)	(-36.13)	(-37.03)	(11.10)	(-54.25)
Controls								
Demographic	X	X	X	X	X	X	X	X
Region and year	X	X	X	X	X	X	X	X
Tenure (quadratic)			X	X	X	X	X	X
Occupation	X	X	X	X	X	X	X	X
Part-time		X		X		X		X
Observations	1,021,443	1,021,443	620,000	625,869	593,950	593,950	876,274	876,274
R-squared	0.207	0.602	0.184	0.569	0.105	0.471	0.119	0.563

Note: Estimated by OLS regressions of the log of yearly gross earnings on a female dummy and a female dummy interacted with a dummy for working in the public sector, controlling for region, year, occupation, education, age groups, part-time, tenure and tenure squared.

However, fewer working hours are just one aspect of a better work-life balance (next to additional sick days, holidays, flexibility to work from home, employer provided child care etc.). In our model we want to capture differences in work-life balance across sectors in an ample sense, and hence we do not use these estimates to identify any parameters. Nevertheless, our results on fewer working hours in the public sector support the claim of a better work-life balance in the public compared to the private sector.

3 Model

Results from our empirical analysis suggest that the over-representation of women in the public sector could potentially be due to different job characteristic such as lower gender wage gaps, higher job security or better work-life balance. Furthermore, women could simply have

a preference for public sector occupations, unrelated to the conditions offered. In order to quantify the importance of each of these factors and to be able to conduct policy experiments, we set up a model economy where men and women decide to look for jobs in the public or the private sector. Men's and women's public sector wages are set as a function of their private sector wages according to our empirical findings. We model gender differences in private wages following Albanesi and Şahin [2013] such that women and men face certain opportunity costs of working, which are drawn from different distributions for each gender. In particular, women are more likely to face higher opportunity costs of working, and hence they are more likely to quit their jobs. This leads to lower expected surpluses of jobs occupied by women and hence lower female private sector wages. We build on Garibaldi and Wasmer [2005]'s version of a search model with inactivity, and we model public and private employment following Gomes [2015].

3.1   General setup

We consider a search and matching model with private sector firms and a public sector. Workers – men and women – can be either employed, unemployed and searching for a job or they can be inactive. Each private sector firm is endowed with a single vacancy that can be vacant or filled (job). At each instant, τ individuals are born (enter the labor market) and die (retire) such that the working population is constant and normalized to unity. Agents are assumed to be risk-neutral and to discount the future at a common rate $r > 0$. Time is continuous.

Figure 5 depicts the general structure of the model. Prior to entering the labor market, individuals have to decide which sector to enter: the public or the private sector. We assume that markets are perfectly segmented and that workers do not change sectors once this choice is made. This assumption rules out any transitions between sectors, either directly (through job-to-job transitions) or indirectly (via unemployment or inactivity). Two facts support this simplifying assumption: (i) The majority of inflows into and outflows from public sector employment are from and to non-employment. (ii) Even after a spell of unemployment or inactivity, workers are much more likely to find a job in their sector of previous employment.[9]

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[9]The first fact is particularly true in France and Spain - countries with entry exams into the public sector. In these two countries, workers employed in the private sector in the previous quarter represent only 10 to 15 percent of inflows into public sector employment. Similar magnitudes hold for outflows. In the US and UK these numbers are slightly higher. In the UK, 30 percent of inflows into public sector employment come from the private sector, while 20 percent of public sector workers who leave employment hold a private sector job in the following quarter. In the US, these statistics are 40 and 30 percent, respectively. While somewhat larger, these shares still represent the minority of all inflows into and outflows from public sector employment. Regarding the second fact, for the US, Fontaine et al. [2018] report (in their Appendix V)

Figure 5: Newborn's decisions
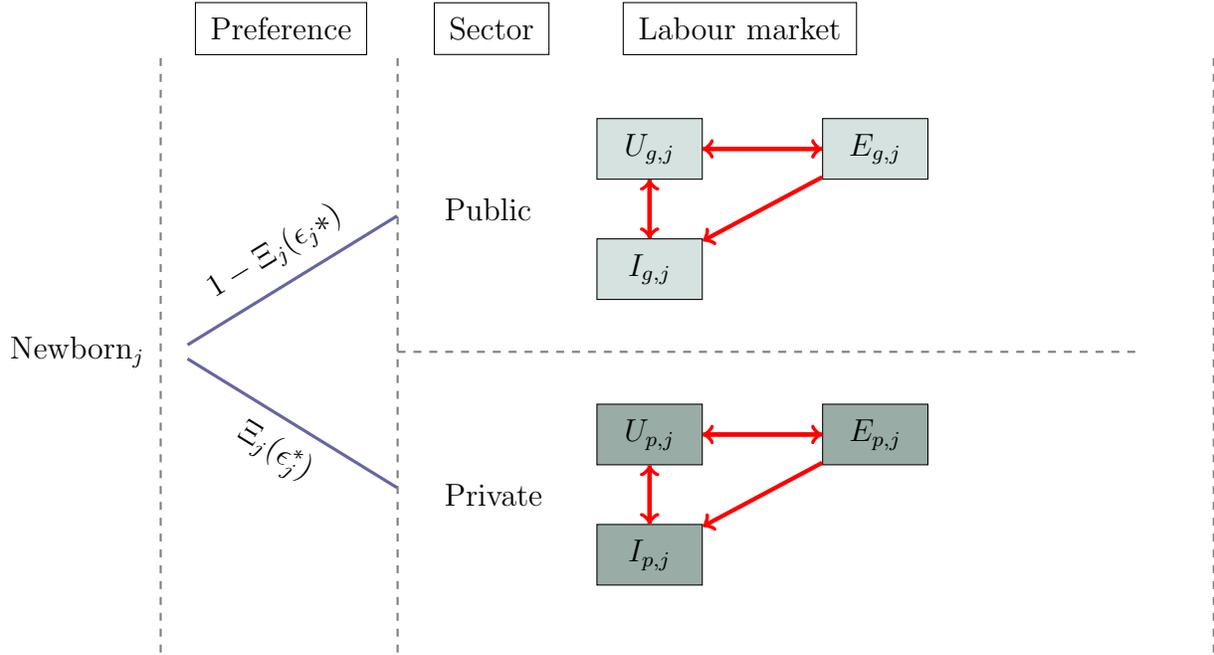
Each individual draws a preference for the public sector, denoted by ϵ. This preference could reflect relative differences in intrinsic preferences for working in the public sector, preferences for public sector occupations, differences in individuals' costs for entering the private or public sector (e.g. due to requirements such as taking an exam for public sector jobs) or differences in other characteristics that are absent from the model (e.g. differences in risk aversion between men and women). We assume that for men and women this preference is distributed across individuals according to the cumulative normal distribution functions $\Xi_m(\cdot)$ and $\Xi_f(\cdot)$ respectively.

Hence, in the spirit of a generalized Roy model, an endogenous proportion of the population (those whose preferences are sufficiently high) enters the public sector while the other fraction (those whose preferences are sufficiently low) joins the private sector. All variables are therefore indexed by two subscripts, subscript $i = [g, p]$, where g refers to the public (government) sector and p to the private sector, and subscript $j = [m, f]$, where m refers to

job-finding rates in the public and private sector, conditional on individuals' previous sector of employment. The unconditional job-finding rate in the public sector is only 1.8 percent, but conditional on having been employed in the public sector in the month preceding unemployment it is close to 30 percent. The public sector job-finding rate conditional on being previously employed in the private sector is 1.4 percent, roughly equal to the rates conditional on previously having been unemployed or inactive. For the private sector, the job-finding rate conditional on previous private sector employment is higher than 40 percent. Being previously employed in the public sector does not raise the job-finding rate in the private sector relative to having been unemployed or inactive (with job-finding rates of around 16 percent). These numbers suggest that individuals' choice of sector is relatively persistent, even after unemployment or inactivity spells.

male and f to female.

In each sector i, a worker of gender j will be in one of the following three states: employed $(e_{i,j})$, unemployed $(u_{i,j})$ or inactive $(i_{i,j})$. Individuals' flow utilities in each state are given by

$$v_{i,j}^E = (1 - \xi_i)x + w_{i,j}, \tag{1}$$

$$v_{i,j}^U = (1 - s)x, \tag{2}$$

$$v_{i,j}^I = x, \tag{3}$$

where x denotes the stochastic value of home production or the opportunity cost of working. We assume that individuals draw a value for x from cumulative log-normal distribution functions $F_m(\cdot)$ and $F_f(\cdot)$, which are potentially different for men and women. Individuals who are inactive enjoy the utility of home production. Those who are unemployed have to spend a fraction s of their time searching, and hence they only enjoy a fraction $1 - s$ of x. Finally employed individuals receive a wage payment $w_{i,j}$ and spend a fraction ξ_i of their time at work, which is potentially different across the two sectors.

3.2 Value functions

Given individuals' flow utilities described above and transition probabilities between the three states, value functions for employment, unemployment, and inactivity for men and women in each of the two sectors can be written as follows:

$$(r + \tau + \lambda)E_{i,j} = v_{i,j}^E + \delta_{i,j}[\max(U_{i,j}, I_{i,j}) - E_{i,j}] + \lambda \int_0^\infty \max(E_{i,j}(x'), U_{i,j}(x'), I_{i,j}(x'))dF_j(x'), \tag{4}$$

$$(r + \tau + \lambda)U_{i,j} = v_{i,j}^U + m(\theta_i)[\max(E_{i,j}, U_{i,j}) - U_{i,j}] + \lambda \int_0^\infty \max(U_{i,j}(x'), I_{i,j}(x'))dF_j(x'), \tag{5}$$

$$(r + \tau + \lambda)I_{i,j} = v_{i,j}^I + \lambda \int_0^\infty \max(U_{i,j}(x'), I_{i,j}(x'))dF_j(x'), \quad j = [m, f], i = [p, g], \tag{6}$$

where $\delta_{i,j}$ denotes the separation rate in sector i that is potentially different by gender, and λ is the arrival rate of shocks to the opportunity costs of working which is independent of gender and sector. The job finding rate in sector i is $m(\theta_i)$, the same for both genders. Hence, we assume there to be no discrimination in hiring neither in the public nor the private sector.

The value function for employment is given by the sum of the flow utility of being employed, the loss suffered when separated, and the change that occurs when individuals draw

a new value for x. The loss suffered when separated will be different if individuals move to unemployment or inactivity thereafter. In particular, individuals who are so-called "attached" employed have a lower opportunity costs of working and hence prefer unemployment to inactivity. On the other hand, the so called "unattached" employed have a higher opportunity cost and prefer inactivity to unemployment upon separation. Upon a new draw of x, individuals either remain employed, or they become inactive.

The value function for unemployed individuals is given by the sum of the flow utility of unemployment, the gain in value when finding a job, plus the change in value due to a new draw of x. Finally, the value function for inactive individuals is the sum of the flow utility of inactivity and the change in value upon a new draw of x. Note that there is no direct transition between inactivity and employment. Individuals always have to go through unemployment and search for a job before becoming employed.

3.3 Thresholds

Individuals' value for home production or their opportunity costs of working x will hence be a main determinant for their state in the labor market. In particular, we can implicitly define the following two thresholds:

$$U_{i,j}(\bar{x}^a_{i,j}) = I_{i,j}(\bar{x}^a_{i,j}), \tag{7}$$

$$E_{i,j}(\bar{x}^{na}_{i,j}) = I_{i,j}(\bar{x}^{na}_{i,j}). \tag{8}$$

The first threshold indicates the marginal individual who is indifferent between being inactive or searching for a job. Individuals with values of x below this threshold search while those with x above $\bar{x}^a_{i,j}$ prefer to be inactive. The second threshold defines an employed worker who is indifferent between working or being inactive. In particular, those with values of x below $\bar{x}^{na}_{i,j}$ work while those with higher values of x quit their jobs for inactivity. Figure 6 displays the value functions for employment, unemployment, and inactivity as a function of x, together with these thresholds. We can obtain the following analytical expressions for the two thresholds:

$$\bar{x}^{na}_{i,j} = \frac{w_{i,j}}{\xi_i} + \frac{\lambda}{\xi_i}[A_{i,j} - B_{i,j}], \tag{9}$$

$$\bar{x}^a_{i,j} = \frac{m(\theta_i)\xi_i(\bar{x}^{na}_{i,j} - \bar{x}^a_{i,j})}{s(\delta_{i,j} + r + \lambda + \tau)}, \tag{10}$$

Figure 6: Decision Thresholds
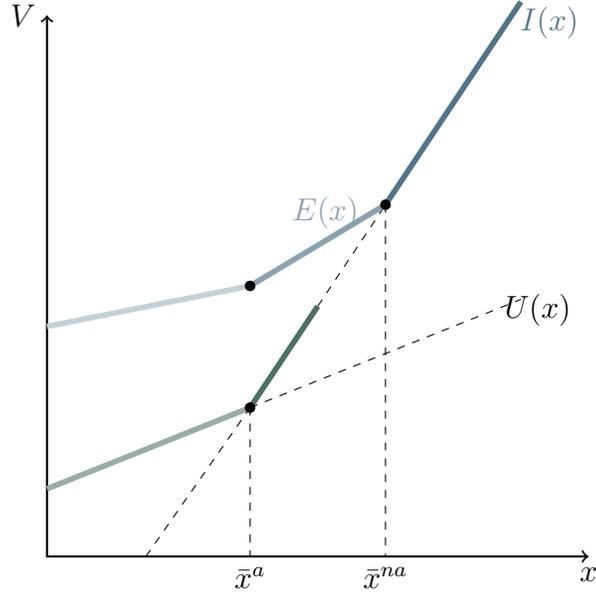
where $A_{i,j} = \int_0^\infty \max(E_{i,j}(x'), U_{i,j}(x'), I_{i,j}(x'))dF_j(x')$ and $B_{i,j} = \int_0^\infty \max(U_{i,j}(x'), I_{i,j}(x'))dF_j(x')$. Equation 9 shows that as expected, a higher wage moves the first threshold to the right, such that fewer individuals decide to quit their jobs to go into inactivity. This implies a direct relationship between a larger gender wage gap and higher inactivity rates of women compared to those of men. Considering Equation 10, higher search costs s move the second threshold to the left, leading to fewer individuals searching for jobs while a higher job finding rate $m(\theta_i)$ has the opposite effect.

Note that in Figure 6, the slope of the value function for employment is discontinuous. This is due to the difference between "attached" and "unattached" workers. If $x > \bar{x}^a$, then upon separation workers move directly into inactivity, while if $x \leq \bar{x}^a$ they move into unemployment. Hence, instead of one value function for employed individuals we can define two values functions, one for "attached" and another one for "unattached" workers and write:

$$(r + \tau + \lambda)E_{i,j} = (1 - \xi_i)x + w_{i,j} + \delta_{i,j}[U_{i,j} - E_{i,j}] + \lambda[A^1_{i,j} + A^2_{i,j}], \quad ifx < \bar{x}^a, \quad (11)$$
$$(r + \tau + \lambda)E_{i,j} = (1 - \xi_i)x + w_{i,j} + \delta_{i,j}[I_{i,j} - E_{i,j}] + \lambda[A^1_{i,j} + A^2_{i,j}], \quad ifx \geq \bar{x}^a, \quad (12)$$
$$(r + \tau + \lambda)U_{i,j} = (1 - s)x + m(\theta_i)[E_{i,j} - U_{i,j}] + \lambda[B^1_{i,j} + B^2_{i,j}], \quad (13)$$
$$(r + \tau + \lambda)I_{i,j} = x + \lambda[B^1_{i,j} + B^2_{i,j}], \quad j = [m, f], i = [p, g], \quad (14)$$

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where $A_{i,j}^1 = \int_0^{\bar{x}^{na}} E_{i,j}(x')dF_j(x')$, $A_{i,j}^2 = \int_{\bar{x}^{na}}^\infty I_{i,j}(x')dF_j(x')$, $A_{i,j} = A_{i,j}^1 + A_{i,j}^2$, $B_{i,j}^1 = \int_0^{\bar{x}^a} U_{i,j}(x')dF_j(x')$, $B_{i,j}^2 = \int_{\bar{x}^a}^\infty I_{i,j}(x')dF_j(x')$ and $B_{i,j} = B_{i,j}^1 + B_{i,j}^2$.

3.4 Flows in and out of each state

For men and women in each sector, there are hence four labor market states: unemployed ($u_{i,j}$), inactive ($i_{i,j}$), "attached" employed ($e_{i,j}^a$) and "unattached" employed ($e_{i,j}^{na}$); i.e. those who drop out of the labor force if they loose their job. Figure 7 shows the hazard rates between the states, abstracting from population flows. In steady state, the flows in and out of each stock have to equate. In particular, Equations 15 to 18 equate the exits (left-hand side) and the entries (right-hand side) into inactivity, unemployment, "attached" employment, and "unattached" employment respectively:

$$i_{i,j}(\lambda F(\bar{x}_{i,j}^a)+\tau) = [\delta_{i,j}+\lambda(1-F(\bar{x}_{i,j}^{na}))]e_{i,j}^n+[\lambda(1-F(\bar{x}_{i,j}^{na}))]e_{i,j}^a+[\lambda(1-F(\bar{x}_{i,j}^a))]u_{i,j}+\tau(1-F(\bar{x}_{i,j}^a))$$
(15)

$$u(\lambda(1 - F(\bar{x}_{i,j}^a)) + \tau + m(\theta_i)) = \delta_{i,j}e_{i,j}^{na} + \lambda F(\bar{x}_{i,j}^a)i_{i,j} + \tau F(\bar{x}_{i,j}^a)$$
(16)

$$e_{i,j}^a(\lambda(1 - F(\bar{x}_{i,j}^a)) + \tau + \delta_{i,j}) = m(\theta_i)u_{i,j} + \lambda F(\bar{x}_{i,j}^a)e_{i,j}^n$$
(17)

$$e_{i,j}^{na}(\lambda(1 - F(\bar{x}_{i,j}^{na}) + F(\bar{x}_{i,j}^a)) + \tau + \delta_{i,j}) = \lambda[F(\bar{x}_{i,j}^{na}) - F(\bar{x}_{i,j}^a)]e^a, \quad j = [m, f], i = [p, g].$$
(18)

Figure 7: Flows in and out of each state
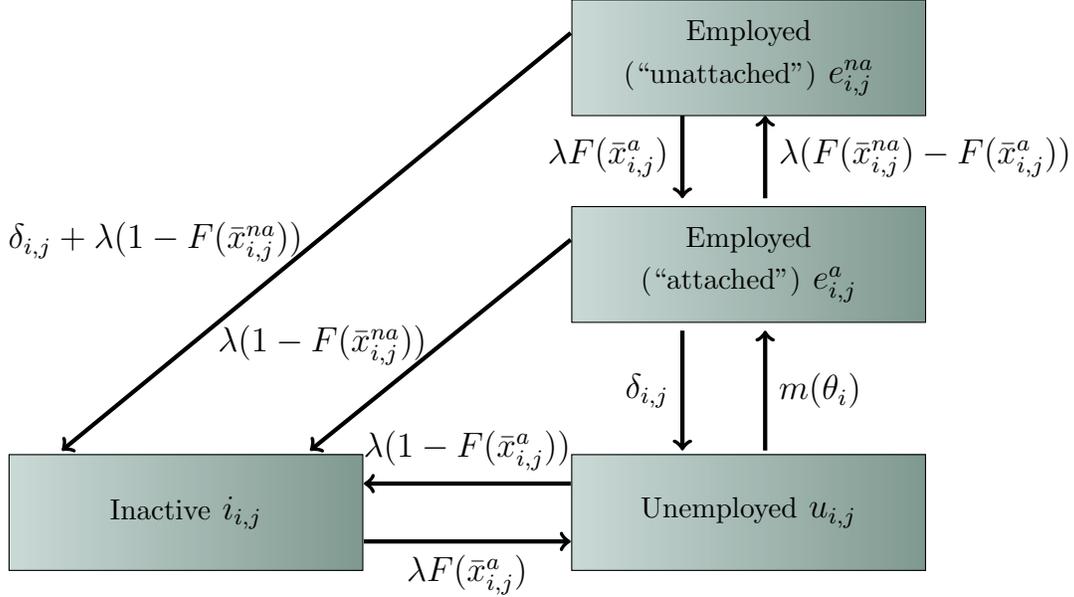
3.5 Private sector

To limit the complexity of the model, we propose a very simple wage setting mechanism for male private sector wages; i.e. we explicitly abstain from modeling any bargaining over the surplus of the match. Instead, we assume that male private sector wages are a constant fraction β of workers' productivity

$$w_{p,m} = \beta y. \tag{19}$$

This implies that male private sector wages are going to be isolated from policy changes. However, this is not the case for female wages which are determined differently. Given male private sector wages, we can calculate the value of a job filled by a man for a private firm as follows

$$rJ_m = (1 - \beta)y - (\delta_{p,m} + \tau + \lambda(1 - F(\bar{x}_{p,m}^{na})))J_m, \tag{20}$$

which solving for J_m gives

$$J_m = \frac{(1 - \beta)y}{r + \delta_{p,m} + \tau + \lambda(1 - F(\bar{x}_{p,m}^{na}))}. \tag{21}$$

We follow Albanesi and Şahin [2013] and set the female private sector wage such that the value of a job for a firm is the same for male and female workers, $J_m = J_f$. Hence, while productivity is assumed to be the same for men and women, women receive lower wages because they might have higher quit rates into inactivity or face higher exogenous separation rates, which is anticipated by employers. The model thus also incorporates a possible causality between higher inactivity rates for women and lower wages. Hence, female private sector wages $(w_{p,f}^*)$ are an endogenous object given by

$$w_{p,f}^* = y\left(1 - (1 - \beta)\frac{r + \delta_{p,f} + \tau + \lambda(1 - F(\bar{x}_{p,f}^{na}))}{r + \delta_{p,m} + \tau + \lambda(1 - F(\bar{x}_{p,m}^{na}))}\right). \tag{22}$$

While this wage setting mechanism encompasses one particular theory to explain the gender wage gap, ex-ante it is unclear whether it will allow us to fully replicate the observed gender wage gap. Given that one of the four possible explanations for the gender bias in public employment to be tested within our model is a lower gender wage gap in the public sector, it is important for us to fully match the private sector gender wage gap. To make sure that this is the case, we hence assume that the actual female wage is only a fraction of what is paid by firms. Similar to the literature on the misallocation of resources, we assume that there is an exogenous wedge $0 \leq \alpha \leq 1$, acting as a tax on women's wages

$$w_{p,f} = (1 - \alpha)w_{p,f}^*. \tag{23}$$

An alternative approach assuming that women are less productive than men, would essentially be similar. On the other hand, assuming that women have lower bargaining power than men, would result in firms preferring to hire women rather than men to take advantage of higher profits.

In our setting, for a firm, the value of a vacancy is hence given by

$$rV_p = -\kappa + q(\theta_p)[\psi^p J_m + (1 - \psi^p) J_f], \tag{24}$$

where κ denotes the cost of creating a vacancy, $q(\theta_p)$ is the probability of finding a worker, and ψ^p denotes the fraction of men among the unemployed in the private sector. Given $J_m = J_f$, firms do not have any reason to discriminate between hiring a man or a woman. Hence, the free-entry condition is given by

$$\frac{\kappa}{q(\theta_p)} = \frac{y(1 - \beta)}{r + \delta_{p,m} + \tau + \lambda(1 - F(\bar{x}_{p,m}^{na}))}. \tag{25}$$

We assume a Cobb-Douglas matching function for the private sector and hence $m(\theta_p) = \theta_p q(\theta_p) = \zeta \theta_p^\eta$.

3.6 Government

The government employs $\bar{e}_g$ workers. At every instance, it has to hire enough workers to compensate for those who retire, exogenously separate into unemployment or inactivity, or endogenously separate into inactivity. We assume that the government has the following matching function $M_g = \min\{v_g, u_g\}$. This assumption is rather convenient. If there are queues for public sector job ($u_g > v_g$) then all vacancies are filled and their number is equal to the number of matches and $m(\theta_h) = \theta_h$. On the other hand, if there are fewer unemployed than vacancies, the government cannot fill all its positions and the public sector breaks down. This might happen if wages in the public sector are too low relative to wages in the private sector.

Given that the government might employ men and women in different proportions, the number of quits from the public sector (which have to be re-hired at every instance) is given by

$$v_g = \bar{e}_g[\tau + \varphi_g(\delta_{g,m} + \lambda(1 - F(\bar{x}_{g,m}^{na}))) + (1 - \varphi_g)(\delta_{g,f} + \lambda(1 - F(\bar{x}_{g,f}^{na})))], \tag{26}$$

where φ_g denotes the fraction of men in public sector employment. The government pays an exogenous premium, π_j over private sector wages that is potentially different for men and

women

$$w_{g,m} = \pi_m w_{p,m},$$ (27)

$$w_{g,f} = \pi_f w_{p,f}.$$ (28)

3.7 Initial choice of sector

Once individuals are born, at rate τ, men and women chose which sector to enter. To this end, individuals will hence compare the expected values of entering the private or the public sector which include their relative preference for the public sector:

$$\max \left\{ (1 - F(\bar{x}^a_{p,j}))I_{p,j} + F(\bar{x}^a_{p,j})U_{p,j}; (1 - F(\bar{x}^a_{g,j}))I_{g,j} + F(\bar{x}^a_{g,j})U_{g,j} + \epsilon_j \right\} j = m, f. \quad (29)$$

The thresholds for the choice of sector, different for men and women, are hence given by

$$\epsilon^*_j = (1 - F(\bar{x}^a_{p,j}))I_{p,j} + F(\bar{x}^a_{p,j})U_{p,j} - (1 - F(\bar{x}^a_{g,j}))I_{g,j} - F(\bar{x}^a_{g,j})U_{g,j}, \ j = m, f, \quad (30)$$

and the shares of men and women entering the public sector labor market are given by

$$1 - \Xi_m(\bar{\epsilon_m}),$$ (31)

$$1 - \Xi_f(\bar{\epsilon_f}).$$ (32)

Apart from testing the importance of gender differences in preferences over public sector occupations for the gender bias in public employment, including differences in preferences in our model serves an additional purpose. Without this additional heterogeneity, selection of workers into the public or private sector would only be driven by aggregate variables and would therefore be equal for all workers. As a result, in a world of gender and sector symmetry, the share of women in the public sector would be undetermined. Furthermore, if the public sector increased wages for women slightly, more women would be attracted to the public sector, lowering the job-finding probability for all workers in the public sector. Hence, all men would then prefer to enter the private sector labor market. The only possible equilibrium would thus be one where only women would be queuing in the public sector. While in our model such a mechanism is still present when increasing women's public sector wages, heterogeneity in preferences allows us to to generate equilibria where both men and women enter the public sector.

3.8 Definition of steady-state equilibrium

Definition 1. *A steady-state equilibrium in our economy is defined by a set of thresholds $\{\bar{\epsilon}_f, \bar{\epsilon}_m, \bar{x}^a_{g,m}, \bar{x}^a_{p,m}, \bar{x}^a_{g,f}, \bar{x}^a_{p,f}, \bar{x}^{na}_{g,m}, \bar{x}^{na}_{p,m}, \bar{x}^{na}_{g,f}, \bar{x}^{na}_{p,f}\}$, job-finding probabilities $\{p_p, p_g\}$, stocks of inactive $\{i_{p,m}, i_{p,f}, i_{g,m}, i_{g,f}\}$, unemployed $\{u_{p,m}, u_{p,f}, u_{g,m}, u_{g,f}\}$, "attached" employed $\{e^a_{p,m}, e^a_{p,f}, e^a_{g,m}, e^a_{g,f}\}$, "unattached" employed $\{e^{na}_{p,m}, e^{na}_{p,f}, e^{na}_{g,m}, e^{na}_{g,f}\}$, and private sector wages $\{w_{g,f}, w_{g,m}\}$, such that, given some exogenous government policy $\{w_{g,m}, w_{g,f}, \bar{e}_g\}$ and an exogenous "wedge" for female private sector wages $\{\alpha\}$:*

1. *Private sector firms satisfy the free-entry condition.*

2. *Male private sector wages are a constant fraction of workers' productivity.*

3. *Female private sector wages prior to applying a "wedge" are such that the value of a job for a firm is the same when hiring a man or a woman.*

4. *Newborns decide optimally which sector to join.*

5. *Workers decide optimally the threshold values of x for quitting their job or to stop searching.*

6. *Worker flows in and out of the four stocks are constant.*

7. *The total population adds up to 1 (0.5 men, 0.5, women):*

   - $\frac{1}{2}(1 - \Xi_m(\bar{\epsilon}_m)) = i_{g,m} + u_{g,m} + e^a_{g,m} + e^{na}_{g,m}$

   - $\frac{1}{2}\Xi_m(\bar{\epsilon}_m)) = i_{p,m} + u_{p,m} + e^a_{p,m} + e^{na}_{p,m}$

   - $\frac{1}{2}(1 - \Xi_f(\bar{\epsilon}_f)) = i_{g,f} + u_{g,f} + e^a_{g,f} + e^{na}_{g,f}$

   - $\frac{1}{2}\Xi_f(\bar{\epsilon}_f)) = i_{p,f} + u_{p,f} + e^a_{p,f} + e^{na}_{p,f}.$

Summarizing, in our model men and women differ along the following dimensions: the distributions for preferences of working in the public sector and for the opportunity costs of working, $\Xi_j(\cdot)$ and $F_j(\cdot)$, respectively as well as a "wedge" α on women's wages and different exogenous job-separation probabilities $\delta_{p,j}$ and $\delta_{g,j}$. Public and private sectors on the other hand differ in terms of losses in home production when working, ξ_i, separation rates $\delta_{i,m}$ and $\delta_{i,f}$, and wage schedules for men and women, $w_{i,m}$ and $w_{i,f}$.

4 Calibration

We calibrate our model to data from the four countries from our empirical analysis. For France, the UK, and Spain we have quarterly data, while for the US data is recorded on a monthly frequency. Some parameters are set exogenously based on outside information or as normalizations, while the remaining parameters are calibrated to match data moments. We assume that men and women draw values of home production or opportunity costs x from cumulative log-normal distribution functions $F_m(\tilde{x}_m, \sigma_m^x)$ and $F_f(\tilde{x}_f, \sigma_f^x)$ with different means and standard deviations. We assume normally distributed preferences for working in the public sector; i.e. for men and women ϵ is drawn from $\Xi_m(\tilde{\epsilon}_m, \sigma^\epsilon)$ and $\Xi_f(\tilde{\epsilon}_f, \sigma^\epsilon)$ respectively, with different means but a common standard deviation.

Table 4 displays all parameters for each country. For all countries we set the interest rate such as to match a 4% annual interest rate. For public sector wage premia for each country we use results from our empirical analysis (see Table 3). We also obtain numbers for public sector employment from our empirical analysis. We normalize the matching efficiency for all countries to 1, and we also set the time cost of working in the private sector to 1. Following Borowczyk-Martins et al. [2013], we set the elasticity of the matching function with respect to unemployment to 0.3. Regarding the time unemployed individuals spend searching, Krueger and Mueller [2012] report median times of around 110-120 minutes per day for the US, Spain, and France, and we hence set s to 0.25.

For each country, we calibrate the remaining sixteen parameters to match seventeen data moments. In particular, we search for parameters such as to minimize the sum of the squared percentage difference between data and model moments for the following targets: unemployment and inactivity rates for men and women, the ratio of public employment shares, the gender wage gap in the private sector, vacancy costs in terms of weekly wages, the relative conditional job finding rate in public to private sector, the regional sensitivity of the ratio of public employment shares, as well as eight flow rates between public and private employment, unemployment, and inactivity by gender. In particular, we target the following four flow rates for both men and women: private sector employment to unemployment, private sector employment to inactivity, public sector employment to unemployment, and public sector employment to inactivity. Note that these numbers used for calibration are different from those in Table 2. In particular, we apply a time aggregation bias correction to calculate the continuous rates from the probabilities of changing state within a survey frequency. Appendix B describes the applied procedure in detail.

While all parameters affect all targets, certain calibrated parameters can be related to

Table 4: Baseline calibration

	US (monthly)	UK (qt)	France (qt)	Spain (qt)
Parameters set exogenously				
Discounting				
Interest rate (r)	0.004	0.012	0.012	0.012
Death rate (τ)	0.002	0.006	0.006	0.006
Public sector policies				
Wage premium (men) (π_m)	0.955	1.037	0.878	0.998
Wage premium (women) (π_f)	1.050	1.057	0.950	1.069
Employment (e_g)	0.118	0.170	0.137	0.074
Labor market parameters				
Matching efficiency (ζ)	1	1	1	1
Matching elasticity (η)	0.3	0.3	0.3	0.3
Time cost of labor force				
Private sector (ξ_p)	1	1	1	1
Unemployed (s)	0.25	0.25	0.25	0.25
Calibrated parameters				
Labor market parameters				
Bargaining power of men (β)	0.924	0.965	0.967	0.939
Cost of posting vacancies (κ)	4.940	1.563	3.555	6.876
"Wedge" female-male wage prv. sector (α)	0.299	0.171	0.158	0.203
Time cost of labor force				
Public sector "discount" ($\mu = \xi_p - \xi_g$)	0.264	0.376	0.610	0.643
Arrival rate of shocks				
Outside option (λ)	0.057	0.057	0.046	0.043
Job separation - private, men ($\delta_{p,m}$)	0.022	0.020	0.022	0.052
Job separation - public, men ($\delta_{g,m}$)	0.007	0.008	0.008	0.024
Job separation - private, women ($\delta_{p,f}$)	0.016	0.017	0.022	0.058
Job separation - public, women ($\delta_{g,f}$)	0.010	0.006	0.008	0.032
Outside option distribution: Log normal				
Mean - men ($\tilde{x}_m$)	-2.755	-1.206	-1.945	0.463
Difference women-men ($\tilde{x}_f - \tilde{x}_m$)	1.305	0.783	2.248	0.641
Std. men - ($\sigma_{x,m}$)	5.518	2.379	5.831	2.027
Std. women - ($\sigma_{x,f}$)	5.858	1.903	4.157	1.132
Preference distribution: Normal				
Mean - men ($\tilde{\epsilon}_m$)	-132.410	-66.815	-7.521	-17.258
Difference women-men ($\tilde{\epsilon}_f - \tilde{\epsilon}_m$)	26.736	38.030	0.865	1.904
Std. - men and women ($\sigma_{\epsilon,m}$)	134.413	63.853	8.746	10.938

data moments which they are more likely to affect. The parameter β indicating men's bargaining power is closely linked to male and female unemployment rates. We identify the cost of posting vacancies κ, by matching firms' expected vacancy costs equal to eight weekly wages. Our calibrated values for κ differ across countries, being highest in Spain (and lowest in the UK) where high (low) unemployment rates imply that vacancies will be filled faster (slower). The exogenous "wedge" on female private sector wages (α) is closely linked to the resulting gender wage gap and hence is calibrated to a lower (higher) value in France (the US) where the private sector gender wage gap is lowest (highest). Note that the calibrated

parameter values for α are rather close to the observed gender wage gaps, indicating that the model's mechanism of endogenously generating these gaps can only explain 2.5 to 3.5 percent of the observed gender wage gap.

There are six parameters closely linked to inactivity: the parameter $\mu = \xi_p - \xi_g$, indicating the difference in work-life balance between working in the private compared to the public sector, the arrival rate of a shock to the outside option, λ and the parameters of the log-normal distribution of individuals' shocks to the opportunity costs of working (two different means and two different standard deviations). These six parameters pin down six variables, namely the inactivity rates and the flows from public and private employment to inactivity for men and women. In particular, a higher calibrated mean for women in all countries relates to the higher level of female compared to male inactivity as well as higher female flow rates from private and public employment to inactivity. Values for parameter μ are estimated to be larger in France and Spain and lower in the US and the UK. However, a direct comparison across countries is not possible because the effect of μ depends on the distribution of x. In all countries, the mean of the opportunity cost distribution is higher for women than for men. In all three European countries, also the standard deviation is smaller for women than for men; for a graphical representation of the distributions of outside options together with the thresholds for men and women see Figure C.1 in Appendix C.

Flow rates from private employment to unemployment and public employment to unemployment are determined by separation rates $\delta_{p,m}$, $\delta_{p,f}$, $\delta_{g,m}$ and $\delta_{g,f}$ respectively. As expected, and given much higher flow rates from private than public employment to unemployment, for all countries we estimate 2-3 times higher values for job separation rates in the private compared to the public sector. In addition, calibrated values for Spain are higher given larger flow rates for men and women between private and public employment and unemployment.

Finally, there are three parameters related to the distribution of preferences for working in the public sector: the mean of the distribution for men, the mean of the distribution for women and the standard deviation which is assumed to be equal for both genders. These three parameters are identified using three moments in the data. First, we use the length of the queue in the public relative to the private sector; i.e. the ratio of (conditional) job finding rates in the public compared to the private sector (equal to p_g/p_p). In the data, this ratio is equivalent to the ratio of unemployment duration of new hires in the private over that of new hires in the public sector, which we observe in our microdata. For the UK, France and Spain this statistic is smaller than one, meaning that the unemployment

Targets	US		UK		France		Spain	
	Data	Model	Data	Model	Data	Model	Data	Model
Unemployment rates								
Male ($u_m/(1-i_m)$)	0.069	0.056	0.064	0.056	0.090	0.078	0.156	0.160
Female ($u_f/(1-i_f)$)	0.059	0.059	0.056	0.061	0.096	0.088	0.190	0.184
Inactivity rates								
Male (i_m)	0.169	0.178	0.162	0.168	0.238	0.210	0.329	0.325
Female (i_f)	0.250	0.259	0.284	0.271	0.330	0.335	0.490	0.482
Public sector employment shares ratio								
$(e_f^g/(e_f^p+e_f^g))/(e_m^g/(e_m^p+e_m^g))$	1.429	1.421	2.187	2.267	1.744	1.809	1.583	1.555
Private sector wage gap								
w_f^p/w_m^p-1	-0.314	-0.309	-0.177	-0.177	-0.163	-0.162	-0.214	-0.209
Nr. of weekly wages- exp. cost vacancy								
$\kappa\Theta^{(}1-\eta)/(W_{mp}/4)$	8.000	7.303	8.000	7.997	8.000	7.300	8.000	8.070
Ratio probability job finding private/public								
p_p/p_g	1.066	0.901	0.743	0.762	0.809	0.899	0.878	0.884
Slope of public sector jobs on public-sector employment shares ratio								
ϵ_{u_g/w_g}	0.017	0.018	0.046	0.046	0.065	0.063	0.060	0.063
Flows rates - male								
$P \to U$	0.020	0.022	0.019	0.020	0.020	0.022	0.053	0.052
$P \to I$	0.019	0.018	0.016	0.017	0.019	0.017	0.023	0.026
$G \to U$	0.007	0.007	0.008	0.008	0.008	0.008	0.025	0.024
$G \to I$	0.015	0.017	0.015	0.013	0.014	0.014	0.019	0.017
Flows rates - female								
$P \to U$	0.016	0.016	0.018	0.017	0.022	0.022	0.058	0.058
$P \to I$	0.028	0.024	0.029	0.026	0.027	0.025	0.043	0.039
$G \to U$	0.010	0.010	0.006	0.006	0.008	0.008	0.029	0.031
$G \to I$	0.020	0.023	0.018	0.020	0.018	0.021	0.026	0.027

duration is lower in the private sector, or in other words, queues are longer in the public sector. In the US, the number is slightly above one. The mean preference for women is determined as a residual needed to match the ratio of public employment shares. Finally, the standard deviation of the two distributions, which we assume to be equal across genders, is a crucial parameter that governs the effect of a change in the payoff in the public sector on the number of individuals applying for public sector jobs. Hence, to assign a value to this parameter we need to target some element of variation in policy. To this end, we use the regional variation in the ratio of public employment shares, regressing it on the total size of the public sector (number of public sector workers over the working age population). We find statistically significant negative correlations in all four countries, with coefficients ranging from -0.017 in the US to -0.065 in France. Figure A.5 in Appendix A shows these correlations. In our calibration we thus target these coefficients.

Table 5 displays our model statistics next to the targeted data moments. Most data moments are matched well with an average percentage deviation of less than 7 percent in all

countries. The model generates higher unemployment rates for women than for men in all four countries, which is true in France and Spain but not for the UK and the US. The model cannot generate a smaller queue in the public compared to the private sector as observed in the US. Finally note that including also public sector wages leads to slightly lower aggregate gender wage gaps in all countries.

5   Examining public sector policies

5.1   Counterfactual Experiments

We then use our model to run counterfactual experiments that can help us to better understand the over-representation of women in the public sector. In particular, we run five different experiments shutting down distinct features of the model and comparing the resulting statistics on the gender bias in public employment to those in our benchmark economy. The first experiment shuts down gender differences in preferences for working in the public sector and eliminates any differences between the two sectors. In particular, we set wages in the private sector equal to wages in the public sector for each gender, eliminate differences in time costs and separation rates between the two sectors and impose the same preferences for working in the public sector for men and women. Then to understand how each feature contributes, we run the following four experiments shutting down one by one: (i) gender differences in preferences for working in the public sector, (ii) public sector wage premia, (iii) sectoral differences in hours worked, and (iv) differences in job security between the public and private sector. Table C.1 in Appendix C shows the results from the opposite exercise: again starting from a model without sector differences and without gender differences in preferences but adding each feature in turn.

For each experiment, Table 6 displays the two indicators reflecting the gender composition in the public sector next to the ones from our benchmark economy; for results on the raw measures for the gender bias see Table C.2 in Appendix C. As expected, eliminating gender differences in preferences as well as all sector differences leads to fewer women in the public sector in all countries. Note that the only impediment for a 50/50 representation of men and women in each sector (indicators taking on the value of 1) are the different distributions of outside options for men and women and the "wedge" on female private sector wages. The second experiment that only eliminates gender differences in preferences for working in the public sector comes close to generating the low representation of women in the public sector as under the first experiment. Especially in the UK, gender differences in preferences seem to

Table 6: Gender composition of the public sector under different scenarios

Country	Benchmark	No sector differences & no preference differences	No preference differences	No wage differences	No hours differences	No job security differences
		$\pi_w = \pi_m = 1$ $\xi_g = \xi_p$ $\bar\epsilon_f = \bar\epsilon_m$ $\delta_g = \delta_p$	$\bar\epsilon_f = \bar\epsilon_m$	$\pi_w = \pi_m = 1$	$\xi_g = \xi_p$	$\delta_g = \delta_p$
Public sector employment shares ratio						
US	1.42	0.991	1.08 (79%)	1.28 (33%)	1.43 (-2%)	1.45 (-7%)
UK	2.19	0.997	1.07 (94%)	2.17 (2%)	2.17 (2%)	2.19 (0%)
France	1.83	0.925	1.6 (25%)	1.34 (54%)	1.63 (22%)	1.85 (-2%)
Spain	1.53	0.856	1.25 (42%)	1.35 (27%)	1.31 (33%)	1.58 (-7%)
Women's employment shares ratio						
US	1.25	0.994	1.05 (78%)	1.17 (31%)	1.26 (-4%)	1.27 (-8%)
UK	1.71	0.998	1.04 (94%)	1.7 (1%)	1.66 (7%)	1.71 (0%)
France	1.55	0.941	1.42 (21%)	1.25 (49%)	1.38 (28%)	1.56 (-2%)
Spain	1.64	0.871	1.29 (46%)	1.42 (29%)	1.26 (49%)	1.7 (-8%)

Note: Model simulations; in brackets the percentage difference between the first and second column that is explained when equating one characteristic of the sector at a time. Percentages do not necessarily add up to 1.

almost entirely (to 94%) explain the female over-representation in the public sector. For the remaining countries, preferences explain 80 percent of the gender bias in public employment in the US, 45 percent in Spain, but only 20 to 25 percent in France.

In our empirical analysis we estimated positive public sector wage premia for women that were higher than those for men in most countries. The only exception was France where all individuals in the public sector earned on average lower wages. But even in France, the wage discount was lower for women. In the third experiment we hence eliminate public sector wage premia. As a result, in all countries except for the UK, the representation of women in the public sector is lower than in our benchmark economy. The fact that women earn relatively higher wages in the public sector is hence an important driver for their over-representation. In the US and Spain it explains around 30 percent of the gender bias in public employment, and it explains around 50 percent in France.

We also presented empirical evidence showing that individuals in the public sector work on average fewer hours, something that in our model is captured by $\xi_g < \xi_p$. The fourth experiment considers a version of the model without differences in time costs between public and private sector employment. With respect to the gender composition in the benchmark economy we observe little differences in the US and the UK. This is different in France and Spain where better work-life balance in the public sector explains around 20 to 30 percent

and 30 to 50 percent of the gender bias respectively. In our last experiment we impose the same job separation rates in the public and private sector. However, eliminating differences in job security increases the gender bias in public employment because more job security attracts more men to the public sector.

5.2 Quantifying the value of public sector characteristics

These last results that neither higher job security nor better work-life balance are the main drivers attracting women into the public sector do not imply that individuals do not value these features of public employment. It merely implies that individuals' valuation does not differ as much across genders as other aspects such as preferences or wages. To further investigate this matter we then use our model to quantify the value of different public sector characteristics. In particular, we ask how much of their wage would male and female private sector workers be willing to sacrifice to obtain: i) the same work-life balance and ii) the same job security as in the public sector. Alternatively, we can ask public sector workers how much they would have to be compensated to accept the same job characteristics as private sector workers; see Appendix C for details regarding the calculation of these compensating differentials. Table 7 displays the results from this exercise. Overall private sector workers seem to value work-life balance more than higher job security. While they are willing to give up 3-41% of their private sector wages for fewer working hours, they would only sacrifice 1-4% of their wages for higher job security.

The work-life balance premium is very high in Spain (25 to 41 percent), high in France and the UK (7 to 13 percent) and lower in the US (around 3 percent). Regarding gender differences, we find that women are willing to pay more for work-life balance in all countries. We estimate a job security premium that is much lower – around one percent – in countries with low unemployment rates, like the US and the UK. We find a much higher premium, more than twice as large – between 2 and 4 percent– for France and Spain, countries where

Table 7: Value of public sector job characteristics from

	Perspective of a private sector worker				Perspective of a public sector worker			
Country	Work-life balance $[\xi_p = \xi_g]$		Job security $[\delta_{p,j} = \delta_{g,j}]$		Work-life balance $[\xi_p = \xi_g]$		Job security $[\delta_{p,j} = \delta_{g,j}]$	
	Women	Men	Women	Men	Women	Men	Women	Men
US	3.24	2.73	0.689	1.92	4.2	3.56	0.611	1.69
UK	12.9	8.76	1.12	1.29	18.3	12.3	1.44	1.6
France	12.3	6.73	2.09	2.32	28.1	15.6	2.47	2.62
Spain	41	24.2	2.42	3.89	96.9	55.4	3.89	5.04

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the risk of unemployment is much higher. In all countries except for France, men are willing to pay more for job security. This is due to the fact that on average men's outside options x are lower and their wages are higher, and hence job losses are more costly for men.

When alternatively evaluating these differentials through the lens of a public sector worker, in the three European countries job-security premia are more than twice as large. This is due to the fact that the conditional job-finding rate in the public sector is lower than in the private sector, unemployment is hence more costly and thus public sector workers demand higher compensations for accepting a lower private sector job security. Similarly, work-life balance premia estimated this way are also higher. Because of a better work-life balance in the public sector (low ξ_g), there are more public sector workers with higher opportunity costs of working (higher x) compared to workers in the private sector. These individuals hence demand a much larger compensation for accepting a loss in work-life balance (a higher ξ_p).

5.3 Effects of public sector wages and employment

The over-representation of women in the public sector implies that public wage and employment policies could potentially have very different effects for male and female labor market outcomes. Our model allows us to test this and to quantify these differences. In particular, we consider three different policies. The first increases public sector wages by 1%, the second one increases public sector employment by 1%, and finally we consider a situation without a public sector. For each country, Table 8 displays the changes in male and female unemployment and inactivity rates as well as changes in the aggregate gender wage gap compared to the benchmark case for each of the three scenarios.

Higher wages in the public sector lead to increases in male and female unemployment as more individuals and in particular more women decide to search for public sector jobs. More people queuing in a sector where job creation does not respond to labor market conditions, and fewer people in the private sector raises the unemployment rate. The negative effect of public sector wages on the unemployment rate is twice as high for women than for men. As unemployment increases, inactivity rates particularly for women decrease. Higher public sector wages reduce the gender wage gap, and even more so in countries like the UK and France (around 0.20 percentage points) with larger public sectors in which over 60% of workers are women.

Increasing public sector employment on the other hand reduces unemployment for men and more so for women in all countries because the probability to find a job in the public

Table 8: Effects of public sector policies for different countries

Policy	United States	United Kingdom	France	Spain
Increase of wages by 1 percent				
Δ unemployment rate male	0.07 pp.	0.08 pp.	0.10 pp.	0.15 pp.
Δ unemployment rate female	0.13 pp.	0.21 pp.	0.23 pp.	0.31 pp.
Δ inactivity rate male	-0.00 pp.	-0.02 pp.	0.01 pp.	-0.01 pp.
Δ inactivity rate female	-0.01 pp.	-0.08 pp.	-0.01 pp.	-0.02 pp.
Δ aggregate wage gap	-0.06 pp.	-0.19 pp.	-0.15 pp.	-0.13 pp.
Increase of employment by 1 percent				
Δ unemployment rate male	-0.08 pp.	-0.10 pp.	-0.03 pp.	-0.06 pp.
Δ unemployment rate female	-0.15 pp.	-0.25 pp.	-0.07 pp.	-0.11 pp.
Δ inactivity rate male	0.02 pp.	0.02 pp.	0.03 pp.	0.01 pp.
Δ inactivity rate female	0.02 pp.	0.03 pp.	0.04 pp.	0.00 pp.
Δ aggregate wage gap	-0.01 pp.	-0.01 pp.	-0.01 pp.	-0.01 pp.
No public sector				
Δ unemployment rate male	3.94 pp.	3.36 pp.	0.50 pp.	2.41 pp.
Δ unemployment rate female	8.60 pp.	6.59 pp.	1.99 pp.	5.23 pp.
Δ inactivity rate male	-0.68 pp.	2.51 pp.	-2.42 pp.	-1.77 pp.
Δ inactivity rate female	0.38 pp.	12.07 pp.	-5.51 pp.	0.17 pp.
Δ aggregate wage gap	1.60 pp.	1.36 pp.	0.29 pp.	2.31 pp.

sector increases. Similarly to public sector wage increases, increasing public employment reduces the size of the private sector. Unlike public sector wage increases however, additional public employment has a direct job-creation effect which is larger than the crowding out effect on private employment, and hence unemployment falls. Again the magnitude of the effect is more than twice as large for women compared to men. Effects on inactivity and the aggregate gender wage gap are rather small. Inactivity rates increase slightly (by up to 0.04 percentage points), and we observe a fall in the aggregate gender wage gap by 0.01 percentage points.

Finally considering a theoretical scenario without a public sector, we observe increases in unemployment rates for men between 0.5 to 4 percentage points, but particularly for women by as much as 8 percentage points. The effect on inactivity rates is mixed. Inactivity rates would be higher in the UK but lower in all other countries. Without a public sector, the aggregate gender wage gap is equal to the private sector gender wage gap and as such up to 2.2 percentage points higher compared to the one in our benchmark scenario.

6 Conclusion

The public sector hires dis-proportionally more women than men. To understand why, we build a model where men and women decide if to participate in the labor market and if to enter private or public sector labor markets. We calibrate our model to the United States, the United Kingdom, France and Spain, to quantify how much different characteristics of public

sector jobs explain the selection of women into the public sector. We find different results for each country. In the UK, preferences for public sector jobs play the most important role, while for the US, Spain, and France higher wages are also important for explaining the over-representation of women in the public sector. Maybe surprisingly, higher job security in the public sector plays a more important role for men than for women, something we confirm when calculating the sacrifice private sector workers are willing to make for obtaining public sector conditions in terms of work-life balance and job security.

Our finding regarding the important role for gender differences in preferences opens up a variety of interesting questions for future research. Although there is some debate, most studies find women to be more risk averse than men (see Eckel and Grossman [2008]). In our model, this is captured by gender differences in preferences for working in the public sector. Explicitly including gender differences in risk aversion into our model would most likely increase the role of sector differences in job-separation rates, and it would reduce the importance of preferences for explaining the gender bias in public employment. Another interesting question, from a micro rather than a macro perspective, would be to disentangle women's preferences for public service from their preferences to work in public sector occupations. Given that the latter is closely linked to individuals' specialization choices, incorporating this aspect into our model would require modeling education choices prior to entering private or public sector labor markets.

Our estimation of the compensating differentials of public sector jobs and our findings on the different effects for men and women of public sector wage and employment policies are important for policy makers. First, governments should be aware that such policies have asymmetric impacts on labor market outcomes of men and women. The effects of public sector wage or employment increases on unemployment rates are twice as large for women than for men. Also, to the extent that on average mothers' employment status affects children more than fathers', because upon divorce children tend to remain with their mothers and because some women are single mothers, public sector employment policies might also have important effects for children's outcomes and ultimately fertility decisions. Second, when discussing increases or cuts to public sector wages, it is commonly argued that job security and better work-life balance provide compensating differentials. While these two forms of compensation seem to be of extreme relevance for policy makers, to the best of our knowledge there are few attempts to calculate them.[10] For all four countries, we find that

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[10]One notable exception is Danzer and Dolton [2012] who use UK survey data to calculate total reward differentials, including current earnings, pensions, hours of work, paid holidays, employer provided health care and probability of unemployment.

the work-life balance premium is larger than the job-security premium, the latter varying between 1 and 4 percent. Given that our model considers agents with linear utility, these number should be interpreted as lower bounds. We conjecture that introducing risk aversion into our model would most likely lead to larger estimates of how men and women value public sector job-security.

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COMPANION APPENDIX

You're the one that I want! Public employment and women's labour market outcome
Pedro Gomes and Zoë Kuehn

Appendix A: Gender bias in public sector employment

- Figure A.1 Different statistics across industries and occupations

- Figure A.2 Public sector employment shares, regional variation

- Figure A.3 Ratio of women's employment shares, regional variation

- Figure A.4 Share of women in the public sector and the size of government

- Figure A.5 Public employment shares ratio and the size of government

- Figure A.6 Women's employment share ratio and the size of government

- Figure A.7 Public sector employment shares by gender, time variation

- Figure A.8 Women's employment share by sector, time variation

- Figure A.9 Public employment shares ratio, time variation

- Figure A.10 Ratio of women's employment shares, time variation

- Figure A.11 Public sector employment shares by gender, over age groups

- Figure A.12 Women's employment shares by sector, over age groups

- Figure A.13 Ratio of public employment shares, over age groups

- Figure A.14 Ratio of women's employment shares, over age groups

- Figure A.15 Different statistics for gender bias in public employment, by education

Appendix B: Stocks and flows by gender

- Figure B.1 Average worker flows, 2003-2018

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A   Gender bias in public sector employment

Figure A.1: Different statistics across industries and occupations

Industries

3-digit Occupations

Note: 1st panel uses the French and the UK Labour Force Surveys and the CPS (2003-2018). 2nd panel: CPS data, averages between 1996 and 2017. 3-digit occupations that have an overall share of public-sector employment between 0.05 and 0.95.

Figure A.2: Public sector employment shares, regional variation

Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.3: Ratio of women's employment shares, regional variation
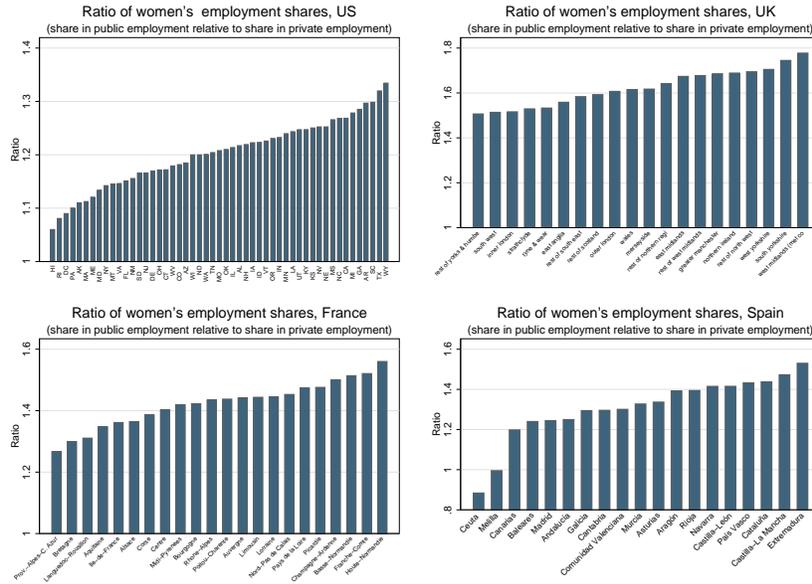
Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.4: Share of women in public sector and the size of government
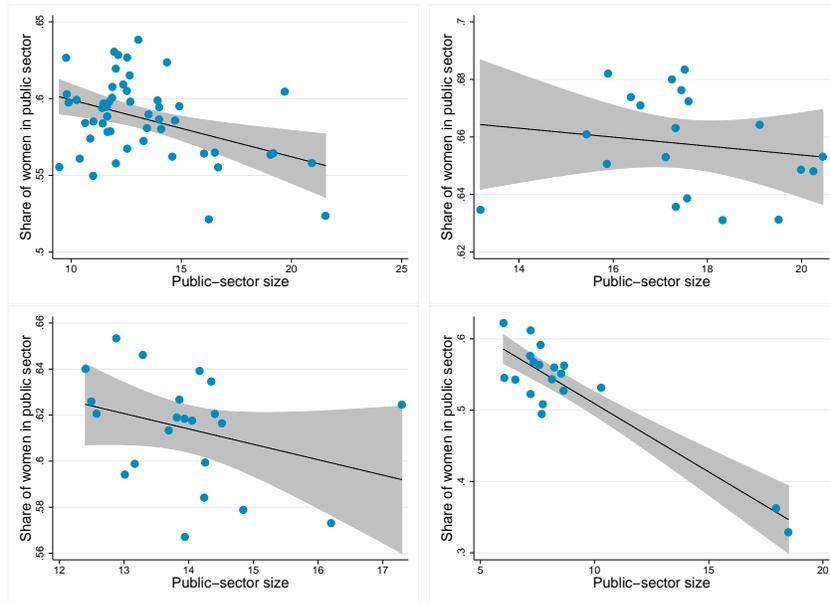
Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.5: Public employment shares ratio and the size of government

Figure A.6: Women's employment shares ratio and the size of government
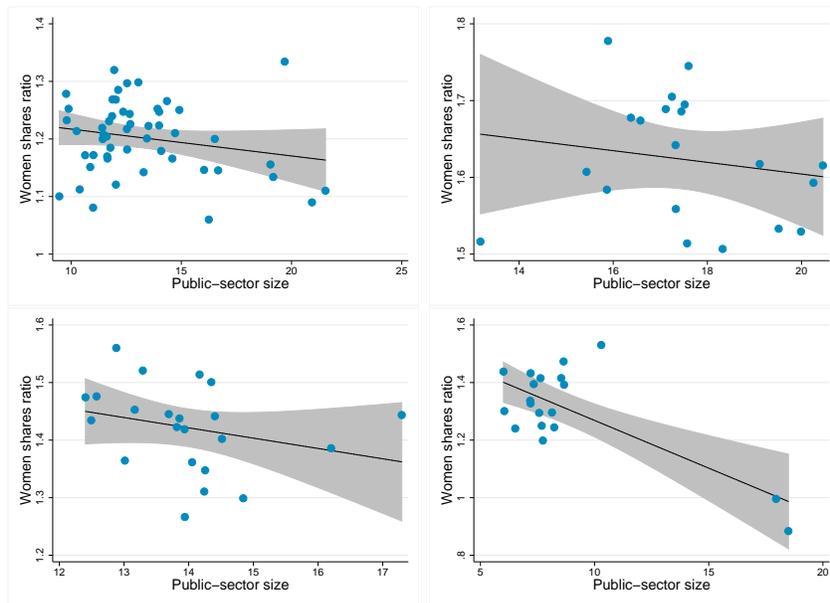
Figure A.7: Public employment shares by gender, time variation
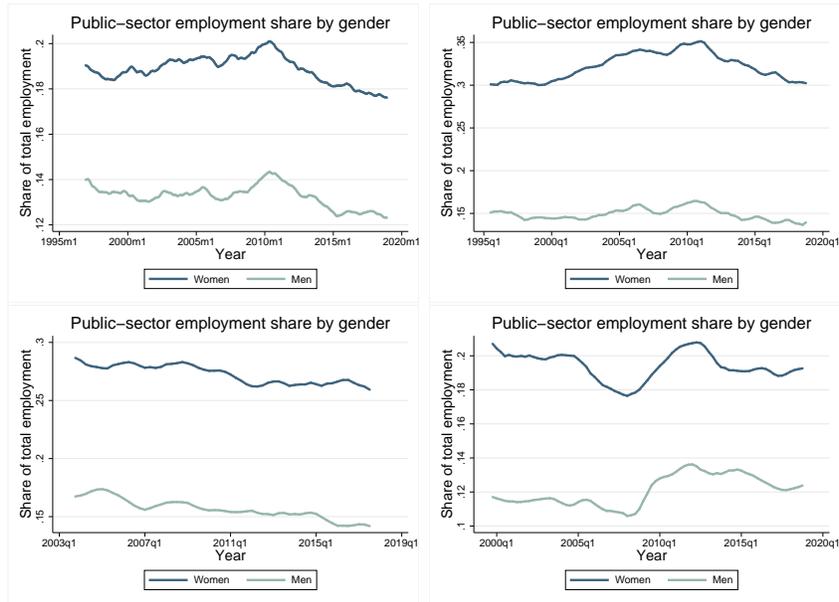
Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.8: Women employment shares by sector, time variation
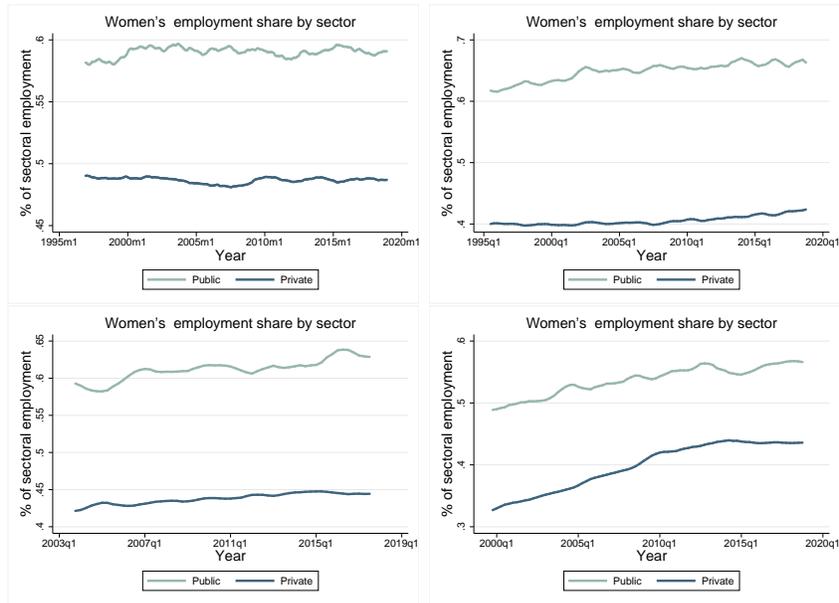
Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.9: Public employment shares ratio, time variation
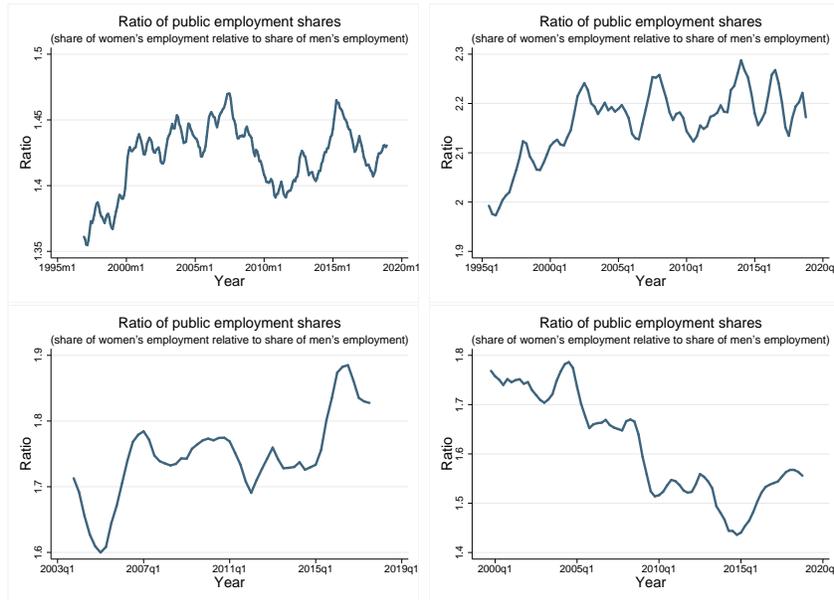
Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.10: Ratio of women's employment shares, time variation
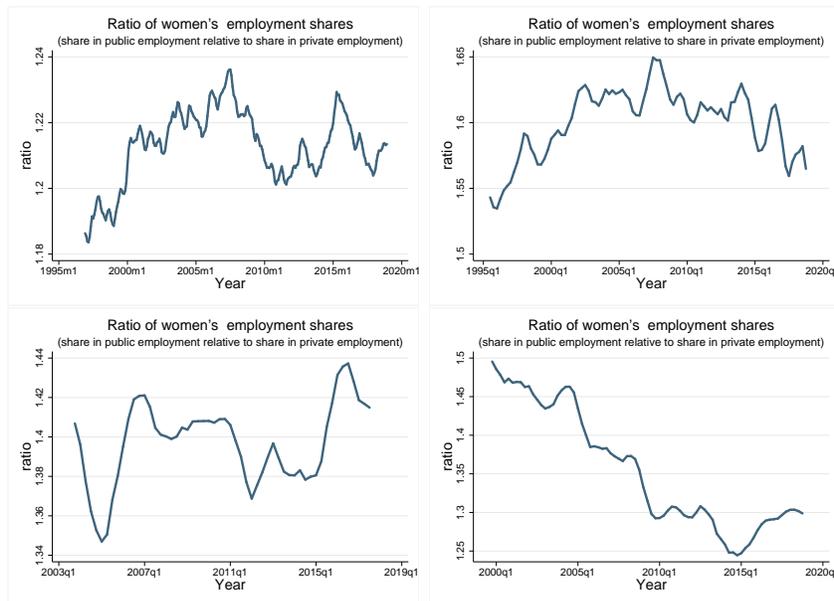
Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.11: Public employment shares by gender, variation over age groups
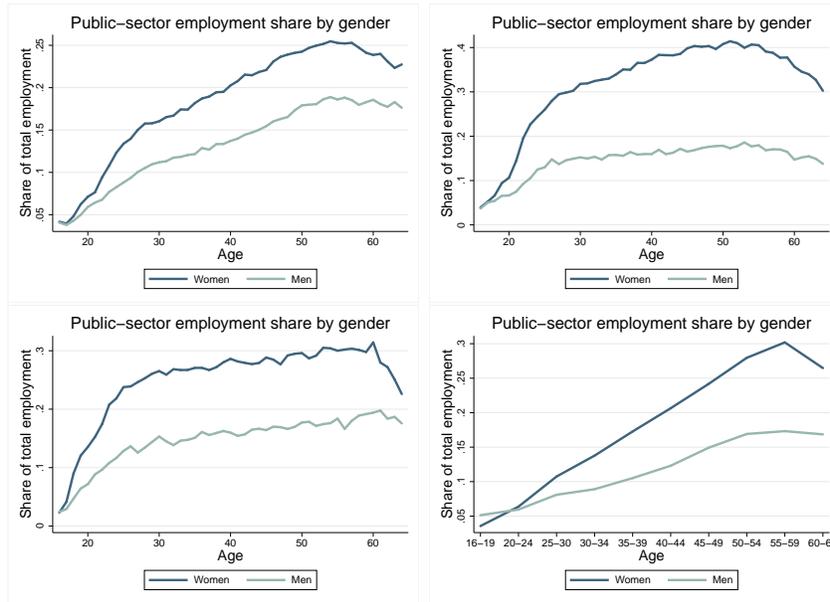
Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.12: Women's employment shares by sector, variation over age groups
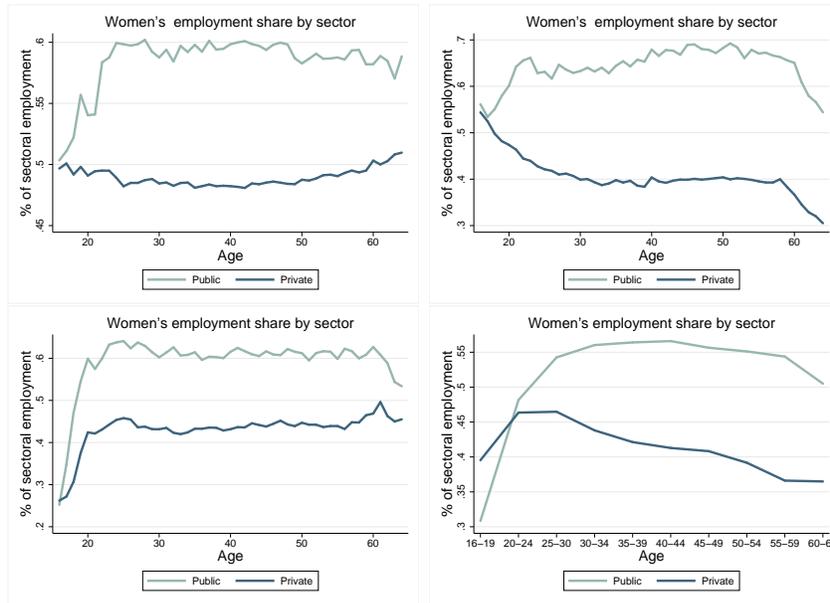
Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.13: Ratio of public employment shares, variation over age groups
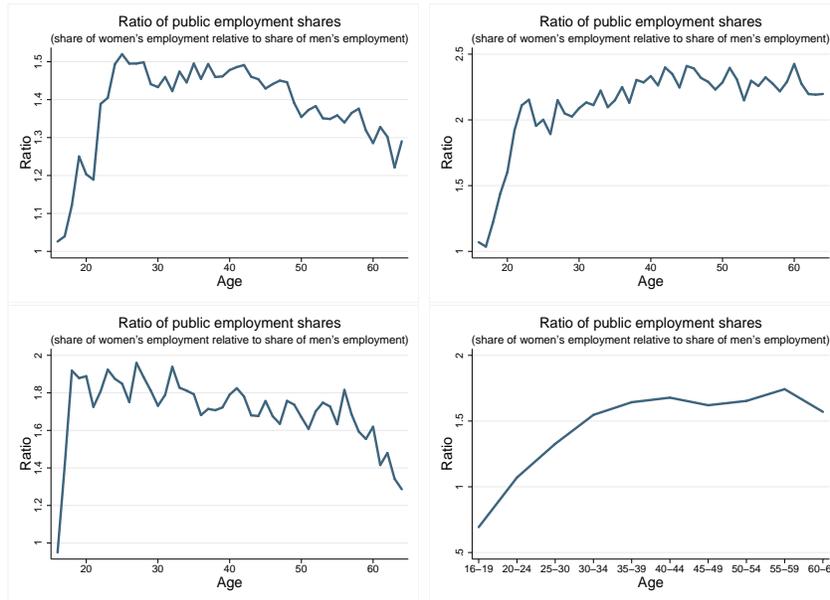
Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.14: Ratio of women's employment shares, variation over age groups
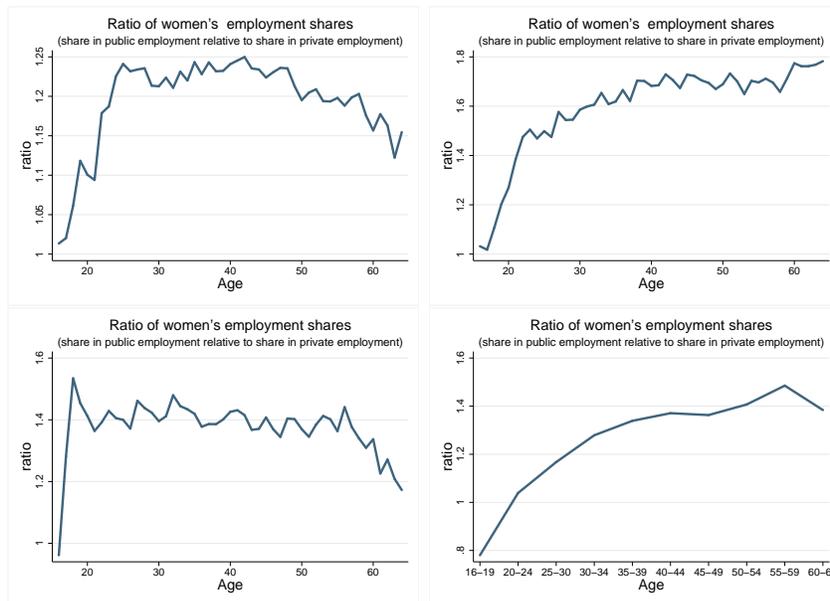
Note: French, Spanish, and UK Labour Force Surveys and CPS (2003-2018).

Figure A.15: Different statistics for the gender bias in public employment, by education
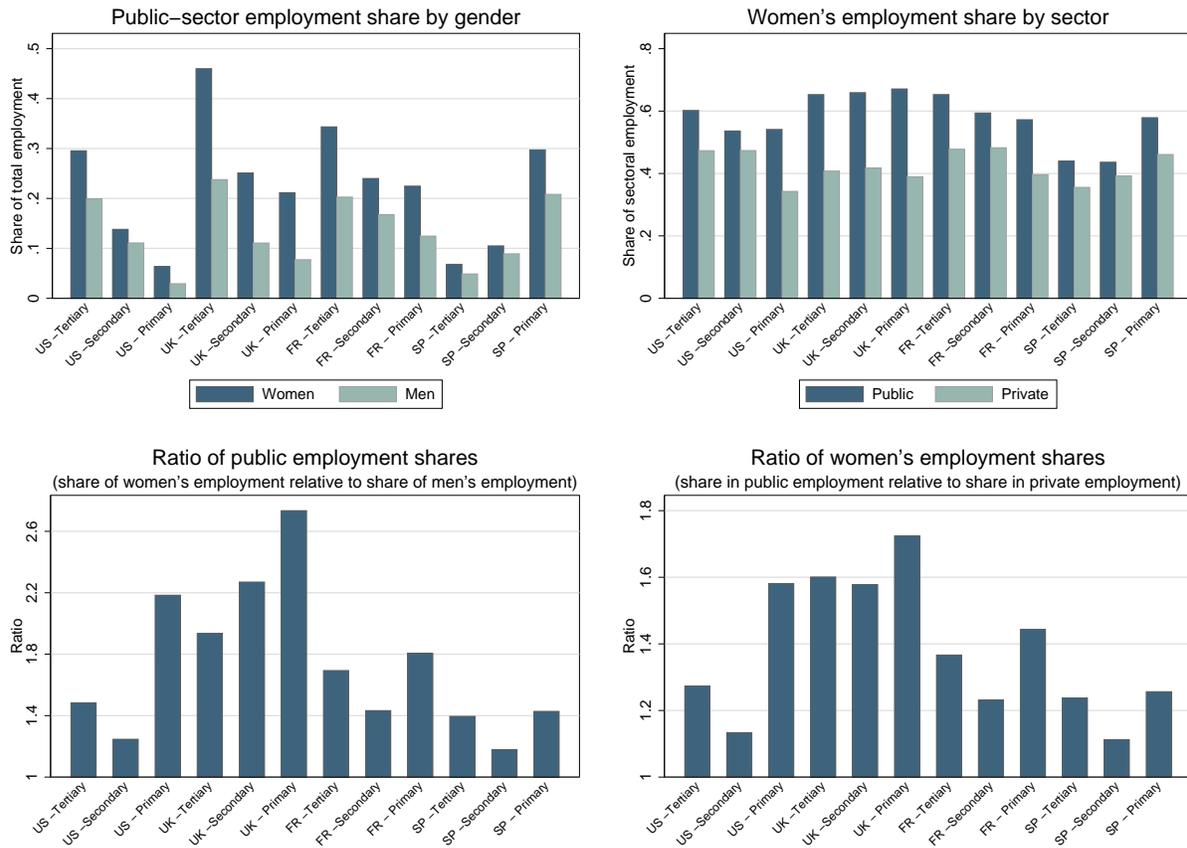
Note: At the top, the graph on the left shows the public sector employment shares by gender and the graph on the right the share of women in sectoral employment. At the bottom, the graph on the left shows the ratio of public employment shares rg and the graph on the right shows the ratio of women's employment shares rf. For the United States the data is taken from the CPS (2003-2018), for the United Kingdom from the UK Labour Force Survey (2003-2018), for France from the French Labour Force Survey (2003-2017) and for Spain from the Spanish Labour Force Survey (2003-2018); for details on the methodology see Fontaine et al. (2018). [2018]

B   Stocks and flows by gender

Figure B.1: Average worker flows, 2003-2018

United States

United Kingdom

France

Spain
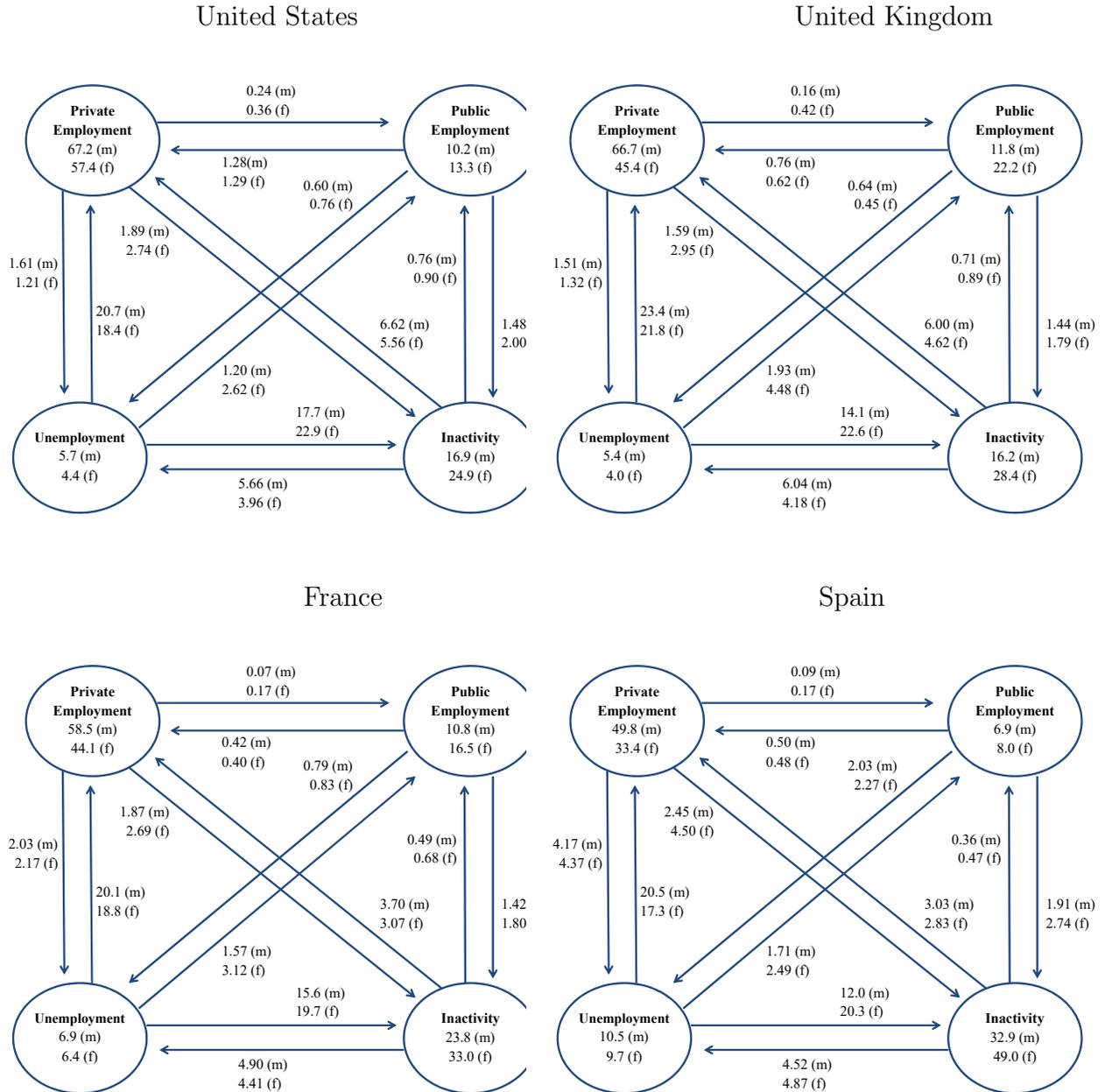
Note: worker stocks are expressed as a fraction of the total working-age population and flows are expressed as hazard rates. Data are extracted from the French, UK, and Spanish Labour Force Survey, and the CPS; see Fontaine et. al (2018) for details on the extraction of stocks and flows.

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Estimation of conditional transition probabilities

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:

$$\lambda_i^U = \frac{\exp(x_i\beta_U)}{1 + \exp(x_i\beta_U) + \exp(x_i\beta_I)} \tag{B.1}$$

$$\lambda_i^I = \frac{\exp(x_i\beta_I)}{1 + \exp(x_i\beta_U) + \exp(x_i\beta_I)}, \tag{B.2}$$

where x_i denotes the control variables age and age squared, as well as indicator variables for education, region, year, occupation, and age between 60 and 64 to capture increasing flows into retirement. The estimation also includes a female dummy, a public sector dummy, and an interaction term between the two. These estimates then allow us to predict transition probabilities for the average female and male employee in both public and private sector.

Figure B.2: Conditional transition probabilities out of employment
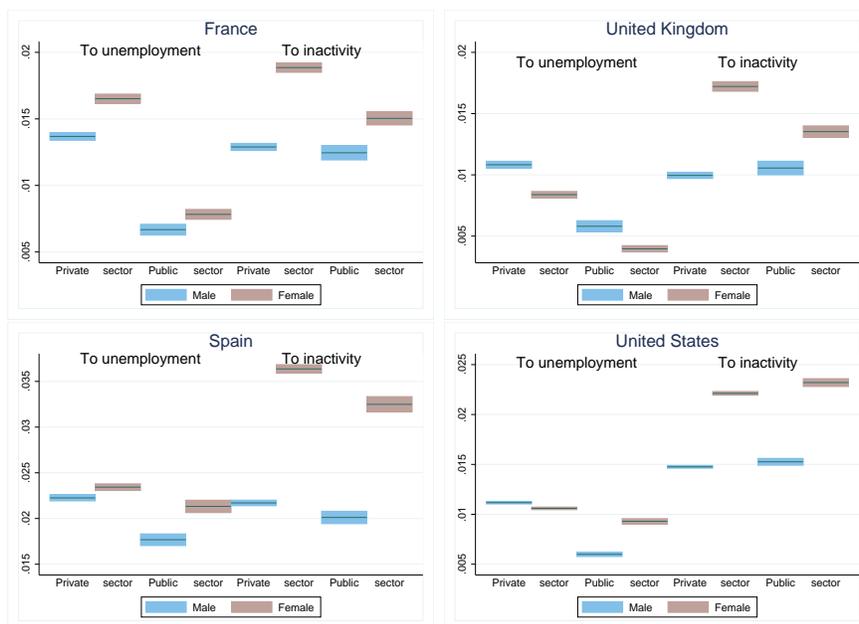
Note: Based on the estimation of equations B.1 and B.2 using a multinomial logit regression. For France the number of observations is 1,634,340 and the pseudo R-squared is 0.092. For the UK the number of observations is 1,417,683 and the pseudo R-squared is 0.077. For Spain the number of observations is 1,989,672 and the pseudo R-squared is 0.090. For the US the number of observations is 7,593,719 and the pseudo R-squared is 0.068. For France, the UK, and Spain, transition rates are quarterly, while they are monthly for the US. Included as controls are regional and year fixed effects, education and occupation dummies as well as age and age squared and a dummy for age 60-64. The predicted probability is calculated based on an individual with the average characteristics of the employed population. Data is for 2003-2016 (2005-2016 for Spain). The boxes report the 95 percent confidence interval on the prediction.

Calculation of continuous rates

Consider a labor market with four states: private employment (P), public employment (G), unemployment (U) and inactivity (I). Each period $t \in \{0, 1, 2, 3, ..\}$ corresponds to a quarter (a month for the US). A survey observes the transitions between t and $t+1$ recorded in a 4×4 discrete time Markov transition matrix n, with columns summing to 1. Suppose that the transitions occur in a continuous time environment. It is possible to estimate (and correct for the time-aggregation bias) the discrete transition matrix. Let μ denote a diagonal matrix of eigenvalues and p the matrix with corresponding eigenvectors of the discrete transition matrix.

Let λ be the 4×4 continuous time Markov transition matrix that records on the off-diagonal the Poisson continuous arrival rate, λ^{AB} from state $A \in \{P, G, U, I\}$ to state $B \neq A$. We can retrieve the continuous time transition matrix from the limit of the discrete transition matrix[11]:

$$\hat{\lambda} = \lim_{\Delta \to 0} \frac{p\mu^{\Delta}p^{-1} - I}{\Delta} \tag{B.3}$$

Table B.1: Continuous transition rates

Transitions	US		UK		France		Spain	
	Men	Women	Men	Women	Men	Women	Men	Women
$P \to G$	0.0023	0.0034	0.0014	0.0038	0.0005	0.0012	0.0005	0.0009
$P \to U$	0.0203	0.0156	0.0189	0.0177	0.0255	0.0281	0.0525	0.0576
$P \to I$	0.0185	0.0275	0.0157	0.0294	0.0177	0.0256	0.0230	0.0426
$G \to P$	0.0120	0.0118	0.0064	0.0053	0.0030	0.0028	0.0022	0.0019
$G \to U$	0.0070	0.0096	0.0076	0.0057	0.0095	0.0104	0.0249	0.0290
$G \to I$	0.0153	0.0201	0.0150	0.0183	0.0142	0.0178	0.0187	0.0260
$U \to P$	0.2621	0.2387	0.2987	0.3013	0.2542	0.2470	0.2592	0.2302
$U \to G$	0.0143	0.0334	0.0240	0.0607	0.0193	0.0402	0.0211	0.0323
$U \to I$	0.2422	0.3185	0.1907	0.3259	0.2036	0.2652	0.1503	0.2672
$I \to P$	0.0636	0.0546	0.0546	0.0423	0.0325	0.0266	0.0261	0.0246
$I \to G$	0.0078	0.0089	0.0068	0.0079	0.0046	0.0061	0.0033	0.0041
$I \to U$	0.0775	0.0552	0.0825	0.0608	0.0644	0.0597	0.0573	0.0648

---

[11]All these transformations can be done provided that the eigenvalues are distinct, real and non-negative which is always the case in our dataset; for more details see Gomes [2015].

C   Further results from the model

Figure C.1: Calibrated distributions for individuals' outside options, $F(\tilde{x}_j, \sigma_j^x) \; j = [m, f]$
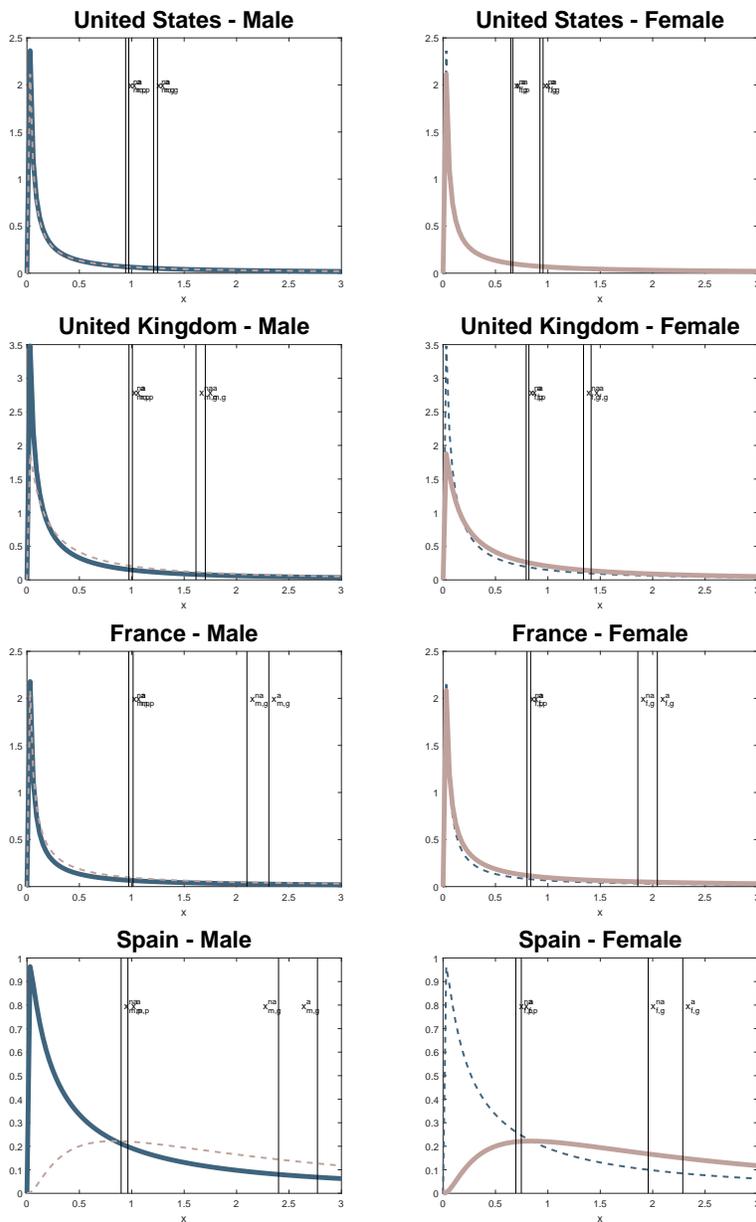
Note: The left-hand graphs show the distributions of individuals' outside options together with the different thresholds for men (for comparison the distributions for women are plotted as dashed lines). The right-hand graphs show the distributions of individuals' outside options together with the different thresholds for women (for comparison the distributions for men are plotted as dashed lines).

Alternative decomposition

Table C.1: Gender composition of the public sector under different scenarios, alternative decomposition

Country	Benchmark	No sector differences & no preference differences	Only preference differences	Only wage differences	Only hours differences	Only job security differences
		$\pi_w = \pi_m = 1$ $e_g = e_p$ $\bar{\epsilon}_f = \bar{\epsilon}_m$ $\delta_g = \delta_p$	$\pi_w = \pi_m = 1$ $e_g = e_p$ $\delta_g = \delta_p$	$e_g = e_p$ $\bar{\epsilon}_f = \bar{\epsilon}_m$ $\delta_g = \delta_p$	$\pi_w = \pi_m = 1$ $\bar{\epsilon}_f = \bar{\epsilon}_m$ $\delta_g = \delta_p$	$\pi_w = \pi_m = 1$ $e_g = e_p$ $\bar{\epsilon}_f = \bar{\epsilon}_m$
Share of public sector in women's employment						
US	0.241	0.167	0.222	0.174	0.176	0.168
UK	0.403	0.15	0.332	0.157	0.189	0.152
France	0.359	0.234	0.266	0.192	0.299	0.245
Spain	0.444	0.071	0.0977	0.0816	0.358	0.073
Share of women in public sector employment						
US	0.541	0.45	0.521	0.478	0.449	0.445
UK	0.642	0.437	0.63	0.44	0.455	0.436
France	0.574	0.395	0.426	0.512	0.464	0.389
Spain	0.329	0.171	0.225	0.193	0.242	0.165
Public sector employment shares ratio						
US	1.42	0.991	1.31	1.11	0.986	0.97
UK	2.19	0.997	2.19	1.01	1.06	0.994
France	1.83	0.925	1.05	1.49	1.2	0.901
Spain	1.53	0.856	1.2	0.983	1.11	0.821
Women's employment shares ratio						
US	1.25	0.994	1.19	1.07	0.99	0.98
UK	1.71	0.998	1.66	1.01	1.04	0.996
France	1.55	0.941	1.04	1.29	1.15	0.92
Spain	1.64	0.871	1.17	0.985	1.13	0.839

Table C.2: Gender composition of the public sector under different scenarios, raw measures for the gender bias

Country	Benchmark	No sector differences & no preference differences	No preference differences	No wage differences	No hours differences	No job security differences
		$\pi_w = \pi_m = 1$ $\xi_g = \xi_p$ $\bar{\epsilon}_f = \bar{\epsilon}_m$ $\delta_g = \delta_p$	$\bar{\epsilon}_f = \bar{\epsilon}_m$	$\pi_w = \pi_m = 1$	$\xi_g = \xi_p$	$\delta_g = \delta_p$
Share of public sector in women's employment						
US	0.261	0.161	0.208	0.247	0.222	0.264
UK	0.392	0.122	0.17	0.387	0.333	0.392
France	0.354	0.228	0.334	0.306	0.236	0.359
Spain	0.401	0.0606	0.31	0.369	0.125	0.404
Share of women in public sector employment						
US	0.523	0.428	0.458	0.492	0.521	0.53
UK	0.66	0.456	0.439	0.659	0.685	0.658
France	0.557	0.394	0.524	0.466	0.531	0.564
Spain	0.402	0.244	0.291	0.359	0.401	0.406

Calculation of the work-life balance and job-security premium

Consider the flow utility for employment, $v_{i,j}^E = (1 - \xi_i)x + w_{i,j}$. Hence, a private sector worker with an opportunity cost x is willing to sacrifice $(\xi_p - \xi_g)x$ in terms of wages to obtain the same job characteristics as a worker in the public sector. To calculate this compensating differential, we then take the expected value of x, conditional on being employed. In percentage of private sector wages we thus obtain the following expression:

$$PremiumH_j^p = \frac{(\xi_p - \xi_g)\int_0^{\bar{x}_{p,j}^{na}} xf(x)dx}{F(x_{p,j}^{\bar{n}a})}\frac{1}{w_{p,j}} \times 100, j = [m, f].\qquad(C.1)$$

Alternatively, we can measure this compensating differential as the additional wage needed for a public sector worker to accept the same job characteristics as workers in the private sector:

$$PremiumH_j^g = \frac{(\xi_p - \xi_g)\int_0^{\bar{x}_{g,j}^{na}} xf(x)dx}{F(x_{g,j}^{\bar{n}a})}\frac{1}{w_{g,j}} \times 100, j = [m, f].\qquad(C.2)$$

The calculation of the job-security premium uses the same approach but requires a bit more algebra. Consider a private sector worker with wage $w_1 = w_{p,j}$, job-separation rate δ_p and opportunity cost of working $x < \bar{x}_{p,j}^a$. If offered a public sector job with separation rate δ_g, Equation 11 indicates that to maintain the value of employment, the worker would only be willing to accept if paid a wage larger that w_2, where $w_2 = w_1 + \delta_p(U_{p,j}(x|\delta_p) - E_{p,j}(x|\delta_p)) -$

$\delta_g(U_{p,j}(x|\delta_g) - E_{p,j}(x|\delta_g))$. Subtracting Equation 13 from 11, and using Equation 9 one obtains $E_{p,j}(x|\delta_i) - U_{p,j}(x|\delta_i) = \frac{(s-\xi_p)x + \xi_p x_{p,j}^{na}}{r+\tau+\lambda+\delta_i+m(\theta_i)}$.

If, on the other hand, the worker has larger opportunity costs of working, $\bar{x}_{p,j}^a > x > \bar{x}_{p,j}^{na}$, and hence if separated moves to inactivity, then combing Equations 14, 12 and 9 gives $w_2 = w_1 + \delta_p(I_{p,j}(x|\delta_p) - E_{p,j}(x|\delta_p)) - \delta_g(I_{p,j}(x|\delta_g) - E_{p,j}(x|\delta_g))$, and $E_{p,j}(x|\delta_i) - I_{p,j}(x|\delta_i) = \frac{-\xi_p x + \xi_p x_{p,j}^{na}}{r+\tau+\lambda+\delta_i)}$. Integrating over x we calculate the conditional expected value to obtain the following expression:

$$
\begin{aligned}
PremiumS_j^p = & \left[\left(F(x_{p,j}^{\bar{a}})\xi_p x_{p,j}^{\bar{na}}\left(\frac{\delta_p}{\tilde{r}+\delta_p+m(\theta_p)} - \frac{\delta_g}{\tilde{r}+\delta_g+m(\theta_p)}\right) \right. \right. \\
& + (s-\xi_p)\left(\frac{\delta_p}{\tilde{r}+\delta_p+m(\theta_p)} - \frac{\delta_g}{\tilde{r}+\delta_g+m(\theta_p)}\right) \int_0^{\bar{x}_{p,j}^a} x f_{p,j}(x)dx \Bigg) \\
& + \left((F(x_{p,j}^{\bar{na}}) - F(x_{p,j}^{\bar{a}}))\xi_p x_{p,j}^{\bar{na}}\left(\frac{\delta_p}{\tilde{r}+\delta_p} - \frac{\delta_g}{\tilde{r}+\delta_g}\right) \right. \\
& + (-\xi_p)\left(\frac{\delta_p}{\tilde{r}+\delta_p} - \frac{\delta_g}{\tilde{r}+\delta_g}\right) \int_{\bar{x}_{p,j}^a}^{\bar{x}_{p,j}^{na}} x f_{p,j}(x)dx \Bigg) \Bigg] \frac{1}{F(x_{p,j}^{\bar{na}})w_{p,j}} \times 100, j \\
= & [m, f],
\end{aligned} \tag{C.3}
$$

where $\tilde{r} = r + \tau + \lambda$. Again we can calculate a similar expression measuring the wage compensation (in % terms) required for a public sector worker to accept a lower job-security in the private sector:

$$
\begin{aligned}
PremiumS_j^g = & \left[\left(F(x_{g,j}^{\bar{a}})\xi_g x_{g,j}^{\bar{na}}\left(\frac{\delta_g}{\tilde{r}+\delta_g+m(\theta_g)} - \frac{\delta_p}{\tilde{r}+\delta_p+m(\theta_g)}\right) \right. \right. \\
& + (s-\xi_g)\left(\frac{\delta_g}{\tilde{r}+\delta_g+m(\theta_g)} - \frac{\delta_p}{\tilde{r}+\delta_p+m(\theta_g)}\right) \int_0^{\bar{x}_{g,j}^a} x f_{g,j}(x)dx \Bigg) \\
& + \left((F(x_{p,j}^{\bar{na}}) - F(x_{p,j}^{\bar{a}}))\xi_g x_{g,j}^{\bar{na}}\left(\frac{\delta_g}{\tilde{r}+\delta_g} - \frac{\delta_p}{\tilde{r}+\delta_p}\right) \right. \\
& + (-\xi_g)\left(\frac{\delta_g}{\tilde{r}+\delta_g} - \frac{\delta_p}{\tilde{r}+\delta_p}\right) \int_{\bar{x}_{g,j}^a}^{\bar{x}_{g,j}^{na}} x f_{g,j}(x)dx \Bigg) \Bigg] \frac{1}{F(x_{g,j}^{\bar{na}})w_{g,j}} \times 100, j \\
= & [m, f].
\end{aligned} \tag{C.4}
$$