Gender Gaps across Countries and Skills: Supply, Demand and the Industry Structure*

Claudia Olivetti
Boston University
and NBER

Barbara Petrongolo
Queen Mary University
and CEP (LSE)

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Abstract

The gender wage gap varies widely across countries and across skill groups within countries. Interestingly, the unskilled-to-skilled gender wage gap is positively correlated to the corresponding gap in hours per person. This positive correlation would reveal the presence of net demand forces shaping gender differences in labor market outcomes across skills and countries. We find that more than half of labor demand differences across countries are driven by differences in the industry structure. In particular, the between-industry component of labor demand explains between one quarter and one third of the overall cross-country variation in wage and hours gaps.

Keywords: gender gaps, education, demand and supply, industry structure.
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1 Introduction

Alongside clear advances in the labor market prospects of women over the past few decades, there is evidence of sizable pay and employment disparity still remaining with respect to men in most countries, and the goal of gender equality has recently been stated as one of the Eight U.N. Millennium Development Goals (U.N., 2009).

It is well known that gender pay and employment gaps vary widely across OECD countries (Blau and Kahn, 2003; Olivetti and Petrongolo, 2008). What is probably less known is that there are also large international differences in how gender gaps vary within countries, across levels of human capital. For example, in the US, the UK, Nordic countries, Germany and the Netherlands, the gender wage gap is either rising with levels of education, or roughly flat. When moving towards the south of Europe and Ireland, gender wage penalties are largest among the unskilled. Large variations in gender wage gaps are also accompanied by substantial variation in the corresponding gaps in hours per head. In particular, gender gaps in hours everywhere fall with levels of education, but such gradient is highest in southern Europe and Ireland, where employment rates of unskilled women are lowest. This pattern of variation yields a positive cross-country correlation between the unskilled-to-skilled difference in the wage gap and the corresponding difference in the gap in hours per person (see Figure 3). Based on a canonical supply and demand framework, positive co-variation in skill differentials in quantities and prices would not be consistent with international differences in labor supply alone, and reveals instead the presence of net demand forces shaping gender differences in labor market outcomes across skills and countries. Thinking along these lines, the labor demand hypothesis has the potential to explain why the labor market prospects of less-skilled women are more vulnerable in some countries than others.

In this paper we exploit this rich pattern of variation in gender gaps, between- and within-countries, in order to identify gender biases in labor demand in a number of OECD countries. Demand forces may have in turn both within- and between-industry components. While within-industry forces reflect differences in gender and skill intensities within sectors, between-industry forces reflect differences in the sectoral composition of the economy, where different sectors may have different skill and gender intensities. The former may include skill-biased technical change, changes in prices of other inputs, outsourcing, gender comparative advantages, or discrimination. The latter may instead be driven by differences in product demand, in sector-specific productivity growth, in the rate of marketization of home production, or international trade. Building on this decomposition, we link the variation in gender gaps to the process of structural transformation, and investigate whether unskilled women suffer relatively larger labor market penalties in some countries because their female-intensive sectors are relatively less-developed. For example, if the service sector is larger in the US than in southern Europe, and unskilled women tend to be over-represented in services, we expect unskilled women to suffer a relatively large wage and/or employment penalty in the latter than in the former.

We use micro data that are as comparable as possible across countries, namely the US Current Population Survey, the Canadian Labor Force Survey, and the European Community Household Panel Survey, in order to obtain a measure of net demand differences by gender and levels of education. Our first result is that in most countries in our sample there is a stronger gender bias in the demand for unskilled than skilled labor, relative to the US. That is, the demand for unskilled female labor is relatively higher in the US than in most countries in our sample. This finding cannot be explained by cross-country differences in the process of women's selection into paid employment, as we obtain very similar results when we correct observed wages for sample selection. We also provide suggestive evidence that cross-country variation in gender gaps is not driven by institutional or cultural factors that may affect the relative demand and supply of female labor differently across skill groups and countries.

Based on a simple model of a multi-sector economy, we illustrate how the variation in the male bias in labor demand may be driven by cross-country differences in labor input intensities within industries, or differences in product demand across industries with different input intensities. Using a ten-fold industry classification, we decompose differences in labor demand between each country in our sample and the US into within- and between-industry components, and find that both play important roles in explaining international differences in labor demand, with wide variation in their relative importance across countries.

For realistic values of the elasticity of substitution between male and female labor inputs, the between-industry component explains more than half of the demand differential with respect to the US in the majority of countries, and namely Nordic countries, the Netherlands, Austria, Ireland, France and southern Europe. This result is mostly driven by the different weight of the broad service sector between these countries and the US. The interpretation is that the service sector in the US is larger than in other countries, and in this sector the unskilled gender bias in labor demand is smaller than the skilled one. Finally, adjusting gender gaps across countries for the between-industry component of labor demand explains between one quarter and one third of the co-movement between wage and hours gaps.[1]

The within-industry component of labor demand differences is also sizable in most countries, as most sectors in the US tend to be more unskilled-women intensive than elsewhere. In particular, we find that international differences in the occupational structure within industries drive a large fraction of the within-industry component of labor demand. If, say, the manufacturing sector is more unskilled-female intensive in the US than in other countries, then not surprisingly this sector also tends to have an occupational structure that is relatively more favorable to unskilled women in the US than in other countries.

The relationship between the process of structural transformation and women's involvement in the labor market has been noted as far back as Fuchs (1968). The idea is that production of goods and services is relatively intensive in the use of "brawn" and "brain", respectively, and as men and women may have different endowments of these factors, the historical growth in the service sector may impact female participation to the labor market. A similar point is made by Goldin (1995, 2006), who notes that service jobs tend to be physically less demanding and cleaner, thus more "respectable" for women entering the labor force, than typical jobs in factories. Insofar the decline in manufacturing and the parallel rise in services are staggered across countries, these ideas can have consequences for the international variation of female labor market outcomes.[2] Our paper makes a contribution in this direction.

In particular, by looking at the role of the industry structure in shaping gender gaps across skills and countries, this paper brings together two strands of literature. First, there exists a literature on the driving forces of the international variation in the gender gap. Our previous work (Olivetti and Petrongolo, 2008) stresses that, if there is overall positive selection into employment, employed women tend to have relatively high-wage characteristics. Thus low female employment rates become consistent with low wage gaps simply because low-wage women are less likely to feature in the observed wage distribution. Work by Blau and Kahn (1996, 2003) emphasize

[1] While we focus on the effect of the industry structure on the demographic composition of employment, it should be recognized that changes in female labor supply may in turn have an impact on the industry mix. However, existing evidence suggests that should not be a major issue. In particular, Lee and Wolpin (2006) find that the growth in the service industry resulted almost entirely from demand-side factors associated with technical change, and that supply-side factors are neutral with respect to relative sector growth.

[2] More recently, Akbulut (2011) calibrates a growth model with two market sectors (goods and services) and a home production sector to assess the impact of higher productivity growth in the service sector relative to the home sector on trends in female market hours.

the role of international differences in overall inequality: if women tend to have on average lower wage characteristics than men, higher overall inequality would translate such differences into a wider gender pay gap. We contribute to this literature by uncovering the skill dimension of gender inequalities, and relating the variation in gender gaps across skills and countries to demand and supply forces.

Second, this paper is related to a large literature on the labor market impact of structural transformation. In the micro literature, seminal work by Katz and Murphy (1992) shows that an important fraction of changes in the US wage distribution from 1963 to 1987 can be explained by a within-sector rise in demand for skilled labor, in turn led by increasing computerization of production processes (Autor, Katz and Krueger, 1998). More recently, Autor, Levy and Murnane (2003) propose a task-based view of technological progress, having conceptualized work as a series of tasks that can be classified into routine or non-routine activities, and Autor and Dorn (2009) show how recent employment and wage polarization in the US might have been driven by the reduced usage of routine tasks following the adoption of new technologies.[3] In the macro literature, Ngai and Pissarides (2008) illustrate how long-run trends in aggregate market hours in the US are related to the secular decline of agriculture and the rise of services. In an international perspective, Rogerson (2007, 2008) and Ngai and Pissarides (2011) relate differences in market hours between continental Europe and the US to the smaller weight of the service sector in European economies, and Rendall (2011) emphasizes different implications for men's and women's hours. These papers highlight the marketization of services that have close substitutes in home production as a key force driving structural transformation and variation in market hours.

Our approach complements existing micro and macro studies along two main dimensions. First, we introduce both gender and skill dimensions in the analysis of the labor market effects of structural transformation. If skilled and unskilled women tend to be over-represented in different industries, special attention should be paid to the impact of the industry structure on female labor market outcomes across the skill distribution. Second, we emphasize international differences in both gender gaps and the industry structure, and illustrate the role of the between-industry component of labor demand in shaping international variation in the gender gap.

[3] See Goos and Manning (2007) for a study of polarization in the UK labor market, and Goos, Manning and Salomons (2010) for an application to a number of European countries. See also Black and Spitz-Oener (2010) for a study of the impact of routinization on the gender wage gap in West Germany.

The paper is organized as follows. Section 2 describes our data sets and provides evidence on the variation of gender gaps across skills and countries. Section 3 shows that international variation in employment selection, institutions or cultural norms fails to explain the observed correlations between hours and wage gaps, while variation in the share of services may have a better scope at that. Section 4 proposes a simple theoretical framework that illustrates the relationship between gender gaps across skills and gender biases in labor demand. Section 5 generalizes our theoretical framework to a multi-sector economy in which differences in labor demand can be decomposed in measurable within- and between-industry components. Section 6 presents our decomposition results. Section 7 provides an extension of our analysis to variation over recent decades, and across US states. Section 8 concludes.

2 Preliminary evidence

In this section we present descriptive evidence on gender gaps by levels of education for the US, Canada and thirteen European countries. These are: UK, Finland, Denmark, Germany, Netherlands, Belgium, Austria, Ireland, France, Italy, Spain, Portugal and Greece. For the US we use data from the March Current Population Survey (CPS) for 1995-2002, where each year's survey contains detailed information on the previous year's labor market variables. This choice of sample period is made to ensure consistency with European data, extracted from the European Community Household Panel Survey (ECHPS), which is only available from 1994-2001 and provides contemporaneous information on labor market variables. For Canada we use data from the March Labor Force Survey (LFS) for 1997-2004. Information on wages and earnings is first included in the Canadian LFS in 1997, and in order to use eight survey years for Canada as for most other countries we extend the Canadian sample until 2004.

While the data are quite different in structure - for the US and Canada we use repeated cross-sections, for Europe we have an unbalanced panel - the information we exploit from these data is as consistent as possible across countries. We select individuals ages 25-54 who are not in full-time education, retired, military, or self employed, and use information on gender, age, educational qualifications, industry, occupation, weekly hours and wages. Weekly hours are obtained for the US as total annual hours in the previous year, divided by the number of weeks worked. For Canada and Europe, we use information on usual hours in the survey week. This allows for a more consistent measure of working hours across countries, as the information on current hours in the CPS refers to actual rather than usual hours. Hourly wages are obtained for the US as gross wage and salary income in the previous year, divided by annual hours worked. For Canada, we use information reported on gross hourly earnings. For Europe, wages are obtained by dividing current gross monthly wage and salary earnings by actual hours worked, as we do not have a measure of usual earnings in the ECHPS. Our core sample includes individuals with positive earnings and non zero hours. As the definition as well as the adoption of part-time work varies widely across countries, we do not restrict the analysis to full-time workers.

Information on educational attainment is only available in the ECHPS by broad categories, i.e. less than upper secondary high school, upper secondary school completed, and higher education. These correspond to ISCED 0-2, 3, and 5-7, respectively. We thus attempt to reproduce this threefold distinction for the US and Canada, where available categories of education are 15 and 7, respectively. For the US (Canada), the low education group includes all individuals who have not completed 12th grade (secondary education), the middle group includes those who have completed 12th grade but do not have a college degree, and the high-education group includes those who have completed a college degree. Education shares in the population for each country are reported in Table A1.

Our analysis below is based on a twofold skilled/unskilled distinction, so one would need to somehow reorganize the three educational categories available into two groups. An obvious solution would be to merge the mid-education group to either the low- or high-education group. This is equivalent to treating secondary school graduates as either pure non-graduate equivalents or pure college equivalents. A method to illustrate which one of these two options is more appropriate consists in using wage regressions to determine the extent to which the wages of high school graduates co-move with the wages of non-graduates and college graduates, respectively, as also performed in Katz and Murphy (1992). We thus regress mean wages for high school graduates by year, country and gender on mean wages for dropouts and college graduates, plus controls for year, country and gender. The regression results show that a person with a high school degree is equivalent to a total of 0.984 of a person without a school diploma (with a standard error of 0.061), and -0.014 of a person with a college degree ($s.e. = 0.029$). We thus merge the low- and middle-education groups to form our unskilled labor group, and the skilled group is represented by college graduates. This classification also has the advantage to define as skilled a group whose qualifications are measured relatively consistently across countries.

Figure 1 shows cross country variation in the gender wage gap for the skilled and the unskilled by plotting one against the other, together with the 45 degree line. The values represented are obtained as coefficients on a male dummy in regressions for log hourly wages that only control for gender and year effects, using population weights. All estimates are significantly different from zero at the 1 percent level. In Nordic countries and a group of continental European countries including Germany, Netherlands, Austria and France, the gender wage gap is higher for the skilled than for the unskilled, though it can be noted that the proportional difference is stronger in Nordic countries than elsewhere. In the rest of the sample the wage gap is instead higher for the unskilled than for the skilled. While in the US such difference is rather small, at least in proportional terms, it becomes quite sizable in other countries, and especially in Canada, Ireland, Italy and Greece. Although the correlation is far from perfect, countries with low average wage gaps are also countries in which the wage gap tends to fall with years of education.

Figure 2 presents corresponding information for gender gaps in hours per person. The values displayed are the gender differences in the (log of the) hours to population ratio, where hours are obtained as the sum of usual weekly hours by gender, skill and country, and the population is the corresponding head count. In all countries except Finland the gender gap in hours falls substantially with the level of education, but the gradient is much stronger in Belgium, Ireland and Southern Europe than elsewhere. Interestingly, countries differ widely in their unskilled hours gap, but there is much less international variation in the skilled hours gap.

This rich variation in gender gaps can be broadly summarized by looking at the correlation between the skill differential in the wage and hours gaps. In Figure 3 we plot the difference between the unskilled and the skilled wage gap (i.e. the difference between x- and y-values in Figure 1) against the difference between the unskilled and the skilled gaps in hours per head (i.e. the corresponding difference from Figure 2). The correlation between them is positive, equal to 0.41. There is clearly no outlier that drives this correlation, and excluding each country in turn from the sample we obtained correlation estimates ranging from 0.32 (excluding Finland) to 0.52 (excluding Canada). Thus despite some variation in the correlation obtained across different samples, its range of variation remains firmly positive. Positive co-movements of quantity and price differentials point in the direction of *net* demand factors possibly shaping the variation in gender gaps across skills and countries. Before exploring the nature of cross-country differences in labor demand, the next section considers a few caveats to a demand-story interpretation of the observed variation in gender gaps.

3 Sample selection, institutions and culture

A rich variety of factors may in principle drive the correlation between wage and hours gaps and, especially when cross-country differences are considered, an obvious culprit would be variation in institutions or something as broad as "social norms". One may think that institutions such as maternity leave legislation can potentially affect relative demand and supply of female labor, and if responses are skill specific, they may affect the cross country variation of gender gaps by skill. Similarly, culture and the perceived role of women in society may vary across countries and skill groups.

We will assess the role of these factors in two ways. First, to the extent that institutions and social norms have an impact on women's (and possibly men's) participation into paid employment, we will control for different patterns of employment selection across countries and skills. Second, we will directly look at partial correlations between wage and hours gaps, having controlled for (available indexes of) attitudes towards female work and labor market institutions at the country level.

Concerning selection, it should be noted that the demographic groups considered are indeed characterized by very different employment rates. In particular, gender gaps in hours per person vary from less than 10 percentage points in some countries, to nearly 60 percentage points in others. Thus it makes sense to worry about the way in which different pattern of employment selection across genders, skills and countries may affect our results, if at all.[4]

Specifically, we relate the observed positive association between wage and hours gaps to underlying differences in labor demand, but one could think of alternative mechanisms that would drive similar correlation patterns, based for example on different social norms. Imagine, for the sake of the argument, that in southern Europe it would be socially acceptable for an educated woman to take a skilled job, but it would not seem proper for an uneducated woman to take an unskilled job as a cleaner or waitress, unless she is 'forced' by economic conditions in her household. As a result, fewer uneducated women would work, and those who work would be negatively selected, i.e. they may be married to relatively low-wage husbands, and would have low-wage characteristics themselves, resulting in higher wage gaps at the bottom of the wage distribution. This hypothetical outcome, although observationally equiv-

[4] Blau and Kahn (2006) and Mulligan and Rubinstein (2008) find that employment selection mechanisms can explain part of the evolution of the gender wage gap in the US, and our previous work (Olivetti and Petrongolo, 2008) has emphasized the importance of employment selection in interpreting international differences in gender wage gaps. None of these studies, however, investigate the role of selection along the skill dimension.

alent to some of the patterns observed in Figures 1 and 2, would not be driven by differences in demand forces, but simply by differences in the quality composition of the employed workforce in different countries.

We use a very simple method for controlling for selection, that is we impute wages to the nonemployed based on their observable characteristics, and then estimate median wage gaps on the resulting enlarged wage distribution. By relying on median, as opposed to mean, wage gaps, the only information that is exploited about imputed wages is their position with respect to the median of the potential wage distribution, not the actual imputed level.[5] Our imputation follows two alternative rules. With the first rule, we impute wages below the median (by gender and skill) to all those who are unemployed, as opposed to nonparticipants, and we leave the potential wages of nonparticipants as missing. The underlying idea is that the unemployed are receiving wage offers (if any) below their reservation wage, while the employed have received at least one wage offer above their reservation wage. At given reservation wages, the unemployed have lower potential wages than the observed wages of the employed, and are thus assigned an imputed wage below the median. With the second rule, we assign wages below the median to non working individuals whose partners have total income in the bottom quartile of their gender/skill-specific distribution, based on the assumption of positive assortative mating along wage attributes.

Figure 4 shows scatter plots of gender gaps using selection-corrected median wages. In panel A wage imputation is based on unemployed versus nonparticipant status, while in panel B it is based on spouse income. The two panels give almost identical results, i.e. the correlation between wage and employment gaps stays firmly positive once we control for selection into paid work. If anything, such correlation is higher than when we use uncorrected wage gaps in Figure 3. Hence we find no evidence at all that employment selection behavior may explain the observed variation of gender gaps by skill.[6]

We next look at how the partial correlation between the unskilled-to-skilled dif-

[5] See Olivetti and Petrongolo (2008) for a formal discussion of this methodology.

[6] An even simpler way to deal with sample selection would be to control for the observed characteristics of the employed population when estimating pay gaps. As our groups are already defined along gender and education dimensions, the obvious further control would be age, as a proxy for labor market experience. We thus estimated gender pay gaps having added age and age squared in the corresponding regressions, and obtained a correlation between the unskilled to skilled difference in the *adjusted* pay gaps and the corresponding difference in the hours gap equal to 0.66. Controlling for age actually raises - rather than explain - the observed correlation between gender pay and hours gaps. In other words, the implied differences in labor demand forces would be even stronger if we were controlling for differences in the average age of gender/skill groups across countries.

ferential in gender wage and hours gap is affected if one controls for institutional or cultural indicators, as well as the sectoral composition of the economy. Note that, only if one were able to properly account for net demand differences across countries, would the partial correlation between wage and hours gap turn negative.

The results of the analysis are reported in Table 1. In column 1 no other controls are included, corresponding to the exercise represented graphically in Figure 3, and the correlation is positive and significant at the 10 percent level. Columns 2-5 control for institutional variables which may affect both demand and supply of female skills, and namely: (i) the generosity of maternity leave legislation; (ii) a measure of the marginal tax rate for second earners, which would predominantly affect the labor supply of (unskilled) women; (iii) the tax wedge, including consumption, income and payroll taxes; and (iv) the strictness of employment protection legislation, which may affect demand for high-turnover workers relative to others. In columns 2 to 4 the correlation between wage and hours gaps is only slightly reduced with respect to column 1, while in column 5 it somewhat increases. The next four columns control for indexes of attitudes towards traditional gender roles. Column 6 and 7 control for the proportion of women and men, respectively, who agree with the statement: *"When jobs are scarce, men should have more right to a job than women"*. Columns 8 and 9 control for the proportion of women and men, respectively, who agree with the statement *"Being a housewife is just as fulfilling as working for pay"*. None of these variables can wash away the positive correlation between wage and hour gaps. In fact such correlation tends to be considerably higher in columns 8 and 9 than in column 1, and is always significant at (at least) the 10 percent level. While institutional and cultural factors may affect the relative labor market position of skilled and/or unskilled women (and we will not expand further on these effects here), the point the partial correlations in column 2-9 make is that there is some residual labor demand story that shapes observed skill/gender differentials.

Next, columns 10-11 control for wage bill shares in various sectors in the economy, proxying for the between-industry component of labor demand. While the wage bill shares of the primary, manufacturing and construction sectors if anything raise the partial correlation between gender wage and hours gaps, this becomes negative as soon as the share of six broad services sectors is controlled for. Moreover, controlling for the weight of service sectors help explain two thirds of the overall cross-country variation, giving the highest R^2 across specifications in this table. Finally, column 12 controls for the IT share in total capital compensation, which may affect demand for skills/genders *within* industries. This reduces the correlation between gender wage and hours gaps in both size and statistical significance, but it remains positive.

Of course the list of variables considered is not exhaustive,[7] and given the basic specification and small sample size one should take these correlations with more than some caution. However, Table 1 suggests that the weight of services in the economy might be the best candidate to account for the observed skill/gender differentials, while a number of institutional or cultural factors seem to fail at that. Taking stock of these pieces of evidence, the next section presents a simple demand/supply framework and works out implications for wage and hours gaps.

4 A simple theoretical illustration

Let's consider an economy that produces output Q employing a combination of skilled and unskilled labor, denoted by S and U respectively, according to the following CES production function:

$$Q = [\alpha S^{\rho} + (1-\alpha) U^{\rho}]^{1/\rho}, \tag{1}$$

where α is a technology parameter representing the relative weight of skilled labor in output production. The elasticity of substitution between skilled and unskilled labor is given by $\overline{\sigma} = 1/(1-\rho)$, with $\rho \leq 1$.

The economy is populated by male and female workers, indexed by M and F respectively, who can be either skilled or unskilled. We assume that skilled and unskilled labor inputs are both described by CES aggregators of female and male labor:

$$S = [\beta_S (B_{MS} M_S)^{\rho_S} + (1-\beta_S)(B_{FS} F_S)^{\rho_S}]^{1/\rho_S} \tag{2}$$
$$U = [\beta_U (B_{MU} M_U)^{\rho_U} + (1-\beta_U)(B_{FU} F_U)^{\rho_U}]^{1/\rho_U}, \tag{3}$$

where M_S, M_U, F_S and F_U represent the four types of labor inputs, B_{MS}, B_{MU}, B_{FS} and B_{FU} are the associated labor-augmenting technological parameters, and β_S and

[7] A factor that one may want to take into account here is migration policies, that could affect the gender/skill mix in labor supply and the labor market prospects of natives. While we do not have internationally comparable indexes of such policies, it is not clear a priori whether and in which direction the presence of migrants should affect the triple differences on which we base our analysis. First, while the US and Canada have traditionally attracted higher flows of immigrants than European countries, the share of foreign-born population in several EU countries has reached levels that are close to those observed in the US, and the share of unskilled immigrants in the US is no higher than in several other countries in our sample (see Dumont et al., 2010, Chart 3). Second, Card (2005) does not find evidence of a strong impact of unskilled migration in unskilled labor market (though this may have spillovers on prices of services and the female, skilled labor market, see Cortes, 2008, and Cortes and Tessada, 2011).

β_U index the share of work activities performed by men from each skill group. Finally, ρ_S and ρ_U determine the elasticity of substitution between male and female labor in each skill group according to $\sigma_S = 1/(1-\rho_S)$ and $\sigma_U = 1/(1-\rho_U)$, respectively.

Under perfect competition in the labor market, all inputs are paid their marginal productivity, and thus the gender wage ratio of skill $i = S, U$ is given by:

$$\frac{W_{Mi}}{W_{Fi}} = \frac{\beta_i}{1-\beta_i}\left(\frac{B_{Mi}}{B_{Fi}}\right)^{(\sigma_i-1)/\sigma_i}\left(\frac{M_i}{F_i}\right)^{-1/\sigma_i},$$

where W_{Mi} and W_{Fi} denote real wages. Taking logs we obtain:

$$\Delta w_i = \widetilde{\beta}_i - \frac{1}{\sigma_i}\Delta h_i, \tag{4}$$

where $\Delta w_i = \ln\left(\frac{W_{Mi}}{W_{Fi}}\right)$ and $\Delta h_i = \ln\left(\frac{M_i}{F_i}\right)$ are the skill-specific gender gaps in wages and hours respectively, while $\widetilde{\beta}_i \equiv \frac{1}{\sigma_i}\left\{\sigma_i \ln[\beta_i/(1-\beta_i)] + (\sigma_i - 1)\ln[B_{Mi}/B_{Fi}]\right\}$ denotes the skill-specific gender bias in labor demand.

Given the gender wage gap in (4), and assuming that elasticities of substitution between male and female labor are constant across skills ($\sigma_S = \sigma_U = \sigma$), one can obtain the within-country skill difference in gender wage gaps as:

$$\Delta w_U - \Delta w_S = \left(\widetilde{\beta}_U - \widetilde{\beta}_S\right) - \frac{1}{\sigma}\left(\Delta h_U - \Delta h_S\right). \tag{5}$$

The within-country variation in wage gaps across skill levels is thus driven by both differences in relative demand for each skill group ($\widetilde{\beta}_U - \widetilde{\beta}_S$) and differences in relative supplies ($\Delta h_U - \Delta h_S$).

Finally, we are interested in how the double difference in (5) varies across countries. To ease this comparison, assume for simplicity that elasticities of substitution between male and female labor inputs are constant across both countries and skills, and denoted by σ, and that the only factors that vary across countries are relative demands and supplies of labor inputs. Thus the (triple) difference in wages across genders, skills and countries can be expressed as

$$\Delta_C\left(\Delta w_U - \Delta w_S\right) = \Delta_C\left(\widetilde{\beta}_U - \widetilde{\beta}_S\right) - \frac{1}{\sigma}\Delta_C\left(\Delta h_U - \Delta h_S\right), \tag{6}$$

where Δ_C indicates the differential between a generic country C in our sample and the US.

One way to assess the importance of demand differences across countries would be to work out the comovement of wage differentials and hours differentials in a scenario in which relative demand for labor inputs does not vary across countries, i.e. $\Delta_C \left(\widetilde{\beta}_U - \widetilde{\beta}_S\right) = 0$. In this case equation (6) implies a negative cross-country relationship between $(\Delta w_U - \Delta w_S)$ and $(\Delta h_U - \Delta h_S)$, with a slope equal to $-1/\sigma$. In fact, we plot $(\Delta w_U - \Delta w_S)$ against $(\Delta h_U - \Delta h_S)$ in Figure 5, and note that the slope of the straight line fitted through the scatter plot is -0.02. Under reasonable values for the elasticity of substitution σ around 2.5,[8] such slope should be -0.4 in the absence of relative demand differences. Thus we note once more that the cross-country variation in wage and hours gaps can only be rationalized by underlying net relative demand differences.[9]

A possible caveat to a demand-story interpretation of cross-country evidence is that our conclusions are drawn in a framework which assumes a constant elasticity of substitution between male and female inputs across countries. One could call into question this assumption by asking what kind of variation in σ could explain the international variation in wage and hours gaps, holding relative demand constant. In other words, we solve equation (6) for σ separately for each country, holding $\Delta_C \left(\widetilde{\beta}_U - \widetilde{\beta}_S\right) = 0$, and obtain implied values of σ ranging from -37 in Spain to 10 in Germany. The resulting range of variation in σ seems more implausible than the combination of a homogeneous σ around 2.5 with heterogeneous labor demand structure.

To understand the nature of these labor demand differences, the next section explicitly introduces a sectoral dimension into a simple model for labor demand.

5 A multisector economy

Differences in labor demand across genders, skills and countries may have both within- and between-industry components. The within-industry component reflects differences in gender or skill intensities that happen within sectors. These are typically attributed to non-neutral technological progress, changes in prices of other inputs, gender comparative advantages, or taste and/or statistical discrimination. Between-industry forces reflect changes in the sectoral composition of the economy, where

[8] Section 6 will provide evidence on this.

[9] Note that Figures 3 and 5 plot different hours variables on the $x-$axis. Preliminary evidence given in Figure 3 is based on gaps in hours per head, in order to factor in cross-country variation in educational attainment. Figure 5 uses instead gaps in total hours, consistent with predictions from the model of this section. The interpretation of the different correlations obtained is that cross-country variation in the educational attainment of the population raises further the correlation between wage and hours gaps from about zero (Figure 5) to positive (Figure 3).

different sectors may have different skill and gender intensities. These may stem from differences in product demand, differences in sector-specific productivity growth, in the rate of marketization of home production, or international trade. Among all these, factors that will be relevant for our analysis are those that can drive cross-country differences between high- and low-skill gender gaps.

5.1 Shift share analysis

Following this distinction, we can decompose the difference between the wage bill share of a given factor k ($k = MS, MU, FS, FU$) between each country and the US into a term reflecting differences in labor allocation across sectors, and a term reflecting differences in gender and skill intensities within sectors. In what follows we denote wage bill shares by lower case y and wage bills by upper case Y, and index by 0 the reference country (US) and by $C = 1, ..., 14$ other countries in the sample. Thus the difference in wage bill shares of input k between country C and the US can be expressed as

$$y_{kC} - y_{k0} = \sum_j \gamma_{kj} \left(\frac{Y_{jC}}{Y_C} - \frac{Y_{j0}}{Y_0} \right) + \sum_j \gamma_j \left(\frac{Y_{kjC}}{Y_{jC}} - \frac{Y_{kj0}}{Y_{j0}} \right), \tag{7}$$

where j indexes sectors, Y_{kjC} denotes the wage bill of input k in sector j in country C, $Y_{jC} = \sum_k Y_{kjC}$ denotes the sectoral wage bill, $Y_C = \sum_j Y_{jC}$ denotes the aggregate wage bill and finally $\gamma_{kj} = \left(\frac{Y_{kjC}}{Y_{jC}} + \frac{Y_{kj0}}{Y_{j0}} \right) /2$ and $\gamma_j = \left(\frac{Y_{jC}}{Y_C} + \frac{Y_{j0}}{Y_0} \right) /2$ are decomposition weights. No time subscripts are used as all magnitudes are averages for the sample period available for each country. The first term in equation (7) represents the cross-country difference in the wage bill share of input k that is attributable to differences in the size of industries that employ input k, while the second term reflects cross-country differences in input-k intensities within industries. The γ_{kj} and γ_j terms serve as weights on the between- and within industry components, respectively, obtained as cross country averages.

While the cross-industry variation is the main dimension through which we analyze cross-country differences in this study, the above decomposition can be used to look into other dimensions of the structure of labor demand. In particular, one may be interested in the role of the occupational structure in shaping labor demand patterns across countries, and this links to a growing "task-based" approach to changes in labor demand, which focuses on the impact of technological change on the occupational structure (see Autor, Levy and Murnane, 2003, and Acemoglu and Autor, 2011, for a comprehensive review of the subsequent literature). As changes in the occupational structure may take place within industries, one can further decompose the within-industry component in (7) into a between-occupation and a within-occupation component, according to the following expression:

$$\begin{aligned} y_{kC} - y_{k0} &= \sum_j \gamma_{kj} \left(\frac{Y_{jC}}{Y_C} - \frac{Y_{j0}}{Y_0} \right) \\ &\quad + \sum_j \gamma_j \left[\sum_q \gamma_{kjq} \left(\frac{Y_{jqC}}{Y_{jC}} - \frac{Y_{jq0}}{Y_{j0}} \right) + \sum_j \gamma_{jq} \left(\frac{Y_{kjqC}}{Y_{jqC}} - \frac{Y_{kjq0}}{Y_{jq0}} \right) \right], \quad (8) \end{aligned}$$

where the first term is the usual between-industry component as in (7), and the second term highlights between- and within-occupations components, with occupations being indexed by q. The γ_{kjq} and γ_{jq} are decomposition weights, and specifically $\gamma_{kjq} = \left(\frac{Y_{kjqC}}{Y_{jqC}} + \frac{Y_{kjq0}}{Y_{jq0}} \right)/2$ and $\gamma_{jq} = \left(\frac{Y_{jqC}}{Y_{jC}} + \frac{Y_{jq0}}{Y_{j0}} \right)/2$, where Y_{kjqC} represents wage bills by group, industry, occupation and country, and Y_{jqC} represents wage bills by industry, occupation and country.

5.2 A multisector model of labor demand

Before quantifying the components of the shift-share decomposition above, we incorporate such decomposition into a multi-sector model of labor demand. This will help link the variation in labor demand to cross-country differences in the strength of the male-bias in each industry or to differences in product demand across industries with different gender and skill intensities.

Following the standard approach in this literature, we consider an economy with J industries, and assume that output in each industry j, Q_j, is produced combining skilled and unskilled labor according to a CES production function like (1), with constant elasticity of substitution across sectors, denoted by $\overline{\sigma} = 1/(1-\rho)$.[10]

In our model skilled and unskilled labor inputs are further CES aggregators of male and female labor according to equations (2) and (3), respectively, with constant elasticities of substitution $\sigma_i = 1/(1-\rho_i)$, but with sector-specific technology parameters β_{ij}, B_{Mij} and B_{Fij}, implying that the various labor inputs are not equally productive across sectors. Aggregate output is given by $Q = \sum_j A_j Q_j$, where A_j denotes total factor productivity in industry j.

The relative demand for the output of industry j relative to a reference industry

[10]See Bound and Johnson (1992) and Katz and Autor (1999).

r is assumed to be given by the unit price elasticity function

$$\frac{Q_j}{Q_r} = \theta_j P_j, \tag{9}$$

where P_j denotes the price of Q_j relative to Q_r and θ_j is a demand shifter that reflects consumer tastes, international trade and other factors affecting relative product demand for the output of industry j.

For the special case of a Cobb-Douglas economy ($\overline{\sigma} = \sigma_S = \sigma_U = 1$), it can be shown that under the assumptions of perfect competition in the labor market the gender wage gap for skill group i is given by:

$$\Delta w_i = \widetilde{\beta}_i - \Delta h_i, \tag{10}$$

which is equivalent to expression (4) of the aggregate economy, with $\sigma_i = 1$ and the qualification that

$$\widetilde{\beta}_i = \ln\left(\frac{\sum_j \beta_{ij}\theta_j}{\sum_j (1-\beta_{ij})\theta_j}\right) \tag{11}$$

is now a function of the different skill intensities within industries (β_{ij}) and consumer's demand across industries (θ_j). This highlights the within- and between-industry components, respectively, in the gender bias in labor demand.

The next step consists in measuring the quantities of interest for our decomposition. Given (10), the total cross-country difference in the gender bias in labor demand is given by the log difference in wage bill shares. That is, denoting by $\Delta_C\widetilde{\beta}_i$ the cross-country difference in $\widetilde{\beta}_i$, (10) implies

$$\Delta_C\widetilde{\beta}_i = \Delta_C \ln y_{Mi} - \Delta_C \ln y_{Fi}. \tag{12}$$

Turning to between- and within-industry components, the assumption of Cobb-Douglas preferences and technology throughout this economy allows us to measure the β_{ij} terms of equation (11) as wage bill shares of a given input in industry j, and the θ_j terms as shares of total revenue accruing to an industry j, having normalized $\sum_j P_j Q_j = 1$. That is, $\beta_{ij} = Y_{Mij}/Y_j$ and $\theta_j = Y_j/Y$, implying that cross-country differences in $\widetilde{\beta}_i$ can be decomposed in simply measurable within- and between-industry components. These are shown to be (approximately) equal to:

$$\Delta_C\widetilde{\beta}_i^{between} = \ln\left(1 + \frac{\sum_j \frac{Y_{MijC}}{Y_{jC}}\left(\frac{Y_{jC}}{Y_C} - \frac{Y_{j0}}{Y_0}\right)}{y_{Mi0}}\right) - \ln\left(1 + \frac{\sum_j \frac{Y_{FijC}}{Y_{jC}}\left(\frac{Y_{jC}}{Y_C} - \frac{Y_{j0}}{Y_0}\right)}{y_{Fi0}}\right) \tag{13}$$

and

$$\Delta_C \widetilde{\beta}_i^{within} = \ln\left(1 + \frac{\sum_j \frac{Y_{jC}}{Y_C}\left(\frac{Y_{MijC}}{Y_{jC}} - \frac{Y_{Mij0}}{Y_{j0}}\right)}{y_{Mi0}}\right) - \ln\left(1 + \frac{\sum_j \frac{Y_{jC}}{Y_C}\left(\frac{Y_{FijC}}{Y_{jC}} - \frac{Y_{Fij0}}{Y_{j0}}\right)}{y_{Fi0}}\right), \tag{14}$$

respectively.[11] These two expressions can be evaluated using the between- and within-industry components from the shift-share analysis in subsection 5.1 and the data on the wage-bill share by demographic group (reported in Table A2). In particular, all terms in the numerators in (13) and (14) are obtained as terms of the shift share decomposition illustrated in equation (7).

The above framework can be generalized by representing S_j and U_j as CES aggregators of male and female labor, with a skill-invariant elasticity of substitution $\sigma_S = \sigma_U = \sigma$, while keeping demand for industry output and sector-level technology as Cobb-Douglas. In this case, the total cross-country difference to be explained is

$$\Delta_C \widetilde{\beta}_i = \frac{1}{\sigma}\left(\Delta_C \ln y_{Mi} - \Delta_C \ln y_{Fi}\right) + \frac{\sigma - 1}{\sigma}\Delta_C \Delta w_i, \tag{15}$$

where $\Delta_C \Delta w_i = \ln\left(\frac{W_{MiC}}{W_{FiC}}\right) - \ln\left(\frac{W_{Mi0}}{W_{Fi0}}\right)$ for $i = S, U$. We show that the between-industry component of (15) is identical to (13). The within-industry component can be obtained as the difference between (15) and (13).[12]

6 Results

6.1 Shift-share analysis of wage bill shares

In order to assess within- and between-industry components of the observed variation in labor demand, we start by providing a simple shift-share analysis of differences in wage bill shares, as illustrated in equation (7), based on a ten-fold industry classification for each country.[13] While this classification is arguably rather coarse, a finer one

[11] See Appendix A, Subsection A.1, for derivation of (11) and its total differential, and derivation of (13) and (14).

[12] See Appendix A, Subsection A.2, for derivation.

[13] Industry classification is as follows: (1) agriculture, hunting, forestry and fishing; mining and quarrying; electricity, gas and water supply; (2) manufacturing; (3) construction; (4) transport and storage; post and telecommunications; (5) wholesale and retail trade; hotels and restaurants; (6) financial intermediation, insurance and real estate; (7) education; (8) health and social work; (9) other services; (10) public administration and defense.

is effectively prevented by both small cell size (by country, gender, skill and industry) and issues of cross-country comparability of more disaggregate industries. The weight of each industry in the total economy for each country is reported in Table A3, together with its demographic composition.

The results are reported in Table 2. Columns 1 and 2 report gender differences in wage bill shares for the unskilled and for the skilled, respectively, and column 3 reports the differences between them. Whereas gender differences in wage bill shares are relatively similar across skill groups in the US, the UK, Denmark and Germany, they are much larger for the unskilled than the skilled in Austria, Ireland and southern Europe, indicating a relatively stronger gender bias in labor demand for the unskilled in the latter group of countries. In column 4 we report triple differences, i.e. cross-country differences between each country and the US in the unskilled-to-skilled differentials reported in column 4. The interpretation of these figures is that, for example, in Canada the unskilled-to-skilled difference in wage bill gaps is 12.48 percentage points higher than in the US. Except for the UK, such differences are everywhere positive, indicating a relatively stronger gender gap in wage bill shares for the unskilled in all the other countries, relative to the US.

Columns 5 and 6 decompose triple differences in wage bill shares into a between- and a within-industry component, according to expression (7). The between-industry component is typically smaller than the within-industry component. However, there are some noteworthy country differences. The weight of the between-industry components is relatively high in Austria, Finland, Ireland and southern Europe (with the exception of Italy), where the total to be explained is largest (see column 4). Other countries where the between-industry component is also high are the UK and Germany, in which the total is instead negative or positive and small, respectively. In all other countries both the total difference relative to the US and its between-industry component are relatively small.

Finally column 8 reports the proportion of the within-industry component that can be explained by differences in the occupational structure across countries, according to expression (8). For the sake of cell size, we consider three broad occupation groups, and namely (1) managers, professionals and technical occupations; (2) middle-skill occupations, including clerical and sales occupations, skilled manual and laborer occupations; and (3) service occupations, including all jobs that involve helping, caring for, or assisting others. This is the three-fold occupational classification emphasized by Acemoglu and Autor (2011) in order to illustrate polarization of labor demand. Interestingly, we find that the weight of the between-industry component in the total to be explained (column 7) and the weight of the between-occupation component in the within-industry component (column 8) are positively correlated, and in particular the latter is positive and relatively larger in the UK, Canada, Germany, Belgium, Ireland and southern Europe. In other words, countries where the industry structure favors a certain labor input, relative to the US, tend to have an occupational structure that favors the same input, relative to the US.[14]

Table 3 provides more disaggregate evidence on our shift share analysis, by showing the role of specific industries to the between- and within-industry components of differences in wage bill shares (Table A4 in the Appendix reports the double differences, by skill group, on which the triple differences of Table 3 are based). The upper panel of the table shows that services play the strongest role in driving the between-industry component in most countries. In other words, between-industry differences in wage bill shares are mostly driven by international differences in the weight of services, where unskilled women are relatively over-represented. The lower panel in turn shows that all industries of the economy tend to contribute significantly to the within-industry component of differences in wage bill shares. That is, most industries in the US tend to be relatively more unskilled-women intensive than the corresponding industries in other countries.

As the broad service industry is the one that contributes the most to the between-industry component, in the upper panel of Table 4 we further disaggregate its contribution into six one-digit industries, namely (1) transport and storage; post and telecommunications; (2) wholesale and retail trade; hotels and restaurants; (3) financial intermediation and real estate; (4) education; (5) health and social work; (6) other services. It seems from these figures that the most important one-digit industry for the between-industry component is finance, insurance and real estate, followed by education and transportation. The role of the finance industry mostly stems from its contribution to the difference in the gender gap in labor demand for the skilled between each country and the US (see double differences by skill reported in Table A5). In other words, the finance sector is more intensive in the use of skilled men than skilled women, and given that its weight is larger in the US, this yields a lower gender

[14] Decompositions such as the one reported in Table 2 are based on the (arbitrary) choice of a reference case, which for us is the US. Of course one could run the same decomposition taking each country in turn as reference. As the triple difference bewteeen the US and most other countries is positive (column 3, Table 2), taking other countries as reference typically reduces the total to be explained (as one would be taking differences between countries that are more similar to each other than to the US). However, on average the weight of the between-industry component is very similar to that reported in Table 2, i.e. it does not seem that using the US as reference would bias our results towards finding a higher between-industry component.

gap in wage bill shares for the skilled in almost all countries than in the US. This in turn delivers a highly positive unskilled-to-skilled difference. A similar argument holds for the education sector, although on a smaller scale. For the transportation (and post and telecommunication) industry it is instead its role on the unskilled gender gap in wage bill shares that matters the most, as this industry is relatively smaller in the US, and it employs relatively fewer unskilled women than men (see again double differences reported in Table A5). Moving to the within-industry component in the lower panel, one can detect an important contribution coming from all 1-digit service industries except education and health. This is the case because transportation, trade, finance and other services are all relatively more unskilled-women intensive in the US than elsewhere.

A potential drawback of our simple educational classification is that it is based on definitions of qualifications that may not be completely comparable across countries, and also delivers relative group sizes that vary widely across countries. Thus we perform a robustness test based on an alternative definition of skills. We first estimate country level wage regressions for males and females separately, controlling for age and its square, education dummies, a marital dummy and year dummies, and use the resulting wage predictions as human capital indicators. The main difference with respect to the previous classification is that age and marital status are considered as further determinants of an individual's human capital, and that the predicted human capital level is continuous rather than discrete. We then construct skill categories by classifying as skilled those with predicted human capital levels in the top tercile of their gender-country specific distribution of predicted wages, and unskilled those in the two bottom terciles. Both raw wage gaps across skills and countries and the results of the shift share decomposition obtained with this alternative definition of skills (here not reported) are very close to those based on educational attainment categories.

In a further robustness check, we also control for occupation (three categories, as described above) in wage regressions, and then again define as skilled those with predicted wages in the top tercile. The resulting between-industry component of wage bill share differences turns out to be larger than that reported in Table 3, consistent with considerable sorting of occupations across industries so that, say, in countries where services are relatively more important, there is relatively higher demand for service occupations. In particular, we find that the relatively large contribution of the finance industry to the between industry component is now driven by gender differences among *both the skilled and the unskilled*. In other words, men tend to be over-represented in high occupations in finance (like analysts and higher occupations), while women tend to be over-represented in low occupations (like bank clerks). This generates a high unskilled-to-skilled difference in gender differentials in labor demand.

6.2 A model-based decomposition of the gender bias in labor demand

We have shown in Section 5 that the components of the shift-share analysis can be used to assess the extent to which the variation in the male bias in labor demand may be driven by cross-country differences in labor input intensities within industries (β_{ij}), or differences in product demand across industries with different input intensities (θ_j).

The results of this decomposition are reported in Table 5. Column 1 reports the triple difference in log wage bill shares, described in expression (12). Column 2 reports its between industry component (obtained using expression (13)), and column 3 reports the ratio between the two (x100), representing the weight of the between-industry component in the total to be explained. This decomposition corresponds to the Cobb-Douglas case, and is conceptually similar to the simple share analysis reported in Table 2, with the key difference that here we are decomposing *log,* as opposed to *absolute*, wage bill differences, as implied by the CES model for labor demand.

The results are qualitatively similar to those reported in Table 2. The notable exception is that, comparing column 4 in Table 2 to column 1 in Table 5, the sign of the triple difference in wage bill shares switches from positive to negative for Germany and the Netherlands, as we move from absolute to log differences. However, the sign of the between-industry component in column 2 of Table 5 is unchanged from Table 2 for all countries, and its relative weight in the triple difference in labor demand tends to be higher than in the shift-share analysis.

The rest of the Table reports decomposition results for the case in which S_j and U_j are CES aggregators of male and female labor inputs, with $\sigma = 2.5$. This extension is important as the few empirical studies in this area have consistently found values of the male-female elasticity of substitution greater than 1. Hamermesh (1993) reviews two such studies that report values of the male-female elasticity of substitution of 2 and 2.3 for the UK and Australia, respectively (Layard, 1983; Lewis, 1985). More recently, Weinberg (2000) obtains an estimate for this parameter for the US of 2.4, which is remarkably similar to the values obtained for Australia and the UK, and Acemoglu, Autor and Lyle (2004) obtain a slightly higher estimate of about 3. Given this range of estimates, we choose to report results based on $\sigma = 2.5$, which roughly coincides with the mean of existing estimates.

As equation (13) implies, the between-industry component does not vary with σ, which is what we empirically observe comparing columns 2 and 5 of Table 5. As the total difference to be explained declines with σ (see equation (15)), the relative importance of the between-industry component in the total variation in labor demand increases with σ. In particular, adopting a value for σ of 2.5, we find that the between-industry component explains about half or more of the variation in labor demand everywhere except Canada, Germany, Belgium and Spain. Overall, the weight of the between-industry component tends to be higher for countries in which the total to be explained is higher, i.e. the values reported in columns 4 and 6 are positively correlated.

A very stylized way to provide a quantitative assessment of the importance of the between-industry component of labor demand for the observed variation in gender gaps consists in going back to our simple scatter plot of Figure 5, and asking what sort of relationship between the unskilled-to-skilled wage gap and the corresponding hours gap one would observe in equilibrium, having corrected wage and hours gaps for the between-industry component of labor demand obtained in Table 5.

To provide an answer to this question, we would need to close our simple labor demand model summarized in equation (5) by introducing a labor supply relationship. Let's consider the simplest labor supply model, in which hours of work respond to wages with a common elasticity $\eta > 0$:

$$\Delta w_U - \Delta w_S = (\delta_U - \delta_S) + \frac{1}{\eta}(\Delta h_U - \Delta h_S), \tag{16}$$

where the δ's are skill-specific supply shifters. Combining (5) and (16) gives the following equilibrium conditions:

$$\Delta w_U - \Delta w_S = \frac{\sigma}{\sigma+\eta}\left(\widetilde{\beta}_U - \widetilde{\beta}_S\right) - \frac{\eta}{\sigma+\eta}(\delta_U - \delta_S) \tag{17}$$

$$\Delta h_U - \Delta h_S = \frac{\sigma\eta}{\sigma+\eta}\left[\left(\widetilde{\beta}_U - \widetilde{\beta}_S\right) - (\delta_U - \delta_S)\right]. \tag{18}$$

Adjusted triple differences in wages and hours are obtained from (17) and (18) as:

$$\Delta_C(\Delta w_U - \Delta w_S) - \frac{\sigma}{\sigma+\eta}\Delta_C\left(\widetilde{\beta}_U^{between} - \widetilde{\beta}_S^{between}\right) \tag{19}$$

$$\Delta_C(\Delta h_U - \Delta h_S) - \frac{\sigma\eta}{\sigma+\eta}\Delta_C\left(\widetilde{\beta}_U^{between} - \widetilde{\beta}_S^{between}\right), \tag{20}$$

where $\Delta_C \widetilde{\beta}_i^{between}$ is given by equation (13).[15]

In order to adjust wage and hours gaps for the between-industry component of labor demand differences, we thus need estimates for both labor demand and labor supply elasticities. Labor supply elasticities are typically much smaller than our conjectured labor demand elasticity of 2.5. For men, Pencavel (1986) reports estimated elasticities of labor supply that are very close to zero, if not negative. For women, elasticities are significantly higher (Killingsworth and Heckman, 1986), but typically below 1.

In the limiting case $\eta = 0$, hours gaps would be unaffected by demand differences, and adjusted wage gaps would be simply $\Delta_C (\Delta w_U - \Delta w_S) - \Delta_C \left(\widetilde{\beta}_U^{between} - \widetilde{\beta}_S^{between} \right)$. We plot these adjusted wage gaps against hours gaps in Figure 6, and note that the slope of the new fitted line equals -0.14. Recall that the corresponding relationship between actual gaps was essentially flat (see Figure 5), while the theoretical relationship that one should obtain in the absence of relative demand differences would have slope $-1/\sigma = -.4$. This implies that between-industry demand differences explain roughly one third (0.14/0.4) of the observed variation of wage and hours gaps. This proportion falls slightly to 30% if one assumes $\eta = 0.5$ (and adjusts wage *and* hours gaps accordingly), and to about 25% if one raises η further to 1. The importance of the between-industry component is thus not too sensitive to the assumed value of η, and it remains quantitatively important even for values of η close to 1, which we tend to consider as a realistic upper bound for labor supply elasticities.

While we have no direct evidence on the forces driving differences in the industry structure across countries, an explanation that has often been put forward is based on differences in the rate of marketization of activities that can be both performed in the market or within the household, like childcare, elderly care, cooking, house repairs, gardening etc. If outsourced to the market, all these activities would be part of the broad service sector. Freeman and Schettkat (2005) provide rich evidence on the marketization hypothesis, based on both time-use data and expenditure data across countries, and conclude that this hypothesis contributes substantially to the hours gap across the Atlantic. In a similar vein, Rogerson (2008) relates the relative poor performance of continental EU labor markets to a relatively under-marketized service industry. Marketization of services can in turn be hindered in continental Europe by higher tax rates, which distort market-home substitution (see also Davis and Henkerson, 2005, for evidence from three low-skill service industries). Ngai and

[15]Incidentally, it should be noted that the simple framework above is no longer valid if supply elasticities are heterogenous.

Pissarides (2011) provide evidence on this mechanism for a number of OECD countries by showing that taxation and subsidies decrease and raise hours, respectively, in sectors that have close home substitutes. In particular, they emphasize that a framework with both taxation and welfare policy - which typically subsidizes production in health and social work - better explains variation in working hours between the US, continental Europe and Scandinavia than a model with taxes and generalized lump-sum transfers.

Using a tenfold industry classification, Table 4 above has shown that the between-industry component of differences in labor demand between each country and the US is positive for most service industries, which arguably include activities that can otherwise be performed in the household, like childcare (included in education), elderly care (included in health), food preparation, dress making, laundering/cleaning services etc. (included in trade) and various personal services (included in other services). Thus under-marketization of these activities in Europe is consistent with our results. As marketization may be correlated to both social norms and institutions, we turn to the institutional and cultural indicators discussed in Section 3 to investigate whether some of these country level characteristics is systematically related to the share of the (market) service industry. Table 6 reports partial correlations (together with their $p-$values) between the same variables considered in Table 1 and the share of the total wage bill accruing to services. The table clearly shows that none of the country indicators considered seems to be significantly correlated to the weight of services, except the overall tax wedge. In line with evidence presented by Rogerson (2008) and Ngai and Pissarides (2011), our results are consistent with the idea that a higher tax wedge is associated with a smaller service industry, which in turn depresses the labor market outcomes of demographic groups over-represented in services. The specific service industries that drive this negative correlation are finance and trade (results not reported).[16]

However, there are also elements of the evidence reported here that may not be explained by a simple "taxation and marketization" hypothesis, as we noted in Table 4 the substantial contribution of the finance industry to the between-industry component of differences in labor demand, and arguably this sector has no large counterpart in home production. There are thus important remaining differences

[16] Our results could interestingly relate to the findings of Blau and Kahn (2003) on the driving forces of the international variation in the gender wage gap. While Blau and Kahn find that labor market rigidities such as wage floors tend to close the overall wage gap, the skill dimension emphasized in our paper reveals that the tax wedge may actually hurt unskilled women via its impact on the industry structure.

in the industry composition of consumer's demand, that cannot be explained by substitution between market and home production.

7 Further applications

Our analysis has shown that over the mid 1990s-early 2000s all countries in our sample (except for the UK) display a relatively stronger gender gap in wage bill shares for the unskilled, relative to the US. We also find that an important portion of this differential is explained by variation in the share of services. To strengthen the external validity of our analysis, we conclude the paper by investigating the evolution of these cross-country differences over time, and the corresponding relationships across US states.

7.1 Time series evidence

Micro data that are both harmonized across countries and going far back in time are not easily available. But for the purpose of our analysis it suffices to have information on labor inputs by gender, skill and industry, which we gather for 1971-2001 using the EU KLEMS database, and either censuses or labor force surveys for countries not covered by the EU KLEMS. However, as wage bill shares by gender and skill are not available for all countries, the analysis of this section is based on shares in the hours bill. Appendix B gives details of these further data sources and measurement issues.

Table 7 reports gender gaps in hours worked and the corresponding shift share analysis over time. The structure of the Table is the same as in Table 2, except that here we report information for (up to) four points in time for each country.

We first observe that, for both skill groups, the gender gap in hours shares decreases over time in all countries, especially so in the US and Canada (columns 1 and 2). This finding is consistent with results obtained by Heathcote et al. (2010), who show that a large part of the increase in US women's labor force participation over the 1980s and the 1990s can be attributed to a gender biased demand shift. The most noteworthy finding, however, concerns the unskilled-to-skilled differential reported in column 3. In 1971, the gender differential in hours shares in the US is about 26 percentage points higher for the unskilled than for the skilled. By 1991 this double differential drops to approximately 5 percentage points, and stabilizes thereafter, showing convergence over time in skill-specific gender gaps. This tendency can also be detected for all other countries, although the double differential remains substantially higher in 2001 in Europe than in the US. In particular, it could be noted that in Italy, Spain and Greece (as well as the Netherlands) the double differential in 2001 is in the range of 20-25 percentage points, reaching values that are very similar to that recorded in the US in 1971.

Column 4 reports the usual triple differences, i.e. the difference for each value of column 3 and the corresponding US value, and column 5 provides their between-industry components. Note that the weight of the between-industry component declines over time in most countries, following the expansion of services, but remains relatively high at the end of the sample period in southern Europe. Interestingly, the size of services is growing in all countries during this period (column 6), although its level is at all points in time higher in the US than in southern Europe (see Rogerson, 2008, for a discussion on this point). Thus countries that were lagging behind the US in their process of structural transformation, also had slower convergence in gender gaps in labor demand across skills.

7.2 Differences across US States

One potential drawback of our analysis is the small number of observations, which is a byproduct of using harmonized cross-country data. In this sub-section we exploit the cross-state dimension of our US CPS sample to provide further support for our findings.

Figure 7 shows a strong, positive cross-state correlation between the unskilled-to-skilled gender wage gap and the corresponding gap in hours worked, and such relationship is robust to whether one uses gaps in total hours or in hours per head. This is not surprising insofar the variation in the educational attainment of the population across US states (and in labor force participation of genders and skills) is much smaller than across our country sample.

Table 8 reports results of the shift-share analysis of wage bill shares, using the US average as reference for triple differences, which are reported in column 4.[17] We find that the between-industry component of triple differences in labor demand (column 5) is positively correlated to the total (column 4), with a correlation coefficient of 0.78. Moreover, the share of services in each state (column 6) is negatively correlated to both the unskilled-to-skilled gap in wage bills (column 3) and the between-industry component of labor demand differences (column 5). The correlation coefficients are equal to -0.29 and -0.46, respectively. The interpretation is that unskilled women

[17] The model-based decomposition delivers similar results. We discuss the shift share analysis here for consistency with the time series analysis above.

have the worst relative labor market outcomes in states where the service sector is less developed, and the weight of services is a key determinant of the between-industry component of labor demand differences.

All in all, the results of this subsection on historical trends and differences across US states confirm our findings about the nature of relative demand differences in a cross-section of countries.

8 Conclusions

This paper uncovers a strong, positive correlation between the unskilled-to-skilled wage gap and the corresponding gap in hours per head across countries, thus pointing at significant (net) demand forces shaping gender differences in labor market outcomes across skills. Of course, when cross-country differences are considered, one should also allow for the role of institutions and/or social norms, that would differently affect the labor supply prospects of various skill groups in different countries, but we provide some evidence that neither of them seem to wash away or even dampen the observed correlation between wage and hours gaps.

Our findings point to a lack of demand as the main cause for the dismal labor market outcomes of less-skilled women in some of the countries in our sample. Moreover, when we decompose such demand differences into a between- and within-industry component, we find that both play important roles. The within-industry component is explained by the fact that most sectors in the US tend to be more unskilled-women intensive than in the majority of other countries. The between-industry component is instead explained by the larger share of services in the US, as the relative demand for unskilled women is higher in services than in other sectors of the economy. In particular, for realistic values of the elasticity of substitution between male and female labor inputs, the between-industry component explains about half or more of the variation in labor demand in all countries in the sample except Canada, Germany, Belgium and Spain. Finally, adjusting gender gaps across countries for the between-industry component of labor demand explains between one quarter and one third of the comovement between wage and hours gaps.

Appendix A: Multisector model of labor demand

A1. The Cobb-Douglas case

In a multisector model, equations (2) and (3) can be re-written as

$$S_j = [\beta_{Sj} \left(B_{MSj} M_{Sj}\right)^{\rho_S} + (1-\beta_{Sj}) \left(B_{FSj} F_{Sj}\right)^{\rho_S}]^{1/\rho_S} \tag{21}$$

and

$$U_j = [\beta_{Uj} \left(B_{MUj} M_{Uj}\right)^{\rho_U} + (1-\beta_{Uj}) \left(B_{FUj} F_{Uj}\right)^{\rho_U}]^{1/\rho_U}, \tag{22}$$

where the technology parameters β_{ij}, B_{Mij} and B_{Fij}, $i = S, U$, are industry-specific, while the elasticities of substitution $\sigma_i = 1/(1-\rho_i)$ are kept constant.

Under perfect competition in the labor market, all inputs are paid their marginal productivity, thus male wages for skill group i in industry j are given by:

$$W_{Mij} = P_j \frac{\partial Q_j}{\partial M_{ij}} = \theta_j Q_j^{1/\sigma-1} \alpha M_{ij}^{1/\sigma_i - 1/\sigma} \beta_{ij} B_{Mij}^{1-1/\sigma_i} M_{ij}^{-1/\sigma_i}, \tag{23}$$

after normalizing $Q_R = 1$.

We assume further a Cobb-Douglas economy with $\overline{\sigma} = \sigma_S = \sigma_U = 1$, which implies

$$W_{Mi} = \frac{\alpha \theta_j \beta_{ij}}{M_{ij}}, \tag{24}$$

after imposing $W_{Mij} = W_{Mi}$ due to perfect mobility of labor across industries.

Summing up across industries implies $W_{Mi} \sum_j M_{ij} = \alpha \sum_j \theta_j \beta_{ij}$, which can be solved for W_{Mi} :

$$W_{Mi} = \frac{\alpha \sum_j \theta_j \beta_{ij}}{M_i}. \tag{25}$$

Combining (25) with a similar expression for female wages delivers the following gender wage gap for skill group i :

$$\Delta w_i = \widetilde{\beta}_i - \Delta h_i, \tag{26}$$

with

$$\widetilde{\beta}_i = \ln \left(\frac{\sum_j \beta_{ij} \theta_j}{\sum_j (1-\beta_{ij}) \theta_j} \right), \tag{27}$$

which coincides with expression (11) in the text.

We next evaluate the total cross-country differential of expression (27):

$$\Delta_C\widetilde{\beta}_i = \frac{\sum_j \beta_{ijC}\Delta_C\theta_j + \sum_j \theta_{jC}\Delta_C\beta_{ij}}{y_{MiC}} - \frac{\sum_j \left(1-\beta_{ijC}\right)\Delta_C\theta_j + \sum_j \theta_{jC}\Delta_C\beta_{ij}}{y_{FiC}}, \quad (28)$$

where $y_{MiC} = \sum_j \beta_{ijC}\theta_{jC}$ and $y_{FiC} = \sum_j (1-\beta_{ijC})\theta_{jC}$.

Rearranging, we obtain $\Delta_C\widetilde{\beta}_i = \Delta_C\widetilde{\beta}_i^{between} + \Delta_C\widetilde{\beta}_i^{within}$, where:

$$\begin{aligned}\Delta_C\widetilde{\beta}_i^{between} &= \frac{\sum_j \beta_{ijC}\Delta_C\theta_j}{y_{MiC}} - \frac{\sum_j \left(1-\beta_{ijC}\right)\Delta_C\theta_j}{y_{FiC}} \\ &= \frac{\sum_j \frac{Y_{MijC}}{Y_{jC}}\left(\frac{Y_{jC}}{Y_C}-\frac{Y_{j0}}{Y_0}\right)}{y_{MiC}} - \frac{\sum_j \frac{Y_{FijC}}{Y_{jC}}\left(\frac{Y_{jC}}{Y_C}-\frac{Y_{j0}}{Y_0}\right)}{y_{FiC}} \end{aligned} \quad (29)$$

and

$$\begin{aligned}\Delta_C\widetilde{\beta}_i^{within} &= \frac{\sum_j \theta_{jC}\Delta_C\beta_{ij}}{y_{MiC}} - \frac{\sum_j \theta_{jC}\Delta_C\beta_{ij}}{y_{FiC}} \\ &= \frac{\sum_j \frac{Y_{jC}}{Y_C}\left(\frac{Y_{MijC}}{Y_{jC}}-\frac{Y_{Mij0}}{Y_{j0}}\right)}{y_{MiC}} - \frac{\sum_j \frac{Y_{jC}}{Y_C}\left(\frac{Y_{FijC}}{Y_{jC}}-\frac{Y_{Fij0}}{Y_{j0}}\right)}{y_{FiC}} \end{aligned} \quad (30)$$

represents the between- and within-industry components, respectively.

For ease of exposition we have expressed the whole decomposition above in terms of infinitesimal changes in relevant variables. When applied to cross-country differences, these are approximated with the finite-change equivalent in equations (13) and (14). These two components sum up exactly to the total (28) only for infinitesimal changes in relevant magnitudes, while this decomposition is only approximate for finite changes. However, we noted in our data that the approximation involved was typically very small.

A2. The general CES case

Under the CES assumptions, equation (23) implies

$$W_{Mi} = \left(\frac{\alpha^\sigma \sum_j \theta_j^\sigma \beta_{ij}^\sigma B_{Mij}^{\sigma-1} M_{ij}^{1-\sigma}}{M_i}\right)^{1/\sigma}, \quad (31)$$

and the log gender wage gap for group i is equal to

$$\Delta w_i = \widetilde{\beta}_i - \frac{1}{\sigma}\Delta h_i, \quad (32)$$

where:

$$\widetilde{\beta}_i = \frac{1}{\sigma} \ln \left(\frac{\sum_j \theta_j^\sigma \beta_{ij}^\sigma B_{Mij}^{\sigma-1} M_{ij}^{1-\sigma}}{\sum_j \theta_j^\sigma \left(1-\beta_{ij}\right)^\sigma B_{Fij}^{\sigma-1} F_{ij}^{1-\sigma}} \right). \tag{33}$$

One can next differentiate $\widetilde{\beta}_i$ with respect to θ_j to obtain the between-industry component of cross-country differences in $\widetilde{\beta}_i$:

$$\Delta_C \widetilde{\beta}_i^{between} = \frac{\sum_j \beta_{ijC}^\sigma B_{MijC}^{\sigma-1} M_{ijC}^{1-\sigma} \theta_{jC}^{\sigma-1} \Delta_C \theta_j}{\sum_j \beta_{ijC}^\sigma B_{MijC}^{\sigma-1} M_{ijC}^{1-\sigma} \theta_{jC}^\sigma} - \frac{\sum_j \left(1-\beta_{ijC}\right)^\sigma B_{FijC}^{\sigma-1} F_{ijC}^{1-\sigma} \theta_{jC}^{\sigma-1} \Delta_C \theta_j}{\sum_j \left(1-\beta_{ijC}\right)^\sigma B_{FijC}^{\sigma-1} F_{ijC}^{1-\sigma} \theta_{jC}^\sigma}. \tag{34}$$

Using the first order condition for wages (i.e. (23) for male wages and the corresponding one for female wages), the β_{ijC}^σ and $\left(1-\beta_{ijC}\right)^\sigma$ terms can be solved for as

$$\beta_{ij}^\sigma = \frac{w_{Mi}^\sigma M_{ij}}{\alpha^\sigma \theta_j^\sigma B_{Mij}^{\sigma-1} M_{ij}^{1-\sigma}} \tag{35}$$

$$\left(1-\beta_{ij}\right)^\sigma = \frac{w_{Fi}^\sigma F_{ij}}{\alpha^\sigma \theta_j^\sigma B_{Fij}^{\sigma-1} F_{ij}^{1-\sigma}}. \tag{36}$$

Substituting (35) and (36) into (34) gives

$$\Delta_C \widetilde{\beta}_i^{between} = \frac{\sum_j w_{MiC} M_{ijC} \theta_{jC}^{-1} \Delta_C \theta_j}{w_{MiC} M_{iC}} - \frac{\sum_j w_{FiC} F_{ijC} \theta_{jC}^{-1} \Delta_C \theta_j}{w_{FiC} F_{iC}}.$$

Finally, using $\theta_{jC} = Y_{jC}/Y_C$ gives an expression which is identical to the Cobb-Douglas case (29), and can be approximated by (13).

Appendix B: EU-Klems data

Time series evidence on the evolution of labor demand for various labor inputs in the countries considered can be obtained using data from the EU KLEMS Growth and Productivity Accounts. This database includes industry-level measures of output and input growth, and derived variables such as multi-factor productivity, for several European countries, Canada, Australia, Japan and the US. Its coverage starts in 1970 and is annual thereafter.[18] Although these data have been constructed by using growth accounting as an organizing principle, they can be used for our application since they derive industry-level measures of labor inputs for 18 demographic groups

[18]The database is publicly available at http://www.euklems.net. See O'Mahony and Timmer (2009) for a description of the methodology employed in constructing the database.

defined by gender, skill (low, medium and high) and age (15 to 29, 30 to 49 and 50 plus). Unfortunately disaggregated labor input data are not available for some of the countries in our sample, and namely France, Greece, Ireland, and Portugal. Thus we augment the EU KLEMS sample using a variety of data sources. For Greece and Portugal we use IPUMS-International public-use Census data available for 1971-2001 and 1991-2001, respectively. For France we use data from the Enquete Emploi for the period 1981-2001. Unfortunately, we could not obtain publicly available data for Ireland so this country is not included in the time series analysis. Using these different data sources we build an unbalanced panel of 14 countries, containing harmonized industry-level measures of labor inputs of interest. Specifically, we show evidence for four data points, 1971, 1981, 1991 and 2001, or as subset of these years when not all data points are available for some country.

For all the countries in our sample we construct crosswalks by industry in order to replicate the tenfold industry classification as in our main cross-section analysis (crosswalks available upon request). In order to define skill groups consistently with the rest of our analysis, we define as skilled those in the high-skill group in the EU KLEMS, corresponding to college graduates, and as unskilled all the others (see Timmer et. al, 2007, for a detailed description of measurement issues in EU KLEMS). Similarly, for France, Greece and Portugal, we define as skilled those with college education.

While our main shift share analysis is based on wage bill shares, historical evidence that we obtain from the EU KLEMS is based on hours shares. This is because, as discussed in O'Mahony and Timmer (2009), imputation of missing wage information by demographic group in the EU KLEMS makes gender comparisons of wage bill shares unfeasible for some of the countries covered. Moreover, the IPUMS-International data available for Greece and Portugal do not include information on earnings.

References

[1] Acemoglu, Daron and David H. Autor. 2011. Skills, Tasks and Technologies: Implications for Employment and Earnings, in Orley Ashenfelter and David Card eds., *Handbook of Labor Economics* Vol. 4B, Amsterdam: Elsevier-North Holland, pp. 1043-1171.

[2] Acemoglu, Daron, Autor, David H. and David Lyle. 2004. Women, War, and Wages: The Effect of Female Labor Supply on the Wage Structure at Midcentury. *Journal of Political Economy* 112 (3), 497-551.

[3] Akbulut, Rahşan. 2011. Sectoral Changes and the Increase in Women's Labor Force Participation. *Macroeconomic Dynamics* 15: 240-264.

[4] Autor, David H., Katz, Lawrence F. and Alan B. Krueger. 1998. Computing Inequality: Have Computers Changed The Labor Market? *Quarterly Journal of Economics* 113 (4): 1169-1213.

[5] Autor, David H., Levy, Frank and Richard J. Murnane. 2003. The Skill Content of Recent Technological Change: An Empirical Investigation. *Quarterly Journal of Economics* 118 (4): 1279–1333.

[6] Autor, David H. and David Dorn. 2010. Inequality and Specialization: The Growth of Low-Skill Service Jobs in the United States. NBER Working Paper No. 15150.

[7] Black, Sandra E., and Alexandra Spitz-Oener. 2009. Explaining Women's Success: Technological Change and the Skill Content of Women's Work. *Review of Economics and Statistics* 92 (1), 187-194.

[8] Blau, Francine D., and Lawrence M. Kahn. 1996. Wage Structure and Gender Earnings Differentials: An International Comparison. *Economica* 63: 29-62.

[9] Blau, Francine D., and Lawrence M. Kahn. 2003. Understanding International Differences in the Gender Pay Gap. *Journal of Labor Economics* 21: 106–144.

[10] Blau, Francine D., and Lawrence M. Kahn. 2006. The US Gender Pay Gap in the 1990s: Slowing Convergence? *Industrial and Labor Relations Review* 60: 45-66.

[11] Bound, John, and George Johnson. 1992. Changes in the Structure of Wages in the 1980s: An Evaluation of Alternative Explanations. *American Economic Review* LXXXII: 371–392.

[12] Card, David. 2005. "Is the New Immigration Really So Bad?" *Economic Journal* 115: F300-F323.

[13] Cortes, Patricia. 2008. "The Effect of Low-Skilled Immigration on US Prices: Evidence from CPI Data," *Journal of Political Economy* 116, 381-422.

[14] Cortes, Patricia and Jose Tessada. 2011. "Low-skilled Immigration and the Labor Supply of Highly Educated Women", mimeo.

[15] Davis, Steven J. and Magnus Henkerson. 2005. Tax Effects on Work Activity, Industry Mix and Shadow Economy Size: Evidence from Rich Country Comparisons. In Ramon Gómez-Salvador, Ana Lamo, Barbara Petrongolo, Melanie Ward and Etienne Wasmer (eds.) *Labour Supply and Incentives to Work In Europe*. Aldershot: Edward Elgar.

[16] Dumont, Jean Christophe, Gilles Spielvogel and Sarah Windmayer. 2010. "International Migrants in Developed, Emerging and Developing Countries: An Extended Profile", OECD Social, Employment and Migration WP No. 114. www.oecd.org/els/workingpapers.

[17] Fortin, Nicole M. 2005. Gender Role Attitudes and the Labour Market Outcomes of Women Across OECD Countries. *Oxford Review of Economic Policy* 21: 416-438.

[18] Freeman, Richard B. and Ronald Schettkat. 2005. Marketization of Household Production and the EU-US Gap in Work. *Economic Policy* 20: 6-50.

[19] Fuchs, Victor R. 1968. *The Service Economy*. National Bureau of Economic Research, Inc.

[20] Goldin, Claudia. 1995. The U-Shaped Female Labor Force Function in Economic Development and Economic History.In T. P. Schultz, ed., *Investment in Women's Human Capital and Economic Development*, pp. 61-90.

[21] Goldin, Claudia. 2006. The Quiet Revolution That Transformed Women's Employment, Education, and Family, Ely Lecture, in *American Economic Review, Papers and Proceedings* 96: 1-21.

[22] Goos, Maarten, and Alan Manning. 2007. Lousy and Lovely Jobs: The Rising Polarization of Work in Britain. *Review of Economics and Statistics* 89 (1): 118–33.

[23] Goos, Maarten, Manning, Alan and Anna Salomons. 2010. Explaining Job Polarization in Europe: The Roles of Technology, Globalization and Institutions. CEP Discussion Paper No. 1026.

[24] Hamermesh, Daniel S. 1993. *Labor Demand* Princeton, NJ: Princeton University Press.

[25] Heathcote, Jonathan, Kjetil Storesletten and Gianluca Violante. 2010. The Macroeconomic Implications of Rising Wage Inequality in the United States. *Journal of Political Economy* 118 (4): 681-722.

[26] Katz Lawrence F. and Kevin M. Murphy. 1992. Changes in Relative Wages, 1963-1987: Supply and Demand Factors. *Quarterly Journal of Economics* 107 (1): 35-78.

[27] Katz, Lawrence F. and David H. Autor. 1999. Changes in the Wage Structure and Earnings Inequality. In Orley C. Ashenfelter and David Card, eds., *Handbook of Labor Economics* vol. 3A, Amsterdam: Elsevier Science, pp. 1463-1555.

[28] Killingworth, Mark R. and James J. Heckman. 1986. Female Labor Supply: A Survey. In Orley C. Ashenfelter and Richard Layard eds., *Handbook of Labor Economics* vol.1, Amsterdam: Elsevier Science, pp. 103-204.

[29] Layard, Richard. 1982. Youth Unemployment in Britain and the United States Compared, in Richard B. Freeman and David A. Wise, eds., *The Youth Labor Market Problem: Its Nature, Causes, and Consequences,* Chicago: University of Chicago Press, pp. 499-542.

[30] Lee, Donghoon and Ken Wolpin. 2006. Intersectoral Labor Mobility and the Growth of the Service Sector. *Econometrica* 74: 1-46.

[31] Lewis, Philip E. T. 1985. Substitution Between Young and Adult Workers in Australia. *Australian Economic Papers* 24: 115-126.

[32] Mulligan, Casey B., and Yona Rubinstein. 2008. Selection, Investment, and Women's Relative Wages Over Time. *Quarterly Journal of Economics* 123 (3): 1061-1110.

[33] Nickell, W. 2006. The CEP-OECD Institutions Data Set. CEP Discussion Paper No. 759.

[34] Ngai, L. Rachel and Christopher A. Pissarides. 2008. Trends in Hours and Economic Growth. *Review of Economic Dynamics* 11 (2): 239-256.

[35] Ngai, L. Rachel and Christopher A. Pissarides. 2011. Taxes, Social Subsidies and the Allocation of Work Time. *American Economic Journal - Macroeconomics* 3: 1-26.

[36] Olivetti, Claudia, and Barbara Petrongolo. 2008. Unequal Pay or Unequal Employment? A Cross-Country Analysis of Gender Gaps. *Journal of Labor Economics* 26: 621-654.

[37] O'Mahony, Mary and Marcel P. Timmer. 2009. Output, Input and Productivity Measures at the Industry Level: The EU KLEMS Database. *The Economic Journal* 119: F374–F403.

[38] Pencavel, John. 1986. Labor Supply of Men: A Survey. In Orley C. Ashenfelter and Richard Layard eds., *Handbook of Labor Economics* vol.1, Amsterdam: Elsevier Science, pp. 3-102.

[39] Rendall, Michelle. 2011. The Service Sector and Female Market Work: Europe vs. US. University of Zurich, mimeo.

[40] Rogerson, Richard. 2007. Taxation and Market Work: Is Scandinavia an Outlier? *Economic Theory* 32: 59-85.

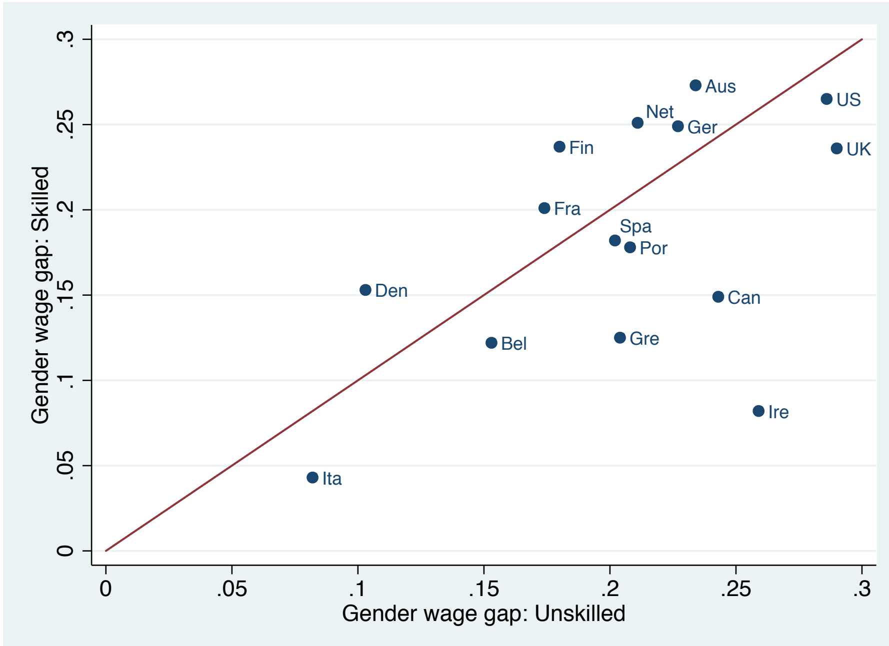
[41] Rogerson, Richard. 2008. Structural Transformation and the Deterioration of European Labor Markets. *Journal of Political Economy* 166: 235-258.

[42] Timmer, Marcel P., O'Mahony, Mary and Bart van Ark. 2007. The EU KLEMS Growth and Productivity Accounts: An Overview. Available at *www.euklems.net*

[43] United Nations. 2009. UN Millennium Development Goals Report. New York: United Nations.

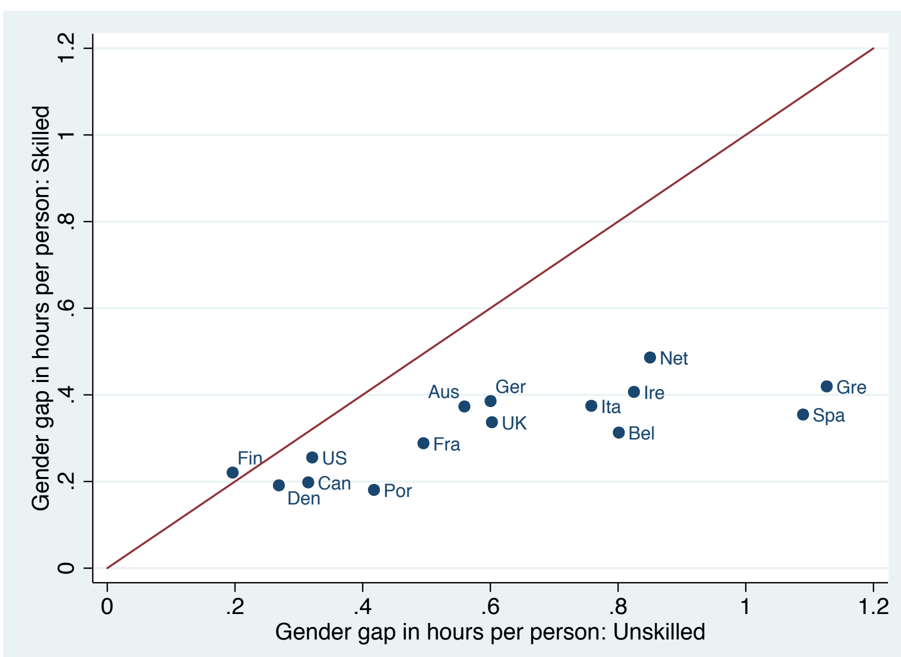
[44] Weinberg, Bruce A. 2000. Computer Use and the Demand for Female Workers. *Industrial and Labor Relations Review* 53: 290-308.

Figure 1
Gender gaps in (log) hourly wages by educational attainment



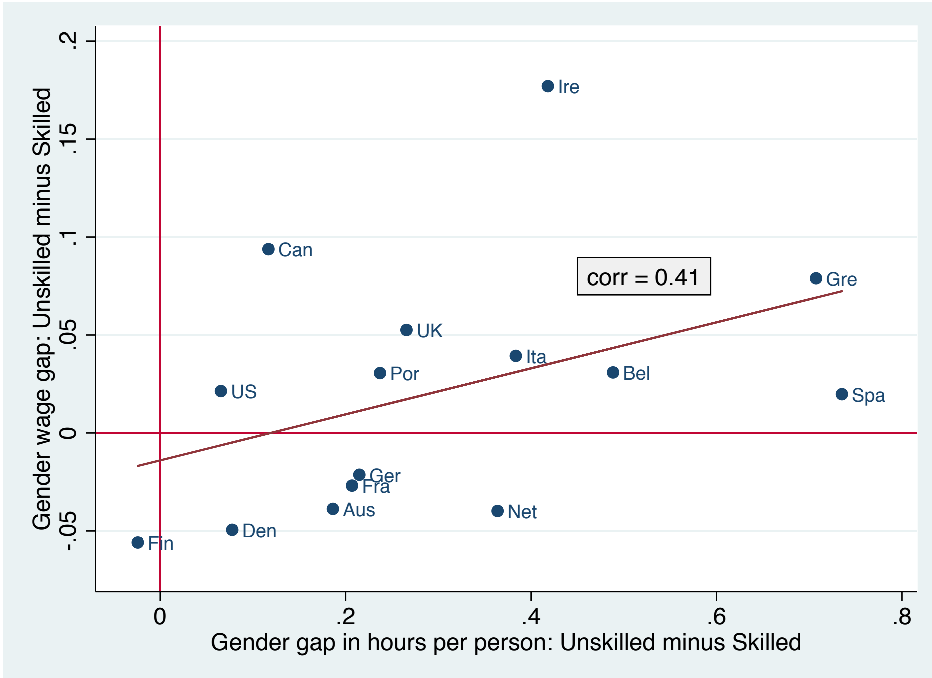
Notes. The skilled are those with a college degree; the unskilled are all others. Values displayed are coefficients on a male dummy from log wage regressions by country and education, which control for gender and year effects, using population weights. All estimates are significant at the 1% level. The straight line is the 45 degree line. Sample: men and women aged 25-54, excluding military, students, and self-employed. Sample period: 1994-2001, except for Canada (1997-2004), Finland (1996-2001) and Austria (1995-2001). Source: CPS, Canadian LFS, and ECHPS.

Figure 2
Gender gaps in (log) hours per person by educational attainment



Notes. Values displayed are gender differences in log(hours/population) by country and skill, using population weights. The straight line is the 45 degree line. See notes to Figure 1 for samples and source.

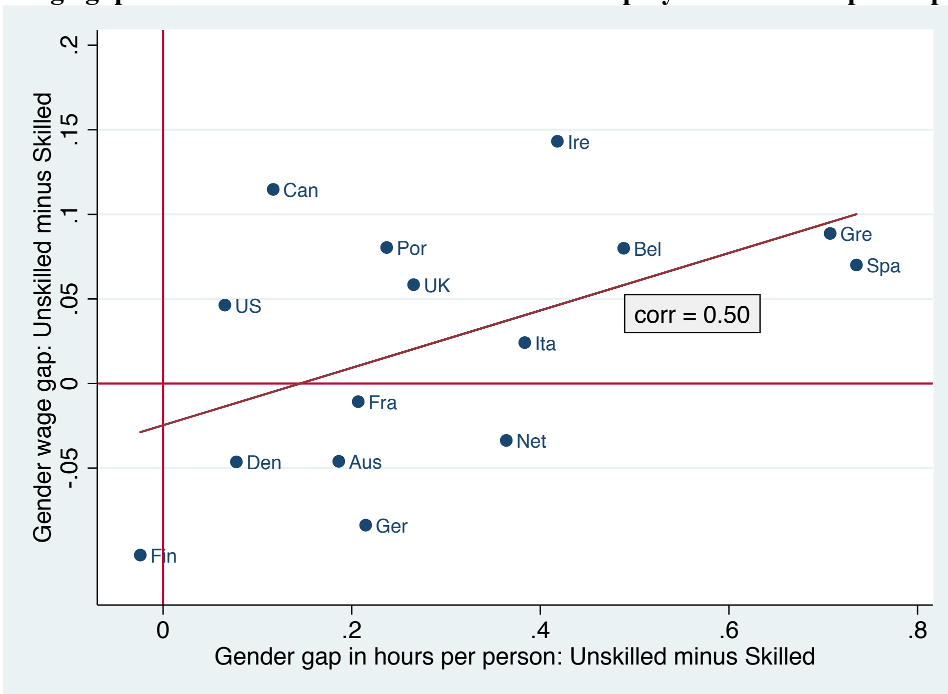
Figure 3
Gender gaps in wages and hours per person:
Unskilled-to-skilled differences.



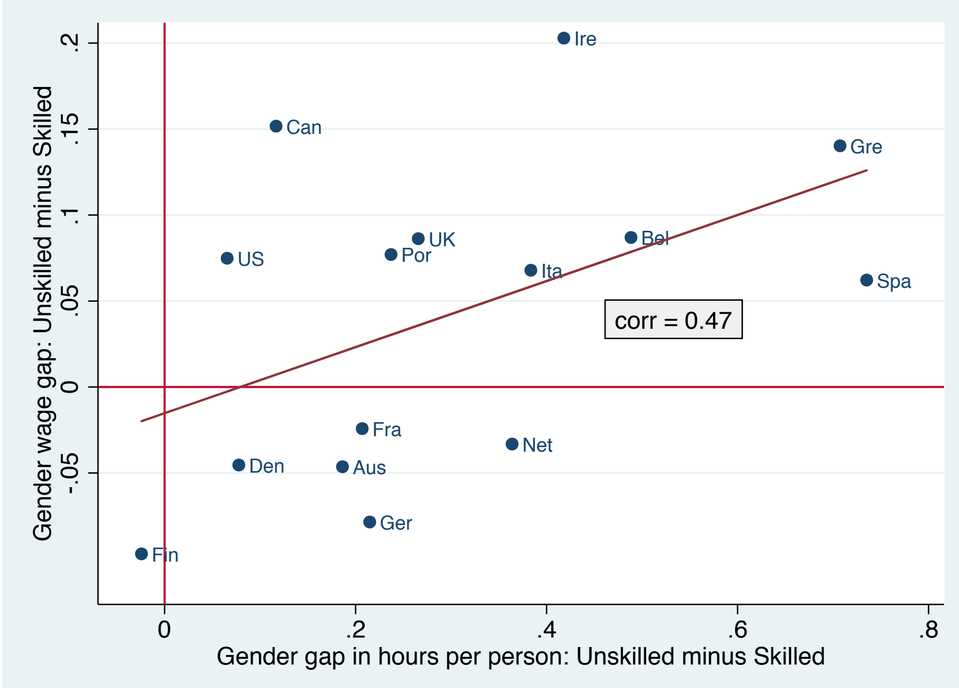
Notes. Wage and hours gaps are defined in notes to Figures 1 and 2, respectively.

Figure 4
Unskilled-to-skilled differences in gender gaps in wages and hours per person:
The role of selection

Panel A: Wage gaps corrected for selection based on unemployed versus nonparticipant status

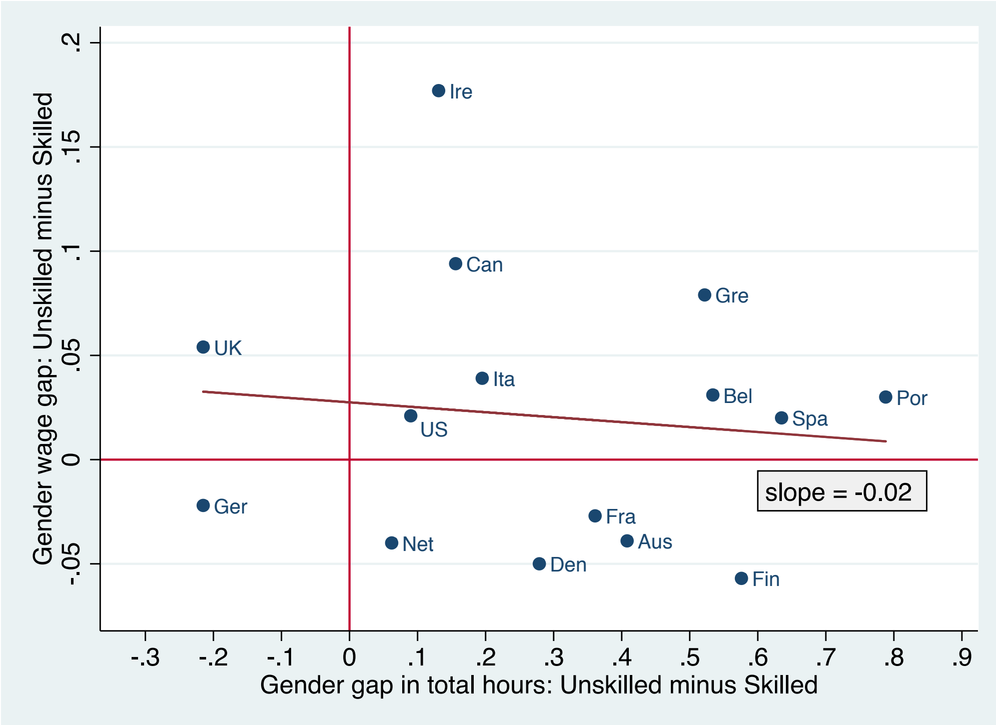


Panel B: Wage gaps corrected for selection based on quartile of spouse income



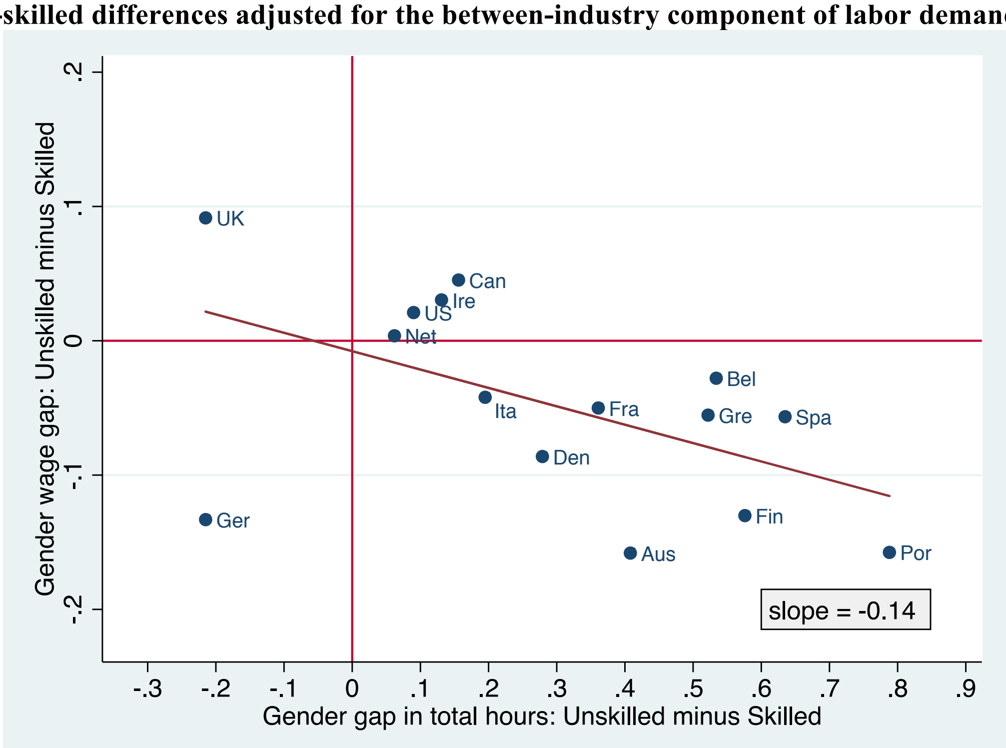
Notes. The procedure to obtain selection corrected wage gaps is described in Section 3. Gaps in hours per person are defined in notes to Figure 2. See notes to Figure 1 for samples and sources.

Figure 5
Gender gaps in wages and total hours:
Unskilled-to-skilled differences.



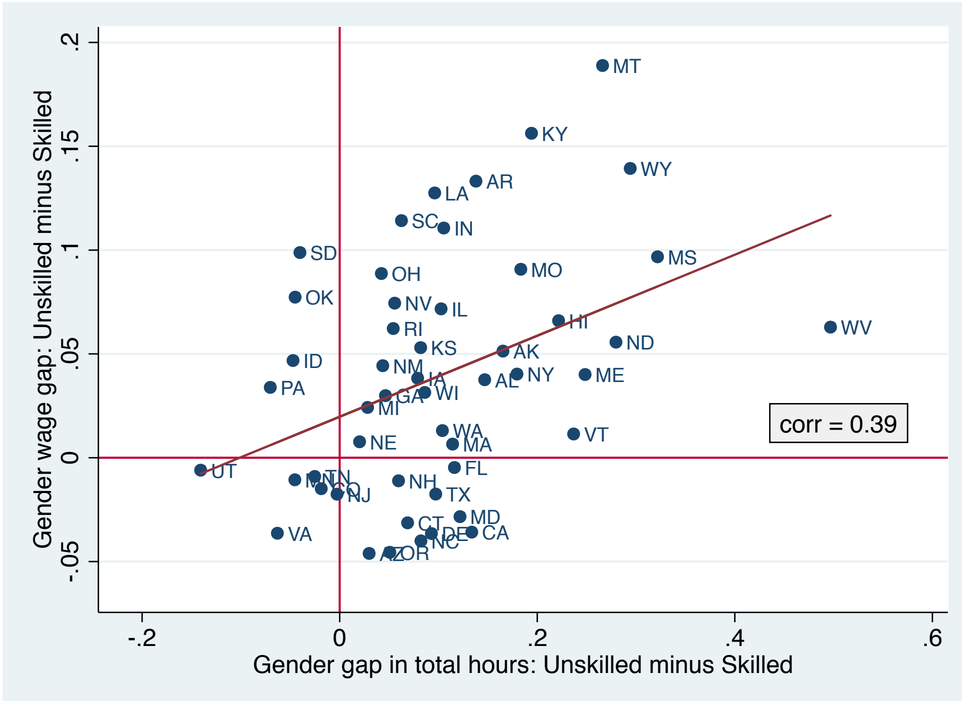
Notes. Wage gaps are defined in notes to Figures 1. Hours gaps are gender differences in log(total hours) by country and skill, using population weights.

Figure 6
Gender gaps in wages and total hours:
Unskilled-to-skilled differences adjusted for the between-industry component of labor demand differences.



Notes. Adjusted wage gaps are obtained from equation (19) in the text. Hours gaps are defined in notes to Figure 5.

Figure 7
Gender gaps in wages and total hours across US states:
Unskilled-to-skilled differences.



Notes. Wage and hours gaps are defined in notes to Figures 1 and 2. See notes to Figure 1 for details, samples and sources.

Table 1
Unskilled-to-skilled difference in gender gaps across countries: Partial correlations.

	1	2	3	4	5	6	7	8	9	10	11	12
Partial correlation [p-value]	0.410 [0.072]	0.331 [0.097]	0.370 [0.105]	0.303 [0.314]	0.482 [0.116]	0.418 [0.087]	0.408 [0.081]	0.658 [0.080]	0.595 [0.023]	0.598 [0.038]	-0.260 [0.231]	0.301 [0.220]
R-squared	0.168	0.511	0.178	0.478	0.282	0.169	0.168	0.354	0.447	0.424	0.675	0.260
Observations	15	15	15	14	14	15	15	15	15	15	15	14
						Attitudes about gender roles:				Wage bill shares in:		
Other controls		Maternity Leave	Marginal Tax Rate, Second Earner	Tax Wedge	EPL	Scarce Jobs (Women)	Scarce Jobs (Men)	Housewife (Women)	Housewife (Men)	Primary; Manuf; Constr.	Six service industries	ICT share

Notes. The Table reports partial correlations and p-values between the unskilled-to-skilled wage gap and the unskilled-to-skilled hours gap, controlling for other factors in turn. Wage and hours gaps are defined in notes to Figures 1 and 2, respectively. The R^2 figures come from the corresponding regressions. Other controls. Column (2): Maternity leave in weeks. Source: OECD Family Database, Table PF2.1.A, available at: http://www.oecd.org/document/4/0,3343,en_2649_34819_37836996_1_1_1_1,00.html. Reference year: 2006. Column (3): Marginal income tax rate for the spouse of a two-earner married family with 2 children in which the head earns 100% of the average gross wage (APW) and the spouse earns 33% of the APW. Source: Column 6, Table 7 in OECD Taxing Wages 2000-2001. Available at http://www.oecd.org/document/34/0,3746,en_2649_34897_44993442_1_1_1_1,00.html. Reference year: 2000. Columns (4) and (5): Average Tax Wedge and Employment Protection Legislation indicator for regular work. Source: Nickell (2006). Reference year: 2000. The average tax wedge is computed by adding (a) the average tax rates from OECD Taxing Wages Statistics including employers' social security contributions and (b) the average consumption tax rate ((Indirect taxes - subsidies) ÷ consumption) from OECD National Accounts. Columns (6) and (7): Attitudes toward gender roles, measured as mean response in World Value Survey to the statement `*When jobs are scarce, men should have more right to a job than women'* (0-1 scale: 0 indicates no agreement with the statement, 1 indicates complete agreement with the statement). Women's views in Column 5; Men's views in Column 6. Columns (8) and (9): Attitudes toward gender roles measured as mean response in World Value Survey to the statement `*Being a housewife is just as fulfilling as working for pay*' (0-1 scale: 0 indicates no agreement with the statement, 1 indicates complete agreement with the statement). Women's views in Column 7; Men's views in Column 8. Source: Fortin (2005, Appendix Table 2, Columns 1,3,9,11). Sample period: Average over 1990-1993, 1995-1997, and 1999-2001. Columns (10) and (11): Wage bill shares obtained on our main sample (three extra regressors in Column 9, six extra regressors in column 10, referring to transport, storage and post and telecommunications; wholesale and retail trade and hotels and restaurants; financial intermediation and real estate; education; health; other services. Column (12): IT capital share in total capital compensation. Source: EU Klems, March 2008 release (available at http://www.euklems.net/). In columns (4), (5) and (12) data for Greece are not available.

Table 2
Shift share decomposition of differences in wage bill shares (x100)

	1	2	3	4	5	6	7	8
	Gender gaps in wage bill shares							
Countries	Unskilled	Skilled	Difference (1)-(2)	Cross-country difference	Between industry component	Within industry component	% between industry 100*(5)/(4)	% of within industry component that is between occupation
US	11.29	10.36	0.93	-	-	-	-	-
Canada	15.77	2.37	13.41	12.48	1.13	11.35	9.09	23.65
UK	9.58	15.44	-5.86	-6.79	-1.38	-5.41	20.31	36.82
Finland	12.42	-0.53	12.95	12.02	1.97	10.05	16.37	-28.47
Denmark	10.14	4.43	5.72	4.79	0.60	4.19	12.51	-38.40
Germany	18.00	12.48	5.52	4.59	3.62	0.98	78.72	22.10
Netherlands	24.35	11.81	12.55	11.62	-1.45	13.07	-12.48	-7.57
Belgium	15.80	5.64	10.17	9.24	0.56	8.68	6.04	23.97
Austria	30.42	2.82	27.60	26.67	3.88	22.79	14.54	6.29
Ireland	21.78	8.05	13.74	12.81	3.13	9.68	24.46	19.34
France	16.85	6.70	10.15	9.22	0.40	8.82	4.35	-20.28
Italy	26.09	3.68	22.41	21.49	1.88	19.61	8.74	17.56
Spain	27.15	10.19	16.96	16.04	2.05	13.99	12.79	15.20
Portugal	22.35	-2.17	24.52	23.59	4.76	18.83	20.19	10.53
Greece	24.67	7.78	16.89	15.97	3.12	12.84	19.57	29.85

Notes. Wage bill shares for the US are computed as shares of previous-year annual earnings, for Canada they are computed as shares of current weekly earnings and for European countries they are computed are shares of current monthly earnings. See notes to Figure 1 for samples and source. Decomposition based on equations (7) and (8) in the text.

Table 3
Further decomposition of triple differences in gender gaps in wage bill shares (×100) between each country and the US. Three broad industries.

	Total	Primary, Manuf. & Construct.	Services	Public Admin.
	1	2	3	4
Between component				
Canada	1.13	0.05	1.15	-0.06
UK	-1.38	-1.55	0.50	-0.33
Finland	1.97	-0.10	2.01	0.06
Denmark	0.60	-0.62	1.42	-0.21
Germany	3.62	1.66	1.92	0.04
Netherlands	-1.45	-1.51	-0.10	0.16
Belgium	0.56	-1.61	2.13	0.04
Austria	3.40	2.40	0.65	0.35
Ireland	3.13	-0.12	2.86	0.39
France	0.40	-0.94	1.36	-0.01
Italy	1.88	0.36	0.88	0.64
Spain	2.05	1.03	0.98	0.04
Portugal	4.76	1.92	1.86	0.99
Greece	3.12	-0.70	3.30	0.53
Within component				
Canada	11.35	10.57	0.17	0.61
UK	-5.41	-2.35	-2.37	-0.70
Finland	10.05	5.95	4.17	-0.06
Denmark	4.19	1.94	2.23	0.02
Germany	0.98	1.98	-2.37	1.37
Netherlands	13.07	8.43	2.77	1.87
Belgium	8.68	2.46	4.85	1.37
Austria	22.62	13.04	6.75	2.84
Ireland	9.68	6.20	0.69	2.79
France	8.82	4.74	2.89	1.19
Italy	19.61	10.68	5.30	3.63
Spain	13.99	3.99	8.60	1.40
Portugal	18.83	7.03	7.41	4.39
Greece	12.84	5.05	4.83	2.96

Notes. Figures represent the contribution of each broad industry to the shift-share analysis reported in Table 2. The primary sector includes: agriculture, hunting, forestry and fishing; mining and quarrying; electricity, gas and water supply.

Table 4
Further decomposition (II) of triple differences in gender gaps in wage bill shares (×100) between each country and the US. Detailed service industries.

	Total Services	Transport	Trade	Finance	Education	Health	Other
	1	2	3	4	5	6	7
Between component							
Canada	1.15	-0.06	-0.05	1.46	0.11	-0.33	0.01
UK	0.50	0.12	0.21	-0.09	0.14	0.00	0.12
Finland	2.01	0.69	0.15	1.07	0.08	0.05	-0.02
Denmark	1.42	0.08	-0.38	1.31	0.02	0.44	-0.03
Germany	1.92	0.01	0.13	1.77	-0.19	0.19	0.01
Netherlands	-0.10	0.56	-0.28	0.23	-0.01	-0.67	0.07
Belgium	2.13	0.24	0.04	0.77	1.11	0.05	-0.09
Austria	0.65	0.47	0.00	0.15	-0.23	0.26	0.00
Ireland	2.86	0.94	-0.06	1.51	0.43	0.01	0.03
France	1.36	0.34	-0.05	0.77	0.13	0.00	0.17
Italy	0.88	0.46	-0.45	0.93	0.04	-0.15	0.05
Spain	0.98	0.29	-0.10	0.68	0.18	-0.06	0.00
Portugal	1.86	0.13	-0.02	0.75	0.70	0.13	0.16
Greece	3.30	1.17	-0.03	1.58	0.47	0.10	0.00
Within component							
Canada	0.17	2.39	1.81	0.39	-1.20	-4.20	0.99
UK	-2.37	-0.62	-1.36	-0.06	-0.10	-0.15	-0.09
Finland	4.17	1.32	-0.43	2.37	-0.13	0.11	0.93
Denmark	2.23	-0.01	2.55	-1.97	-1.04	1.97	0.74
Germany	-2.37	1.16	-0.20	1.21	-1.55	-2.98	0.00
Netherlands	2.77	2.80	3.08	4.12	-3.61	-3.82	0.19
Belgium	4.85	1.71	0.41	1.39	0.34	0.49	0.53
Austria	6.75	3.47	0.89	6.53	-0.56	-4.41	0.82
Ireland	0.69	2.40	0.96	0.75	-0.86	-2.82	0.27
France	2.89	1.52	1.49	1.57	-0.88	-0.28	-0.53
Italy	5.30	3.20	2.68	4.04	-3.04	-2.79	1.21
Spain	8.60	1.00	2.63	4.37	-0.16	0.49	0.27
Portugal	7.41	1.33	3.59	4.47	0.18	-1.04	-1.12
Greece	4.83	1.40	2.29	1.90	-0.68	-0.77	0.69

Notes. Figures represent the contribution of each 1-digit service industry to the shift-share analysis reported in Table 2. See main text for the exact definition of industries.

Table 5
Model-based decomposition of the gender bias in labor demand (×100)

	σ=1			σ=2.5		
	1	2	3	4	5	6
	Triple diff in labor demand	Between industry compt.	(2)/(1) x100	Triple diff in labor demand	Between industry compt.	(2)/(1) x100
Canada	17.14	4.88	28.46	12.88	4.88	37.89
UK	-26.53	-3.75	14.12	-8.12	-3.75	46.15
Finland	44.76	7.32	16.34	15.63	7.32	46.81
Denmark	15.23	3.62	23.74	3.90	3.62	92.60
Germany	-34.99	11.12	-31.79	-16.98	11.12	-65.51
Netherlands	-9.75	-4.37	44.83	-7.76	-4.37	56.36
Belgium	43.79	5.89	13.45	17.07	5.89	34.50
Austria	26.09	11.91	45.66	6.57	11.91	181.40
Ireland	16.87	14.66	86.92	14.24	14.66	102.98
France	19.09	2.31	12.08	2.89	2.31	79.88
Italy	12.31	8.11	65.91	5.88	8.11	138.02
Spain	52.51	7.66	14.59	20.37	7.66	37.61
Portugal	71.54	18.76	26.22	28.93	18.76	64.83
Greece	49.12	13.44	27.36	23.22	13.44	57.90

Notes. Columns 1 reports triple differences in labor demand for the Cobb-Douglas case (see equation (12)), column 2 reports their between-industry component (see equation (13)), and column 3 reports the proportion of the total explained by the between-industry component. Column 4 reports triple differences in labor demand for the CES case with σ=2.5 (see equation (15)), column 5 reports their between-industry component (again given by equation (13)), and column 6 reports the proportion of the total explained by the between-industry component.

Table 6
Service wage bill shares, institutions and culture across countries

	Dependent variable: Service wage bill share							
	1	2	3	4	5	6	7	8
Partial Correlation	0.001	-0.001	-0.324	-0.021	-0.097	0.092	0.161	0.195
[p-value]	[0.274]	[0.264]	[0.005]	[0.168]	[0.561]	[0.322]	[0.252]	[0.142]
R-squared	0.04	0.076	0.452	0.163	0.023	0.068	0.131	0.147
Observations	15	15	15	14	15	15	15	15
					Attitudes about gender roles			
	Maternity Leave	Marginal Tax Rate, Second Earner	Tax Wedge	EPL	Scarce Jobs (Women)	Scarce Jobs (Men)	Housewife (Women)	Housewife (Men)

Notes. Service wage bill shares are obtained on our main sample. See notes to Table 1 for variable definitions and data sources.

Table 7
Shift share decomposition of differences in hour shares (x100) over the period 1971 to 2001

		1	2	3	4	5	6
Country	Year	Gender gaps in Hours Shares		Difference (1)-(2)	Cross-country difference	Between industry component	Service sector share
		Unskilled	Skilled				
USA	1971	33.67	7.69	25.98	.	.	52.87
	1981	19.82	9.1	10.72	.	.	57.30
	1991	12.6	6.99	5.61	.	.	63.29
	2001	10.55	5.19	5.36	.	.	67.57
Canada	1971	38.35	4.28	34.07	8.09	2.66	51.75
	1981	27.92	4.68	23.24	12.52	2.77	57.32
	1991	19.37	3.89	15.49	9.87	2.78	62.04
	2001	16.67	2.88	13.79	8.43	2.03	66.56
UK	1971	16.82	0.92	15.9	-10.08	5.63	45.33
	1981	16.98	3.09	13.89	3.16	4.83	52.86
	1991	8.54	3.72	4.82	-0.79	3.71	61.75
	2001	6.99	3.61	3.38	-1.98	1.05	68.66
Finland	1971	17.83	2.01	15.82	-10.15	15.70	37.23
	1981	11.67	2.16	9.51	-1.22	10.66	43.78
	1991	5.53	0.40	5.13	-0.49	6.53	52.32
	2001	8.84	-2.06	10.90	5.54	4.44	56.77
Denmark	1981	12.80	1.74	11.05	0.33	-2.45	59.16
	1991	7.96	1.81	6.15	0.54	-1.86	62.99
	2001	8.66	1.56	7.11	1.74	-1.42	65.92
Germany	1991	11.68	3.08	8.60	2.98	7.65	51.10
	2001	8.34	3.00	5.34	-0.02	3.12	60.44
Netherlands	1981	47.26	3.48	43.78	33.06	0.89	55.57
	1991	37.46	4.18	33.29	27.67	1.82	61.40
	2001	28.82	3.55	25.26	19.90	0.58	67.55
Belgium	1981	26.45	3.04	23.41	12.69	3.94	52.77
	1991	19.26	3.46	15.81	10.19	3.83	57.72
	2001	12.92	3.33	9.60	4.24	1.20	63.63
Austria	1981	17.12	1.97	15.15	4.43	4.88	55.52
	1991	15.41	2.71	12.70	7.08	2.95	64.16
	2001	14.96	1.81	13.16	7.79	2.32	66.75
France	1981	22.49	2.28	20.20	9.48	6.03	48.24
	1991	16.40	2.11	14.29	8.68	6.23	53.45
	2001	13.23	1.49	11.75	6.38	1.73	58.73
Italy	1971	36.94	1.56	35.37	9.40	11.05	34.62
	1981	34.09	1.85	32.24	21.52	8.81	44.16
	1991	26.58	1.94	24.64	19.03	6.18	55.15
	2001	21.69	1.67	20.02	14.66	4.49	60.30
Spain	1981	40.21	2.50	37.71	26.99	9.26	44.71
	1991	32.61	1.86	30.75	25.13	8.69	51.89
	2001	25.43	1.00	24.43	19.06	8.86	55.52
Portugal	1991	18.54	0.28	18.26	12.65	11.94	38.57
	2001	12.54	-1.88	14.42	9.06	8.82	49.86
Greece	1971	54.10	4.28	49.82	23.84	10.75	40.80
	1981	41.03	4.86	36.16	25.44	11.37	42.67
	1991	30.04	4.01	26.03	20.41	6.45	55.93
	2001	25.38	1.55	23.83	18.47	6.34	61.65

Notes : Data Sources: France: Enquete Emploi. Greece and Portugal: IPUMS-International.
All other countries: EU_KLEMS. See Appendix B for more details on samples and sources.

Table 8
Shift share decomposition of differences in wage bill shares (x100) across US states

	1	2	3	4	5	6
State	Gender gaps in wage bill shares		Difference	Cross-state differences	Between industry component	Service Sector Share
	Unskilled	Skilled	(1)-(2)	(3) - US Average		
Alabama	11.83	7.20	4.63	3.39	1.45	59.32
Alaska	15.91	8.66	7.26	6.02	2.66	57.97
Arizona	12.26	11.60	0.66	-0.57	0.79	64.22
Arkansas	12.64	4.12	8.52	7.28	2.11	61.35
California	12.74	11.36	1.38	0.15	-1.13	63.91
Colorado	10.27	14.40	-4.13	-5.36	-0.71	65.36
Connecticut	7.97	10.63	-2.66	-3.90	-2.58	66.40
Delaware	9.12	8.46	0.66	-0.57	-1.29	63.18
Florida	9.64	7.58	2.06	0.83	-0.71	72.41
Georgia	10.23	9.33	0.90	-0.34	-0.27	65.93
Hawaii	10.50	4.79	5.70	4.47	1.86	69.07
Idaho	14.84	12.82	2.01	0.78	2.48	57.55
Illinois	13.03	10.64	2.39	1.16	-0.79	63.28
Indiana	12.65	8.58	4.07	2.84	1.32	56.89
Iowa	8.50	9.50	-1.00	-2.24	0.00	61.80
Kansas	11.67	11.93	-0.27	-1.50	0.40	64.20
Kentucky	14.93	8.30	6.63	5.39	2.63	61.61
Louisiana	15.17	9.16	6.02	4.78	1.88	63.72
Maine	11.86	6.65	5.21	3.98	0.65	65.42
Maryland	6.40	6.83	-0.43	-1.66	-1.67	66.49
Massachusetts	9.04	12.44	-3.41	-4.64	-2.23	67.87
Michigan	14.69	13.11	1.58	0.34	0.41	54.58
Minnesota	8.01	15.33	-7.31	-8.55	-0.69	62.88
Mississippi	13.26	2.51	10.76	9.52	2.03	60.08
Missouri	12.16	6.62	5.54	4.30	0.99	62.33
Montana	17.70	4.86	12.84	11.61	2.75	62.23
Nebraska	10.84	12.02	-1.17	-2.41	0.01	68.40
Nevada	14.83	7.82	7.02	5.78	1.73	69.83
New Hampshire	11.08	15.20	-4.13	-5.36	-0.50	60.70
New Jersey	9.68	14.11	-4.43	-5.66	-3.19	68.49
New Mexico	2.37	6.44	-4.07	-5.30	-0.57	67.44
New York	10.28	8.38	1.91	0.67	-2.14	70.14
North Carolina	9.06	10.10	-1.04	-2.27	0.54	59.93
North Dakota	12.54	4.96	7.58	6.35	4.33	68.77
Ohio	12.92	11.32	1.60	0.36	-0.19	59.77
Oklahoma	12.59	12.00	0.59	-0.65	1.34	61.15
Oregon	10.42	12.24	-1.82	-3.06	1.32	57.46
Pennsylvania	9.32	13.69	-4.37	-5.60	-1.06	64.79
Rhode Island	7.42	6.97	0.44	-0.79	-2.10	66.45
South Carolina	10.88	6.56	4.32	3.09	1.71	57.91
South Dakota	8.80	9.75	-0.95	-2.18	1.52	67.90
Tennessee	10.41	9.48	0.94	-0.30	0.65	61.71
Texas	13.29	11.06	2.23	0.99	1.16	63.28
Utah	15.93	16.32	-0.39	-1.62	1.29	59.90
Vermont	12.38	8.50	3.88	2.64	1.25	61.45
Virginia	8.65	13.15	-4.49	-5.73	-2.72	61.91
Washington	13.08	11.91	1.17	-0.06	0.84	62.13
West Virginia	21.77	4.13	17.64	16.41	4.45	57.31
Wisconsin	13.52	11.53	1.98	0.75	1.00	56.30
Wyoming	21.28	7.33	13.94	12.71	7.97	55.51

Notes: Benchmark = USA. See notes to Table 2 for details, samples and sources.

Appendix Tables

Table A1
Distribution of Population by Educational Attainment

	Males			Females		
	Educ.= 1	Educ.= 2	Educ.= 3	Educ.= 1	Educ.= 2	Educ.= 3
US	0.065	0.233	0.166	0.068	0.275	0.193
Canada	0.095	0.297	0.076	0.093	0.349	0.089
UK	0.166	0.088	0.191	0.275	0.105	0.176
Finland	0.112	0.245	0.140	0.109	0.246	0.147
Denmark	0.093	0.217	0.158	0.092	0.193	0.247
Germany	0.085	0.215	0.190	0.095	0.192	0.224
Netherlands	0.084	0.274	0.121	0.121	0.308	0.093
Belgium	0.111	0.242	0.109	0.158	0.280	0.099
Austria	0.124	0.161	0.180	0.143	0.170	0.223
Ireland	0.060	0.382	0.040	0.136	0.333	0.050
France	0.194	0.154	0.089	0.241	0.234	0.088
Italy	0.140	0.211	0.120	0.180	0.203	0.147
Spain	0.212	0.187	0.048	0.282	0.220	0.050
Portugal	0.259	0.088	0.115	0.322	0.091	0.124
Greece	0.370	0.064	0.033	0.413	0.067	0.053

Notes. Educ.=1 includes individuals with less than upper secondary education; Educ.=2 includes individuals who have completed upper secondary education; Educ. =3 includes individuals who have completed college education or above. See notes to Fig. 1 for samples and sources.

Table A2
Wage bill shares of four demographic groups

	No college degree		College degree	
	Males	Females	Males	Females
US	0.297	0.184	0.311	0.207
Canada	0.452	0.139	0.294	0.115
UK	0.287	0.186	0.344	0.183
Finland	0.309	0.189	0.255	0.247
Denmark	0.310	0.202	0.268	0.220
Germany	0.436	0.248	0.221	0.095
Netherlands	0.469	0.212	0.222	0.096
Belgium	0.309	0.145	0.304	0.242
Austria	0.587	0.274	0.084	0.055
Ireland	0.438	0.209	0.219	0.134
France	0.384	0.210	0.237	0.169
Italy	0.550	0.285	0.101	0.064
Spain	0.416	0.141	0.277	0.167
Portugal	0.495	0.264	0.114	0.128
Greece	0.422	0.157	0.252	0.169

See notes to Figure 1 for samples and sources.

Table A3
Wage Bill Shares of Four Demographic Groups by Sector

	Primary & Utilities	Manuf.	Constr.	Transp., Storage, Comm.	Trade, Hotels, Rest.	Finance, Insurance, Real Est.	Educ.	Health	Other Services	Public Admin.
USA										
MU	0.539	0.414	0.718	0.456	0.375	0.164	0.056	0.057	0.198	0.282
FU	0.095	0.157	0.054	0.150	0.260	0.190	0.138	0.254	0.260	0.188
MS	0.288	0.332	0.197	0.285	0.252	0.427	0.281	0.243	0.280	0.343
FS	0.078	0.097	0.031	0.108	0.114	0.219	0.525	0.446	0.261	0.186
Sector Share	0.039	0.189	0.060	0.059	0.150	0.193	0.093	0.099	0.045	0.073
Canada										
MU	0.737	0.688	0.868	0.752	0.504	0.274	0.102	0.114	0.444	0.373
FU	0.114	0.175	0.072	0.169	0.375	0.384	0.187	0.628	0.312	0.288
MS	0.120	0.109	0.051	0.061	0.074	0.221	0.292	0.065	0.141	0.208
FS	0.029	0.028	0.009	0.017	0.047	0.121	0.418	0.193	0.103	0.132
Sector Share	0.067	0.182	0.046	0.057	0.138	0.128	0.104	0.116	0.068	0.094
UK										
MU	0.586	0.441	0.519	0.470	0.345	0.216	0.027	0.064	0.241	0.252
FU	0.113	0.145	0.045	0.148	0.299	0.170	0.114	0.328	0.260	0.202
MS	0.236	0.353	0.411	0.332	0.263	0.449	0.311	0.177	0.286	0.370
FS	0.065	0.060	0.025	0.051	0.093	0.165	0.548	0.430	0.214	0.176
Sector Share	0.005	0.230	0.037	0.073	0.121	0.197	0.100	0.099	0.032	0.106
Finland										
MU	0.528	0.507	0.845	0.551	0.294	0.193	0.059	0.035	0.194	0.174
FU	0.164	0.155	0.026	0.116	0.288	0.179	0.111	0.377	0.164	0.145
MS	0.219	0.226	0.111	0.230	0.240	0.366	0.314	0.118	0.264	0.392
FS	0.089	0.112	0.018	0.103	0.177	0.262	0.517	0.470	0.378	0.289
Sector Share	0.020	0.240	0.055	0.089	0.113	0.127	0.098	0.156	0.037	0.065
Denmark										
MU	0.656	0.484	0.665	0.498	0.477	0.168	0.058	0.068	0.305	0.192
FU	0.134	0.185	0.061	0.206	0.258	0.183	0.095	0.300	0.230	0.252
MS	0.191	0.246	0.238	0.230	0.152	0.493	0.379	0.120	0.246	0.278
FS	0.019	0.085	0.036	0.066	0.113	0.156	0.468	0.513	0.219	0.278
Sector Share	0.014	0.190	0.063	0.064	0.101	0.149	0.096	0.151	0.067	0.106
Germany										
MU	0.471	0.530	0.720	0.629	0.420	0.340	0.051	0.132	0.339	0.413
FU	0.197	0.170	0.058	0.169	0.384	0.312	0.151	0.528	0.277	0.256
MS	0.244	0.273	0.190	0.165	0.127	0.261	0.371	0.123	0.258	0.197
FS	0.089	0.027	0.032	0.037	0.069	0.087	0.428	0.217	0.126	0.134
Sector Share	0.010	0.338	0.086	0.060	0.107	0.102	0.063	0.084	0.043	0.108
Netherlands										
MU	0.658	0.665	0.850	0.725	0.569	0.409	0.099	0.145	0.375	0.478
FU	0.225	0.131	0.076	0.134	0.273	0.213	0.118	0.485	0.235	0.172
MS	0.085	0.167	0.063	0.094	0.123	0.292	0.490	0.170	0.280	0.265
FS	0.032	0.037	0.011	0.047	0.034	0.086	0.292	0.200	0.110	0.085
Sector Share	0.010	0.165	0.058	0.076	0.119	0.174	0.097	0.143	0.033	0.125

Table A3 (continued)
Wage Bill Shares of Four Demographic Groups by Sector

	Primary & Utilities	Manuf.	Constr.	Transp., Storage, Comm.	Trade, Hotels, Rest.	Finance, Insurance, Real Est.	Educ.	Health	Other Services	Public Admin.
					Belgium					
MU	0.463	0.485	0.686	0.623	0.378	0.197	0.037	0.053	0.303	0.393
FU	0.063	0.119	0.024	0.088	0.282	0.137	0.074	0.286	0.192	0.168
MS	0.333	0.311	0.237	0.219	0.208	0.442	0.333	0.190	0.303	0.287
FS	0.141	0.086	0.053	0.071	0.132	0.225	0.556	0.472	0.202	0.152
Sector Share	0.006	0.217	0.040	0.067	0.070	0.155	0.157	0.118	0.070	0.100
					Austria					
MU	0.697	0.744	0.901	0.833	0.513	0.551	0.120	0.165	0.474	0.598
FU	0.160	0.179	0.073	0.138	0.454	0.285	0.178	0.662	0.354	0.257
MS	0.143	0.069	0.026	0.029	0.025	0.113	0.274	0.072	0.099	0.122
FS	0.000	0.008	0.000	0.000	0.007	0.051	0.428	0.101	0.073	0.023
Sector Share	0.011	0.245	0.096	0.071	0.146	0.107	0.075	0.087	0.050	0.112
					Ireland					
MU	0.644	0.578	0.850	0.689	0.477	0.264	0.046	0.138	0.372	0.526
FU	0.043	0.183	0.036	0.110	0.350	0.267	0.062	0.538	0.327	0.147
MS	0.305	0.189	0.108	0.166	0.125	0.326	0.394	0.102	0.179	0.243
FS	0.009	0.049	0.005	0.035	0.048	0.142	0.499	0.221	0.123	0.084
Sector Share	0.017	0.212	0.063	0.092	0.108	0.122	0.127	0.098	0.038	0.123
					France					
MU	0.639	0.525	0.790	0.581	0.450	0.250	0.076	0.129	0.187	0.368
FU	0.241	0.151	0.048	0.136	0.269	0.198	0.144	0.374	0.369	0.272
MS	0.094	0.250	0.123	0.196	0.190	0.382	0.316	0.139	0.237	0.208
FS	0.026	0.074	0.039	0.087	0.091	0.170	0.464	0.358	0.208	0.151
Sector Share	0.007	0.225	0.053	0.069	0.132	0.155	0.107	0.102	0.032	0.119
					Italy					
MU	0.705	0.680	0.909	0.800	0.578	0.478	0.145	0.277	0.540	0.599
FU	0.243	0.234	0.044	0.148	0.375	0.294	0.403	0.420	0.364	0.252
MS	0.046	0.065	0.042	0.043	0.026	0.184	0.163	0.209	0.063	0.099
FS	0.005	0.020	0.006	0.008	0.020	0.044	0.289	0.094	0.033	0.050
Sector Share	0.026	0.246	0.054	0.071	0.097	0.093	0.114	0.111	0.060	0.129
					Spain					
MU	0.745	0.528	0.786	0.536	0.513	0.358	0.028	0.080	0.367	0.326
FU	0.105	0.122	0.026	0.082	0.257	0.168	0.064	0.188	0.338	0.116
MS	0.134	0.311	0.170	0.278	0.162	0.310	0.362	0.282	0.171	0.342
FS	0.017	0.040	0.019	0.104	0.068	0.163	0.546	0.450	0.123	0.216
Sector Share	0.022	0.219	0.086	0.073	0.135	0.123	0.105	0.079	0.045	0.113
					Portugal					
MU	0.705	0.599	0.907	0.622	0.594	0.427	0.081	0.083	0.231	0.584
FU	0.277	0.314	0.048	0.174	0.341	0.196	0.237	0.433	0.572	0.248
MS	0.011	0.068	0.038	0.155	0.051	0.272	0.174	0.124	0.102	0.083
FS	0.007	0.020	0.007	0.050	0.014	0.105	0.508	0.360	0.095	0.084
Sector Share	0.028	0.164	0.099	0.065	0.148	0.105	0.135	0.075	0.038	0.145
					Greece					
MU	0.707	0.516	0.847	0.618	0.459	0.216	0.024	0.124	0.383	0.467
FU	0.225	0.218	0.022	0.062	0.270	0.203	0.045	0.249	0.238	0.137
MS	0.037	0.186	0.115	0.288	0.164	0.350	0.403	0.294	0.218	0.262
FS	0.030	0.080	0.017	0.032	0.107	0.231	0.527	0.333	0.161	0.135
Sector Share	0.008	0.170	0.070	0.114	0.145	0.100	0.129	0.074	0.038	0.151

Notes. MU= unskilled males, FU = unskilled females, MS=skilled males, FS= skilled females, where Unskilled= No College Degree (educ=1+2), Skilled= College Degree (educ=3). See notes to Figure 1 for samples and sources.

Table A4
Further decomposition of double differences in gender gaps in wage bill shares (×100) between each country and the US. Three broad industries.

	Total	Primary, Manuf. & Construct.	Services	Public Admin.	Total	Primary, Manuf. & Construct.	Services	Public Admin.
	1	2	3	4	5	6	7	8
	Between-industry component – Unskilled				Between-industry component - Skilled			
Canada	0.01	0.22	-0.39	0.19	-1.12	0.17	-1.54	0.25
UK	-1.32	-1.77	0.22	0.23	0.06	-0.22	-0.28	0.57
Finland	-0.21	0.40	-0.56	-0.05	-2.18	0.50	-2.57	-0.11
Denmark	-2.62	-1.02	-1.66	0.06	-3.22	-0.40	-3.08	0.26
Germany	5.90	5.03	0.47	0.40	2.28	3.37	-1.45	0.36
Netherlands	-2.61	-2.35	-1.30	1.03	-1.16	-0.84	-1.19	0.88
Belgium	-2.75	-1.96	-1.22	0.43	-3.30	-0.35	-3.35	0.39
Austria	4.48	3.56	0.08	0.84	0.50	1.16	-0.57	0.50
Ireland	1.87	-0.20	0.89	1.17	-1.27	-0.08	-1.97	0.78
France	-0.21	-0.83	0.13	0.49	-0.61	0.12	-1.23	0.50
Italy	0.59	0.92	-1.54	1.20	-1.29	0.56	-2.42	0.56
Spain	2.44	1.93	-0.10	0.60	0.38	0.91	-1.08	0.55
Portugal	2.97	1.84	-0.40	1.54	-1.79	-0.08	-2.27	0.56
Greece	2.99	-1.23	2.58	1.65	-0.13	-0.53	-0.71	1.12
	Within-industry component - Unskilled				Within-industry component - Unskilled			
Canada	4.47	6.41	-1.87	-0.07	-6.87	-4.16	-2.04	-0.67
UK	-0.39	-0.10	0.08	-0.38	5.02	2.25	2.45	0.32
Finland	1.34	2.70	-0.92	-0.44	-8.71	-3.25	-5.09	-0.37
Denmark	1.48	0.66	2.19	-1.37	-2.71	-1.29	-0.04	-1.38
Germany	0.82	1.92	-1.60	0.49	-0.16	-0.06	0.77	-0.87
Netherlands	15.67	5.51	8.06	2.10	2.60	-2.93	5.30	0.23
Belgium	7.26	2.22	3.91	1.13	-1.42	-0.24	-0.94	-0.24
Austria	14.65	8.16	4.19	2.30	-8.34	-4.88	-2.55	-0.54
Ireland	8.63	4.13	1.70	2.80	-1.04	-2.06	1.01	0.01
France	5.78	2.78	2.73	0.26	-3.04	-1.96	-0.16	-0.92
Italy	14.22	5.28	6.41	2.53	-5.39	-5.40	1.11	-1.10
Spain	13.43	4.33	8.03	1.08	-0.55	0.33	-0.57	-0.32
Portugal	8.09	1.98	3.44	2.67	-10.74	-5.05	-3.96	-1.73
Greece	10.39	1.82	5.93	2.64	-2.45	-3.23	1.09	-0.32

Notes. Figures represent the contribution of each broad industry to the shift-share analysis reported in Table 2. The primary sector includes: agriculture, hunting, forestry and fishing; mining and quarrying; electricity, gas and water supply. The differences between the unskilled and skilled values are reported in Table 3.

Table A5
Further decomposition of double differences in gender gaps in wage bill shares (×100) between each country and the US. Detailed service industries.
Between-industry component

	Total Services	Transport	Trade	Finance	Education	Health	Other
	1	2	3	4	5	6	7
Between-industry component: Unskilled							
Canada	-0.39	-0.08	-0.14	0.45	-0.09	-0.61	0.08
UK	0.22	0.46	-0.24	0.00	-0.07	0.01	0.05
Finland	-0.56	1.17	-0.23	0.03	-0.03	-1.51	0.01
Denmark	-1.66	0.18	-0.82	0.09	-0.01	-1.11	0.01
Germany	0.47	0.01	-0.26	0.05	0.28	0.38	0.00
Netherlands	-1.30	0.75	-0.63	-0.16	-0.02	-1.19	-0.05
Belgium	-1.22	0.39	-0.81	-0.07	-0.37	-0.43	0.06
Austria	0.08	0.60	-0.02	-1.02	0.13	0.39	0.01
Ireland	0.89	1.44	-0.51	0.11	-0.17	0.01	0.01
France	0.13	0.53	-0.26	-0.07	-0.08	-0.13	0.14
Italy	-1.54	0.60	-0.84	-0.81	-0.37	-0.20	0.09
Spain	-0.10	0.53	-0.28	-0.58	-0.07	0.30	0.00
Portugal	-0.40	0.21	-0.03	-0.91	-0.49	0.67	0.15
Greece	2.58	2.40	-0.07	0.07	-0.18	0.39	-0.03
Between-industry component: Skilled							
Canada	-1.54	-0.02	-0.10	-1.01	-0.19	-0.28	0.07
UK	-0.28	0.34	-0.45	0.09	-0.21	0.01	-0.07
Finland	-2.57	0.48	-0.37	-1.04	-0.11	-1.56	0.04
Denmark	-3.08	0.11	-0.44	-1.22	-0.03	-1.55	0.05
Germany	-1.45	0.00	-0.39	-1.71	0.47	0.19	-0.01
Netherlands	-1.19	0.19	-0.35	-0.39	-0.01	-0.51	-0.12
Belgium	-3.35	0.15	-0.85	-0.83	-1.48	-0.48	0.15
Austria	-0.57	0.12	-0.02	-1.17	0.36	0.13	0.01
Ireland	-1.97	0.50	-0.45	-1.40	-0.60	0.01	-0.03
France	-1.23	0.19	-0.21	-0.84	-0.21	-0.13	-0.03
Italy	-2.42	0.13	-0.39	-1.74	-0.40	-0.05	0.04
Spain	-1.08	0.25	-0.17	-1.26	-0.25	0.36	0.00
Portugal	-2.27	0.08	-0.02	-1.66	-1.19	0.53	-0.01
Greece	-0.71	1.23	-0.05	-1.51	-0.66	0.30	-0.03

Notes. Table continues on next page

Table A5 (continued)
Further decomposition of double differences in gender gaps in wage bill shares (×100) between each country and the US. Detailed service industries. Within-industry component

	Total Services	Transport	Trade	Finance	Education	Health	Other
	1	2	3	4	5	6	7
			Within-industry component: Unskilled				
Canada	-1.87	1.62	0.21	-1.35	-0.04	-3.41	1.10
UK	0.08	0.08	-0.89	1.43	-0.04	-0.65	0.16
Finland	-0.92	0.96	-1.40	0.69	0.28	-1.85	0.40
Denmark	2.19	-0.06	1.31	0.21	0.41	-0.44	0.76
Germany	-1.60	0.85	-1.33	0.60	-0.19	-2.02	0.49
Netherlands	8.06	1.92	2.41	4.09	0.59	-1.74	0.79
Belgium	3.91	1.51	-0.28	1.51	0.58	-0.41	1.00
Austria	4.19	2.51	-0.87	4.32	0.18	-2.80	0.85
Ireland	1.70	2.05	0.15	0.36	0.72	-2.00	0.42
France	2.73	1.03	0.98	1.52	0.18	-0.50	-0.48
Italy	6.41	2.26	1.08	3.07	-1.84	0.58	1.26
Spain	8.03	0.98	2.00	3.40	0.45	0.79	0.40
Portugal	3.44	0.88	2.05	3.86	-0.84	-1.33	-1.18
Greece	5.93	2.15	1.09	0.56	0.66	0.63	0.84
			Within-industry component: Skilled				
Canada	-2.04	-0.77	-1.60	-1.73	1.16	0.79	0.11
UK	2.45	0.70	0.47	1.49	0.05	-0.50	0.25
Finland	-5.09	-0.36	-0.97	-1.68	0.41	-1.96	-0.53
Denmark	-0.04	-0.04	-1.25	2.19	1.45	-2.41	0.02
Germany	0.77	-0.31	-1.12	-0.61	1.36	0.96	0.49
Netherlands	5.30	-0.88	-0.66	-0.04	4.21	2.07	0.59
Belgium	-0.94	-0.20	-0.69	0.13	0.24	-0.89	0.47
Austria	-2.55	-0.96	-1.76	-2.21	0.75	1.61	0.03
Ireland	1.01	-0.35	-0.81	-0.39	1.58	0.82	0.15
France	-0.16	-0.48	-0.51	-0.05	1.06	-0.22	0.05
Italy	1.11	-0.93	-1.61	-0.98	1.21	3.37	0.05
Spain	-0.57	-0.02	-0.62	-0.97	0.61	0.30	0.13
Portugal	-3.96	-0.45	-1.54	-0.60	-1.03	-0.29	-0.05
Greece	1.09	0.74	-1.21	-1.34	1.35	1.41	0.15

Notes. Figures represent the contribution of each 1-digit service industry to the shift-share analysis reported in Table 2. See main text for the exact definition of industries. The differences between the unskilled and skilled values are reported in Table 4.