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Taxes, Subsidies, and Gender Gaps in Hours and Wages

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Abstract: Using micro data from 17 countries in the Organisation for Economic Co-operation and Development, this paper documents a negative cross-country correlation between gender ratios in market hours and wages. We find that market hours by women and the size of the service sector that produces close substitutes to home production are important for the gender differences in market hours across countries. We quantify the role played by taxes and subsidies to family care on the two gender ratios in a multisector model with home production. Higher taxes and lower subsidies reduce the marketization of home production and therefore reduce market hours. The effect is larger for women because of their comparative advantage in producing home services and the corresponding market substitutes. The larger fall in female market hours drives up the female wage relative to the male wage, resulting in higher gender wage ratios.

JEL classification: E24, E62, J22.

Key words: marketization, gender hour ratios, gender wage ratios, subsidies on family care, taxes, home production

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1 Introduction

Gender gaps in working hours per adult and in wages vary widely across OECD countries. As shown in Figure 1, the ratio of market hours per female to hours per male in the United States is higher than in most European countries, especially among non-college graduates (hereafter referred to as low-skilled). Moreover, the larger gender ratios in hours are accompanied by smaller gender wage ratios. To understand the gender gaps in market hours, it is crucial to differentiate between non-market hours devoted to home production and leisure hours. A recent publication by Addati, Cattaneo, Esquivel and Valarino (2018) at the International Labour Organization reveals that the hours devoted to home production by women are triple that of men and that for women the demand of home production is the main self-reported barrier to enter the labor market.Unlike leisure hours, home production can be outsourced by purchasing close substitutes from the corresponding market service sectors. This process of marketization converts home production hours into market hours, and is especially relevant for women, since these service sectors are also likely to be female intensive.[1] Thus, factors that determine the extent of marketization can have important implications for the labor market outcomes by gender.

In this paper, we focus on the effects of taxes and social subsidies on family care on the marketization of home production, and quantify their contributions to the cross-country differences in the gender gaps of hours and wages. Intuitively, higher taxes reduce the returns to market work and therefore reduce the incentive to marketize home production. This disproportionately reduces female market hours, as home production is intensive in female labor. Less marketization of home production is accompanied by a higher wage ratio of women relative to men as it reduces the relative supply of female market hours. Subsidies to family care act in the opposite direction to taxes, as they lower the cost of marketizing home production.

Using household surveys from 17 OECD countries, we find that the cross-country differences in gender ratios of market hours are mostly accounted for by the differences in market hours of women and the size of the service sector that produces close substitutes to home production. Using the income and consumption taxes constructed by McDaniel (2007) and subsidies on family care from the OECD Social Expenditure Database, we document that taxes are negatively correlated with gender hour ratios (women relative to men) and positively correlated with the corresponding wage ratios for both high-skilled (college graduates) and low-skilled (non-college graduates) labor. In contrast, subsidies on family care

[1]The closure of many of these market sectors during the recent COVID-19 pandemic has shown a disproportional impact on female market work around the world (see, International Labour Organization 2021).

display the opposite correlation with such gender ratios. These correlations operate mainly by affecting the marketization of home production, which primarily affects women.

Motivated by these stylized facts, we develop a multi-sector model to study the quantitative effects of taxes and social subsidies on gender gaps by skill group. The model consists of three market sectors producing goods, non-substitutable services, and substitutable services. Substitutable services and home services are good substitutes and the elasticity of substitution between them is greater than those between goods and services. We model subsidies as a negative tax on the market consumption of substitutable services. There are four types of labor inputs: men and women with low or high skill. Labor can move freely across sectors and production in each sector uses all four types of labor inputs. The representative household allocates time to market work, home production, and leisure for each gender-skill group.

The model is calibrated to match wages and time allocations among the three market sectors, home production, and leisure by gender-skill group in the U.S. economy. The observed sector-specific gender intensity in labor inputs implies that women have a relative comparative advantage in producing home and substitutable market services.[2] By simulating the calibrated model with country-specific taxes and subsidies, we make predictions for European market hours and wages by gender-skill groups.

The quantitative results show that cross-country differences in taxes and social subsidies can indeed generate a negative correlation between gender ratios in hours and wages, as in the data. They also account well for the cross-country variations in the two gender ratios, as judged by the correlation coefficient and the coefficient of determination between model predictions and data. Moreover, taxes and subsidies account for 40% and 97% of the average differences in the gender hour ratios between Western and Southern Europe and the United States for the low-skilled and high-skilled individuals, respectively. In Nordic countries, high social subsidies are helpful in accounting for their high gender hour ratios.

The model predicts higher gender wage ratios in European countries and can explain 17% and 14% of the average differences between European gender wage ratios and the United States for the low-skilled and high-skilled individuals, respectively. To explore further the factors that may affect gender wage ratios, we calibrate the model to each country and the alternative calibration matches gender wage ratios to the data values for each country. The decomposition exercise shows that the parameters that govern the gender intensity of the labor inputs in production are the only set of parameters that has a larger effect on the gender wage ratio than taxes and subsidies. The cross-country differences in this parameter may

[2]Evidence on women's comparative advantage in services relative to men are, for example, Weinberg (2000) on interpersonal and communication skills; and Rendall (2018a) on brain versus brawn skills.

reflect cross-country differences in social norms or discrimination against working women.

The model's predictions on time allocations among market hours, home hours, and leisure match the data generally well. In particular, the model can generate lower European market hours for each gender-skill group and each sector and can also account for most of the differences in market hours from the U.S. along these dimensions. More importantly, the model can generate larger cross-country differences in female market hours, especially in low-skilled female market hours, and larger differences in the hours allocated to the substitutable services sector. The model predicts well the female share of market hours in total work hours and the share of total work in total available time for both genders. The model predictions on these dimensions are consistent with the data evidence that the effects of taxes and subsidies through the marketization margin are important for women, while for men only the effects of taxes through the work-leisure margin are important.

The combination of comparative advantages of production factors and preferences is critical in producing the results. In particular, as taxes increase, households reduce the marketization of home production and market hours decline as a result. The reduction in market hours is especially large in the substitutable service sector because it produces close substitutes to home services. Because women have a relative comparative advantage in producing home and substitutable services, the reduction in marketization of home hours is larger for women than for men. Given the limited substitutability between male and female labor, the fall in women's labor supply relative to men drives up the female wage relative to the male wage, resulting in higher gender wage ratios for countries with higher taxes. In contrast, social subsidies on family care increase the incentive to marketize home services, resulting in more female market hours. Thus, gender comparative advantages turn seemingly gender neutral policies into gender-biased outcomes.

This paper is related to Olivetti and Petrongolo (2008) who find a negative cross-country correlation between the gender gaps in wages and employment.[3] Using a reduced-form analysis, they show that selection into employment explains half of the negative correlation between the gender gaps in wages and employment, but remain agnostic regarding the factors that lead to the observed selection into market work. In contrast, we use a structural model

[3]In the Online Appendix we present a detailed decomposition of the gender ratios in market hours into gender ratios in employment rates (extensive margin) and gender ratios in hours per employed worker (intensive margin). We find that the negative association between the gender ratios in market hours and wages reported in Figure 1 is mainly driven by the gender ratio in employment rate. However, both extensive and intensive margins are important for the cross-country differences in the levels of gender ratios in market hours. In particular, we find that in Southern European countries most of the differences in gender hour ratios from the U.S. are driven by the differences at the extensive margin, while for Western European countries the intensive margin is more important. This might be due to different institutional environments allowing the prevalence of part-time employment.

to study the general equilibrium effects of taxes and subsidies not only on the negative cross-country correlation between gender gaps in working hours and wages, but also on the cross-country differences in the two gender gaps. We find that the effects of taxes and subsidies through marketization of home production are important in accounting for the cross-country differences in the two gender gaps.

Olivetti and Petrongolo (2016) and Blau and Kahn (2017) provide comprehensive surveys of the literature on the variations in the two gender gaps along the time-series and international dimensions. In addition to taxes and subsidies, other factors, such as discrimination, social norms, and the wage structure, may also contribute to cross-country differences in gender gaps. Among the proposed factors, our model mechanism is related to Olivetti and Petrongolo (2014) who study the effects of international differences in the size of service industries on gender outcomes. We study the effect of taxes and subsidies and in our paper one channel through which taxes and subsidies affect gender outcome is by affecting the size of the substitutable service sector.

There is a large literature analyzing the relation between taxes, subsidies, and cross-country differences in market hours, beginning with Prescott (2004) and Ohanian, Raffo and Rogerson (2008). Recent cross-country studies on taxes and market hours focus on the structure of the tax system taking into account the role of gender and marital status, see for instance Chakraborty, Holter and Stepanchuk (2015) and Bick and Fuchs-Schündeln (2018). These studies abstract from home production and focus on the substitution margin between work and leisure. Using harmonized cross-country time use data, Freeman and Schettkat (2005) and Burda, Hamermesh and Weil (2013) documented the importance of marketization of home production in understanding market hours across countries. With a quantitative model, we further show that taxes and subsidies are important factors in determining the extent of marketization. In this sense, our work is related to Rogerson (2008), Olovsson (2009), McDaniel (2011) and Duernecker and Herrendorf (2018) in showing that home production is important in propagating the effect of taxes.[4] Using similar framework, Ngai and Pissarides (2011) and Ragan (2013) show that, in addition to differences in taxes, social subsidies on family care also play an important role in accounting for cross-country differences in aggregate market hours.[5] However, none of these papers focuses on the effect of taxes and subsidies on the gender gaps in hours and wages jointly. Our contribution to this literature is to show that the effects of taxes and subsidies through the marketization channel are also quantitatively important for gender gaps in wages and market hours.

[4]Rendall (2018b) analyzes the impact of different taxation regimes, using a multisector model with home production, on structural transformation and the rise of female and service employment in the United States.

[5]Also see recent works, e.g. Cattan (2016), Guner, Kaygusuz and Ventura (2020), and Hannusch (2018), on the effects of social subsidies on female labor supply.

The rest of the paper is organized as follows. Section 2 presents the data used and the cross-country facts that motivate the paper. Section 3 presents the model. Section 4 calibrates the model to the U.S. data. Section 5 presents the results of the model. Section 6 concludes.

2 Data and Cross-Country Facts

Our data covers almost all the EU-15 region, plus Norway, Canada, and the United States for the years of 2000–2004.[6] We choose this time period because of the availability of time-use data for most of the countries. This section briefly describes the data used in the analysis and presents a set of key stylized facts about time allocation and wages by gender and skill. High-skilled labor is defined as those with college degrees and low-skilled is defined as those without college degrees. For a more detailed description of the data sources and construction procedures, please refer to the Data Appendix.

2.1 Data

2.1.1 Market Hours

Market hours are constructed using the standardized EU Labor Force Survey (EU-LFS) for European countries, the March Supplement of the Current Population Survey (CPS) for the United States, and the 2001 Population Census for Canada. The sample includes individuals between the ages of 20 and 64. The annual average hours worked per person are derived as the total annual hours divided by the number of individuals within the specified age range. Following procedures outlined by Bick, Brüggemann and Fuchs-Schündeln (2019), we construct consistent measures of annual market hours per person across countries.

It is well-known that market hours differ across demographic groups. Thus cross-country differences in demographic composition may affect the differences in aggregate market hours and in hours by gender-skill group. To isolate the effect of taxes and subsidies, we construct market hours controlling for cross-country differences in demographic composition. Specifically, we partition each country's population according to skill, gender, age, and marital status, and calculate the average working hours for each group in this partition. The cell-specific averages are then aggregated into hours per person for each gender-skill group in each country using the U.S. population shares. Furthermore, the U.S. population shares are adjusted so that the age and marital composition is constant across gender-skill cells.[7]

[6] Of the EU-15 region, only Luxembourg is excluded as there is no comparable tax data.

[7] Please see Appendix A for details.

Therefore, the estimates also control for differences in marriage rates across education groups and across countries. Table A1 in the Data Appendix shows that differences in the demographic composition of the population (by gender, skill, age and marital status) account for 2-33% of the aggregate cross-country difference in market hours in our sample.[8] Thus, cross-country differences in hours worked within the same demographic group explain most of the differences in aggregate market hours across countries.

To highlight the importance of marketization of home production in accounting for gender gaps, we divide market production into three sectors and estimate market hours for each of the sectors: goods, non-substitutable services, and substitutable services sectors. This is the simplest classification to capture the idea that men and women may have different comparative advantages in producing goods and services and the fact that only a subset of market services can be substituted with home services. Broadly speaking, a service industry is classified as "substitutable" if its product can be replaced by activities performed at home.[9] To be consistent, in the construction of sectoral hours we also control for differences in the demographic composition across countries.

2.1.2 Time Allocation across Market, Home and Leisure

In our model taxes and subsidies affect market hours of men and women differently through two substitution margins: across market work and home work and across total work (market plus home) and leisure. We refer to the first margin as the marketization of home production. To examine the two margins, we construct the fraction of market hours out of total work and the fraction of total work out of total available time (market plus home plus leisure). The first ratio measures the substitution between market work and home work and the latter measures the substitution between work and leisure. The data come from the American Time Use Survey (ATUS) and the Multinational Time Use Study (MTUS). For the years we study, publicly available micro-level data from time use surveys are available for only ten of the sample countries.[10] The construction of market and home hours follows closely

[8]Table A2 includes the presence of small children in the household as one additional partition of the population. The resulting hours only change slightly. There are two main reasons for the similarity in the results. First, the share of women with small children is on average only 18% in our sample. Second, this group works less than other demographic groups in every country, including the United States. Thus, they do not contribute much to aggregate cross-country differences in the working hours of women.

[9]The substitutable service sector includes Retail trade, Hotels and restaurants, Health and social work, Personal and community services, and Domestic services hired by households. Given the available industry classification in most household surveys it is not possible to do a more detailed disaggregation. The Data Appendix contains the detailed sector classification (Table A3), as well as a description on how we perform the adjustment for demographics in sectoral hours.

[10]The countries are Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, the United Kingdom, and the United States.

Aguiar and Hurst (2007b) with the key exception that we include child care in home hours. Leisure is any time not allocated to work neither in the market nor at home. These estimates are also adjusted for demographic composition differences following the procedure outlined earlier.

2.1.3 Wages

We construct the pre-tax hourly wage rates using various sources including the European Community Household Panel (ECHP) and the European Union Statistics on Income and Living Conditions (EU-SILC) for most countries, Labor Force Surveys for France and the UK, the Socioeconomic Panel (SOEP) for Germany, the 2001 population Census for Canada, and the March CPS for the US. Gender wage ratios for low-skilled and high-skilled are estimated after controlling for age and marital status through a standard Mincerian regression for paid employees.

2.1.4 Taxes and Social Subsidies

We abstract from the complexity of the tax structure and use average labor income and consumption taxes as constructed by McDaniel (2007). Labor income taxes include Federal and State income taxes, as well as Social Security taxes.

Social subsidies on family care are applicable only to the substitutable service sector. We include public non-cash benefits (a.k.a. "in-kind" expenditures) on old-age, incapacity, and family care services. The main care items covered under these categories include residential care, home-help services, rehabilitation, day-care, and early childhood education. The expenditure data from the OECD Social Expenditure Database (SOCX) include direct expenses on the provision of these services, as well as subsidies for the purchase of such services in the market. Following Ngai and Pissarides (2011), the subsidy rate is computed by expressing total expenditures on these services as a fraction of the gross output of the substitutable service sector.

The country-specific tax and subsidy rates are reported in Table A4. The tax rates and subsidy rates are much larger in Europe than in the United States. Among all countries, Nordic countries have the highest subsidy rates.

2.2 Key Stylized Facts

In this subsection we first discuss the cross-country differences of gender ratios in hours and wages. We then explore the correlations between the two gender ratios by skill and our policy variables: taxes and subsidies to family care. To better understand the gender ratio in

market hours, we also study time allocations by gender and skill and their associations with our policy variables. Because of the differences in the substitutability of the three market goods with home-produced goods, the marketization of home production has asymmetric effects across the market sectors. To explore these effects, we also investigate the cross-country differences in sectoral hours.

2.2.1 Gender Ratios

Figure 2 plots the gender ratio in market hours (female relative to male) by country relative to the values observed in the United States. In most countries, the ratio is smaller than in the U.S. for both skill groups. The average deviation from the U.S. in Western and Southern Europe is -0.15 and -0.05 for the low and high-skilled, respectively. In Nordic countries the gender hour ratios are close to the ones observed in the United States.[11]

Figure 2 also plots the corresponding difference in the gender wage ratio from the U.S. Almost all countries have higher gender wage ratios for both skill levels, than the U.S. does.[12] The average deviation is 0.05 and 0.07 for the low and high-skilled, respectively, with the largest deviation at 0.16 in Italy for the low-skilled and at 0.13 in Greece for the high-skilled. In general, countries with smaller gender hour ratios also have larger gender wage ratios. This leads to a negative cross-country correlation of -0.36 for the low-skilled and -0.43 for the high-skilled between the two ratios, as documented in Figure 1.

2.2.2 Market Hours

We now turn to market hours by gender, skill, and sector. Figure 3 presents the percentage difference in annual hours worked per person relative to the U.S. for each of the four population groups.[13] Market hours of every gender-skill group are lower in Europe than in the United States. In most of the countries the largest proportional differences occur for low-skilled women, and the differences are larger for women than for men with the same skill level. The contribution of each demographic group is reported in Table 1. Columns 3-6 of Table 1 report the contribution of each demographic group to the difference in aggregate market hours with respect to the United States. In Western and Southern European countries on average 40% of the difference in market hours is accounted for by the hours of low-skilled women, and 60% by women in total. In Nordic countries, Canada, and Portugal, low-skilled women account for one-fifth of the difference, and women in total account for

[11] Canada and Portugal are exceptions.

[12] The main exception occurs for the high-skilled in Sweden.

[13] In all our analyses we group Ireland together with Southern European countries based on the similarity of the labor supply of women among these countries.

40%.

Turning now to the sectoral dimension, Figure 4 displays the proportional differences in sectoral hours relative to the United States. For most countries, hours in all three sectors are lower than their counterparts in the U.S. and the largest difference occur for the substitutable service sector.[14] Columns 7–9 of Table 1 report the contribution of each sector to the difference in aggregate market hours from the United States. In most Western and Southern European countries more than 40% of the aggregate difference is accounted for by the substitutable service sector; while in Nordic countries and Canada this fraction is one-third and one-fifth, respectively.

2.2.3 Gender Ratios, Taxes, and Subsidies

In order to understand how the gender ratios relate to taxes and subsidies, we report in Table 2 the OLS regressions of gender hour and wage ratios against the effective tax rate and the subsidy rate to family care. The effective tax rate, as in Prescott (2004), is given by

$$\frac{\text{consumption tax rate} + \text{labor income tax rate}}{1+\text{consumption tax rate}}.$$

The regressions give rise to a negative association between taxes and gender ratios in market hours and a positive association between taxes and gender wage ratios for both skill groups. The opposite is found for subsidies.

The gender ratio in market hours can be decomposed into two components: gender ratio in the fraction of market hours out of total work hours and gender ratio in total work hours:

$$\frac{\text{female market hours}}{\text{male market hours}} = \left(\frac{\text{female market hours}}{\text{female total work}} / \frac{\text{male market hours}}{\text{male total work}}\right) \frac{\text{female total work}}{\text{male total work}}. \tag{1}$$

The former (the term in the parentheses in equation (1)) measures the extent of marketizaton of female home hours relative to male home hours. The latter (the term outside the parentheses in equation (1)) measures the extent of the substitution between total work and leisure for women relative to men.

Regressing the two components of the gender ratio in market hours on taxes and subsides can help us understand the relative importance of the two substitution margins in affecting the gender hour ratios. Panels C and D in Table 2 report the regression results. From panel C the gender ratio in marketization is negatively associated with taxes and positively associated with subsidies. All the estimated coefficients are statistically significant and the

[14] This is related to the observation in Rogerson (2008) that the lower aggregate market hours in Europe are mostly due to lower hours in service sectors.

coefficients are larger for low-skilled workers than for high-skilled workers. From panel D the gender ratio in the total work hours is positively related to taxes and negatively related to subsidies. However most of the estimates are statistically insignificant. These results suggest that taxes and subsidies affect gender ratios in market hours mainly through their effects on marketization.

2.2.4 Time Allocations, Taxes, and Subsidies

To further understand the association between gender hour ratios and the policy variables, Table 3 reports the regressions of various measures of time allocation on the effective tax and the subsidy rate, separately by gender and skill. Panel A reports the results for annual market hours per person. The regressions show that higher taxes are associated with lower market hours for all demographic groups. In contrast, higher subsidies are associated with higher female market hours, especially for low-skilled women; while they are not correlated with male market hours.[15] These results indicate that taxes affect market hours of both men and women while subsidies are more important for market hours of women.

Panel B of Table 3 shows clearly that the marketization of female home hours, especially that of the low-skilled women, is negatively correlated with effective taxes and positively correlated with subsidies, while the marketization of male home hours is weakly correlated with the policy variables. This indicates that the effect of marketization on gender hour ratio is mainly driven by the marketization of female home hours. This result and the importance of marketization in affecting gender hour ratio imply that the marketization of female home hours is the main margin through which taxes and subsidies affect gender hour ratio. Panel C of Table 3 shows that taxes have a negative effect on hours of both men and women through the substitution margin between total work and leisure but the effects are much larger and significant for men.

Panel D in the table reports the corresponding regression results for sectoral hours.[16] Market hours in all the three sectors are negatively correlated with taxes, and that the largest negative association occurs for the substitutable service sector. Subsidies are positively related to market hours in the substitutable service sector and the estimates for other sectors are statistically insignificant. These results are not surprising since substitutable services and home-produced services are close substitutes, and therefore the effects of policies through

[15] Chakraborty et al. (2015) report a close to zero cross-country correlation between female market hours and effective taxes. The main reasons for the different findings are the separation of women by skill level and the inclusion of subsidies. In addition, we follow the procedures outlined by Bick et al. (2019) for the construction of market hours and control for demographic differences in composition across countries.

[16] The tax rate for goods and non-substitutable services is the same as the effective tax rate defined earlier. For the substitutable service sector we use the effective tax rate net of the subsidy rate since this is the rate that applies to the consumption of substitutable services.

the marketization channel have a larger impact on the substitutable services sector than the other two sectors.

Taking stock, this section shows that the ratio of female market hours to male market hours is larger in the U.S. than in other studied countries and the opposite pattern is observed for the ratio of female wages to male wages. The cross-country differences in market hours, to a large extent, are accounted for by the differences in female market hours and by the hours worked in the substitutable services sector. More importantly, we find a negative association between taxes and gender ratios in market hours and a positive association between taxes and gender ratios in wages. The opposite associations are found for subsidies. These correlations are mostly driven by the effects of taxes and subsidies on the marketization of female home hours. In the next section we present a multi-sector model that can generate these stylized facts.

3 The model

This section presents an equilibrium model with three market sectors and a home production sector, in an environment with government taxes and subsidies. The three market sectors produce goods, non-substitutable services, and substitutable services, respectively. The production at home delivers a close substitute to the substitutable service produced in the market. Labor is supplied to each sector by a representative household and is indexed by gender and skill.

Government taxes labor income at rate τ and the consumption of market good j at a net rate t_j, where t_j is the gross consumption tax rate less the subsidy rate and j takes values $1, 2, 3$, denoting the goods sector, the non-substitutable service sector, and the substitutable service sector, respectively. The subsidy is therefore modeled as a negative consumption tax and is applicable only to the consumption of the substitutable services. The net revenue from taxes less subsidies is rebated back to households as a form of lump-sum transfer T.

3.1 Firms

Each of the three market sectors is competitive and consists of one representative firm. There are four types of labor inputs: high-skilled female, high-skilled male, low-skilled female and low-skilled male. The labor inputs can move freely across sectors. While production in each sector utilizes all four types of inputs, the intensity of factor inputs differs. The production function in each sector takes a nested CES form capturing the finite elasticity across skills and across genders. The CES aggregator first combines labor inputs of men and women

of the same skill level, and then combines the aggregated low-skilled and high-skilled labor inputs.

Let subscript i index the skill level, where i takes two values of n and e, denoting low skill and high skill, respectively. Let g index gender, where g takes two values of m and f, denoting male and female, respectively. The production function of sector j is given by:

$$Y_j = A_j L_j, \quad L_j = \left[\lambda_j L_{ej}^{\frac{\rho-1}{\rho}} + (1-\lambda_j) L_{nj}^{\frac{\rho-1}{\rho}} \right]^{\frac{\rho}{\rho-1}}, \ j = 1, 2, 3, \tag{2}$$

where A_j is labor productivity and ρ is the elasticity of substitution between low-skilled and high-skilled labor. L_j is an aggregator of the four labor inputs, L_{ej} is the high-skill composite, and L_{nj} is the low-skill composite of female and male labor inputs. We allow $\lambda_j \in (0, 1)$ to differ across sectors. This is to capture the difference in the sectoral intensity of skilled labor. The skill composites combine male and female labor inputs as follows:

$$L_{ij} = \left[\xi_{ij} L_{ifj}^{\frac{\eta-1}{\eta}} + (1-\xi_{ij}) L_{imj}^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}, \ i = n, e, \ j = 1, 2, 3, \tag{3}$$

where L_{ifj} denotes the amount of female labor input and L_{imj} denotes the amount of male labor input with skill level i in sector j. η is the elasticity of substitution between female and male labor. The parameter $\xi_{ij} \in (0, 1)$ affects the intensity of female labor input in producing the composite L_{ij} and it varies by skill and sector. ξ_{ij} captures any factors that could affect the intensity of female labor input in the production function, including social norms, discrimination against women, women's productivity relative to men, and women's productivity differences by skill and by sector. We say that women of skill i have a relative comparative advantage in sector j if ξ_{ij} is larger in sector j than in other sectors.

3.2 The Representative Household

The representative household consists of four types of members and L_{ig} ($i = n, e$ and $g = m, f$) is the share of household members with skill i and gender g. Each household member is endowed with one unit of time. The household utility is given by:

$$U(c_1, c_2, c_3, c_h, L_l) = \ln c + \varphi \ln L_l. \tag{4}$$

The household derives utility from three types of goods and services: c_1 denotes market goods, c_2 denotes non-substitutable market services and c_s denotes a composite of substi-

tutable services, which aggregates substitutable market services (c_3) and home services (c_h) :

$$c \equiv \left[\sum_{j=1,2,s} \omega_j c_j^{\frac{\epsilon-1}{\epsilon}} \right]^{\frac{\epsilon}{\epsilon-1}}; \quad c_s = \left[\psi c_3^{\frac{\sigma-1}{\sigma}} + (1-\psi) c_h^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}, \tag{5}$$

where $\sum_{j=1,2,s} \omega_j = 1$. The elasticity of substitution across different kind of goods and services is low, with $0 \leq \varepsilon < 1$, while the elasticity of substitution within substitutable services is high, with $\sigma > 1$.

Home services are produced with a technology similar to the one used in the substitutable market service sector (see (2)-(3)):

$$c_h = A_h L_h, \quad L_h = \left[\lambda_h L_{eh}^{\frac{\rho-1}{\rho}} + (1-\lambda_h) L_{nh}^{\frac{\rho-1}{\rho}} \right]^{\frac{\rho}{\rho-1}}, \tag{6}$$

where

$$L_{ih} = \left[\xi_{ih} L_{ifh}^{\frac{\eta-1}{\eta}} + (1-\xi_{ih}) L_{imh}^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}, \ i = n, e, \tag{7}$$

and A_h is the labor productivity for the home sector.

Leisure L_l is a CES aggregator of male and female leisure time:

$$L_l = L_l(L_{nl}, L_{el}) = \left[\lambda_l L_{el}^{\frac{\rho_l-1}{\rho_l}} + (1-\lambda_l) L_{nl}^{\frac{\rho_l-1}{\rho_l}} \right]^{\frac{\rho_l}{\rho_l-1}}, \tag{8}$$

where

$$L_{il} = \left[\xi_{il} L_{ifl}^{\frac{\eta_l-1}{\eta_l}} + (1-\xi_{il}) L_{iml}^{\frac{\eta_l-1}{\eta_l}} \right]^{\frac{\eta_l}{\eta_l-1}}, \ i = n, e, \tag{9}$$

and the elasticity of substitution $\eta_l < 1$, indicating male and female's leisure time are complements.

Let w_{if} and w_{im} denote the wages for women and men with skill i, respectively. Because labor can move freely across sectors, wages differ by gender-skill group but not by sector. Taking as given government policy parameters (t_1, t_2, t_3, T), wages $\{w_{if}, w_{im}\}_{i=n,e}$, and prices (p_1, p_2, p_3), a representative household chooses market consumption (c_1, c_2, c_3), home production time $\{L_{imh}, L_{ifh}\}_{i=n,e}$ and leisure time $\{L_{iml}, L_{ifl}\}_{i=n,e}$ to maximize the utility function (4) subject to (5)-(9) and the household budget constraint:

$$\sum_{j=1,2,3} (1+t_j) p_j c_j = T + (1-\tau) \sum_{i,g} w_{ig} (L_{ig} - L_{igh} - L_{igl}). \tag{10}$$

3.3 Competitive Equilibrium

A competitive equilibrium is defined by wages $\{w_{if}, w_{im}\}_{i=n,e}$, prices and consumption $\{p_j, c_j\}_{j=1,2,3}$ and time allocation $\{L_{ifj}, L_{imj}\}_{\forall i,j}$ such that:

1. Given wages and prices, the firms maximize profits subject to production functions (2)-(3); and the representative household maximizes utility (4) subject to (5)-(10).

2. Given the optimal decisions of the firms and the household, wages and prices clear the goods market and the labor market:

$$c_j = Y_j, \qquad j = 1, 2, 3, \tag{11}$$

$$\sum_{j=1,2,3} L_{igj} = L_{ig} - L_{igh} - L_{igl}, \qquad i = n, e; \quad g = f, m. \tag{12}$$

3. Government budget constraint is satisfied:

$$T = \tau \sum_{i,g} w_{ig}(L_{ig} - L_{igh} - L_{igl}) + \sum_{j=1,2,3} t_j p_j c_j. \tag{13}$$

The derivation of the competitive equilibrium is provided in the Online Appendix.

4 Calibration

The model is calibrated to match time allocation and wage ratios in the early 2000s of the U.S. economy. The full calibration procedures are documented in the Online Appendix. The basic principle is as follows. Given the tax parameters $\{\tau, t_1, t_2, t_3\}$, the parameters needed to determine time allocation and wage ratios include the relative population shares $\left\{\frac{L_{ef}}{L_{em}}, \frac{L_{nf}}{L_{nm}}, \frac{L_{ef}}{L_{nf}}\right\}$; the elasticity parameters $\{\sigma, \varepsilon, \rho, \eta, \rho_l, \eta_l\}$; the gender-specific parameters $\{\xi_{ij}\}_{\forall i,j}$; the skill-specific parameters $\{\lambda_j\}_{\forall j}$; the preference parameter on leisure φ; and the relative productivity $\left\{\hat{A}_{3h}, \hat{A}_{23}, \hat{A}_{12}\right\}$.[17]

The relative population shares $\left\{\frac{L_{ef}}{L_{em}}, \frac{L_{nf}}{L_{nm}}, \frac{L_{ef}}{L_{nf}}\right\}$ are calibrated to match the ratios between the number of workers for the relevant gender-skill groups. The six elasticity parameters $\{\sigma, \varepsilon, \rho, \eta, \rho_l, \eta_l\}$ for preferences and production functions are directly set to values derived elsewhere in the literature. The elasticity of substitution between substitutable services and home services, σ, is set to 1.9 which is the mid-point of the estimates in the literature ranging

[17] $\hat{A}_{3h} \equiv \left(\frac{A_3}{A_h}\right)\left(\frac{\psi}{1-\psi}\right)^{\frac{\sigma}{\sigma-1}}$, $\hat{A}_{23} \equiv \frac{A_2}{A_3}\left(\frac{\omega_s}{\omega_2}\right)^{\frac{\varepsilon}{1-\varepsilon}} \psi^{\frac{\sigma}{1-\sigma}}$ and $\hat{A}_{12} \equiv \frac{A_1}{A_2}\left(\frac{\omega_2}{\omega_1}\right)^{\frac{\varepsilon}{1-\varepsilon}}$. Separate information on ψ and ω_j is not needed for the prediction of relative time allocations.

from 1.5 to 2.3.[18] The elasticity of substitution across goods and services, ϵ, is set to 0 given that Herrendorf, Rogerson and Valentinyi (2013) and Moro, Moslehi and Tanaka (2017) both find a value not significantly different from zero. The elasticity between low-skilled and high-skilled labor ρ is set to 1.42 as in Katz and Murphy (1992). For the elasticity between female and male labor, Weinberg (2000) finds an estimate of 2.4 and Acemoglu, Autor and Lyle (2004) find estimates between 2.5 and 4. The benchmark value of η is set at 3. There are no readily available estimates for ρ_l and η_l. We set the benchmark value of $\rho_l = \rho = 1.42$ for the elasticity across high-skilled and low-skilled leisure time. As for the elasticity of substitution across male and female time in leisure, empirical papers have argued for complementarity of male and female leisure time (see Goux, Maurin and Petrongolo (2014), and references therein), suggesting $\eta_l < 1$. We follow Ngai and Petrongolo (2017) to set $\eta_l = 0.2$ in the benchmark. The effects of alternative values for σ, η, η_l, and ρ_l are explored in section 5.3.

The remaining nineteen parameters are calibrated to match relative wages and time allocation for each of the four types of labor inputs in the five sectors (three market sectors, home sector, and leisure). There are a total of nineteen independent data targets used in calibrating the nineteen parameters. The Online Appendix explains how each of these parameters are uniquely pinned down by the data targets. In a nutshell, given the relative wages, the ratio between female and male hours of the same skill in the same sector pins down $\{\xi_{ij}\}$. Similarly, the ratio between low-skilled and high-skilled hours of the same gender in the same sector pins down $\{\lambda_j\}$. The final four parameters $\left\{\varphi, \hat{A}_{12}, \hat{A}_{23}, \hat{A}_{3h}\right\}$ are calibrated to match the three relative wages and leisure time for low-skilled women.

The construction of data targets on wage ratios and time allocation across market, home and leisure was discussed in section 2.1. The data targets are reported in Table 4. The calibration procedure is essentially solving nineteen unknowns from nineteen equations and thus matches the targets exactly. Table 4 also reports the sectoral shares of low-skilled, high-skilled, and total hours in the three market sectors. Although these statistics are not targeted, the model matches them quite well.

The calibrated parameter values are summarized in Table 5. The calibration delivers higher ξ_{ih} and ξ_{i3} than ξ_{i1} and ξ_{i2} for both skill groups, implying that women have a relative comparative advantage in producing home and substitutable services. This calibration result is generated by the higher intensity of female hours in the production of home and substitutable services in the data.

[18] See the survey by Aguiar, Hurst and Karabarbounis (2012) and Rogerson and Wallenius (2016). For individual papers, see for example, Rupert, Rogerson and Wright (1995), Chang and Schorfheide (2003), McGrattan, Rogerson and Wright (1997), Aguiar and Hurst (2007a), Gelber and Mitchell (2012), and Fang and Zhu (2017).

5 Results

In this section, we first discuss the model results on gender ratios in hours and wages. We then discuss the model results on market hours, home hours and leisure. Lastly, we perform several robustness exercises.

5.1 Model Prediction on Gender Ratios

5.1.1 Gender Ratios in Hours and Wages

This section reports the quantitative results on the predictions for the gender hour and wage ratios, obtained by simulating the model with the country-specific taxes and subsidies. Table 6 reports the model results on the differences in the two gender ratios (women relative to men) from the values observed in the United States. We first compare the prediction of the model on gender hour ratios with the data.

Consistent with the data, the model predicts lower gender hour ratios for both skill groups in the Western and Southern European countries than in the United States. On average, taxes and subsidies can explain 40% of the difference in the gender hour ratio between these countries and the U.S. for the low-skilled and 97% of the difference for the high-skilled. In these countries the correlation coefficients between the model predictions and the data are 0.23 and 0.57 for the low-skilled and high-skilled, respectively. Furthermore, the model also accounts for 44% and 62% of the variation in the gender hour ratio from the U.S. for the low and high-skilled, as measured by the coefficient of determination.[19] Nordic countries have high taxes but also high gender hour ratios of women relative to men. Consequently the model predictions for Nordic countries are worse than those for Western and Southern European countries. As a result, the correlation and the coefficient of determination between model and data become weaker when all countries are included.

The last four columns of the table present the model predictions on the gender wage ratios. Consistent with the data, the model generates higher gender wage ratios in European countries and Canada and thus can account for the negative cross-country correlation between the two gender gaps. Quantitatively, taxes and subsidies can account for 17% and 14% of the average difference in gender wage ratios from the U.S. for the low and high-skilled, respectively. Excluding Nordic countries does not change the figures much. To put these

[19]For any given variable y, the coefficient of determination equals $R^2 = 1 - SS_e/SS_T$ where $SS_e = \sum_i (y_{i,model} - y_{i,data})^2$ and $SS_T = \sum_i (y_{i,data} - y_{US})^2$, where $y_{i,model}$ is the value predicted by the model for country i, $y_{i,data}$ is the value taken by variable y in such country, and y_{US} is the value taken by variable y in the United States (both in the model as in the data, since the model is calibrated to the U.S). It compares the "loss" associated with the model prediction relative to the "loss" associated with the U.S. data. See the Online Appendix for details.

numbers in perspective, Olivetti and Petrongolo (2008) find that the selection of women with high-wage characteristics into employment can explain an average of 11% of the differences in gender wage ratios from the U.S. for a similar group of countries.[20] We view our numbers in the same ballpark and conclude that taxes and subsidies are important factors contributing to the cross-country differences in gender wage ratios.

As measured by the coefficient of determination, the model accounts for 20% for the low-skilled and 15% for the high-skilled of the variations in the gender wage ratio between the U.S. and European countries. While the coefficient of determination does not change much by excluding Nordic countries, the correlation coefficient increases from 0.46 to 0.6 for the low-skilled and from zero to 0.26 for the high-skilled by such exclusion.

The combination of preferences and comparative advantages of production factors is important in generating the model results. A higher effective tax induces households to substitute market goods and services with home produced services, and especially they substitute away from substitutable market services because of the good substitutability between such services and the ones produced at home. This leads to less marketization of home production. Because the calibrated $\{\xi_{i3}\}_{\forall i}$ are greater than $\{\xi_{i1}, \xi_{i2}\}_{\forall i}$, women have a relative comparative advantage in producing substitutable services, and therefore the shift in hours away from the market is larger for women than for men. Moreover, because low-skilled women have lower wages, and thus a lower opportunity cost of producing at home or enjoying leisure, the shift is the largest for them. Given the limited substitutability between male and female labor, the larger shift of female market hours decreases the labor supply of women relative to men and drives up the gender wage ratio. Higher subsidies reduce the relative price of substitutable market services and lead to the substitution from home services to their market equivalents, and thus have the opposite effect to that of taxes.

5.1.2 The Role of Taxes and Subsidies

To understand the different effect of taxes and subsidies, in a second exercise we shut down the cross-country differences in subsidies and simulate the model using only the country-specific income and consumption taxes, i.e. setting $t_3 = t_1 = t_2$. Table 7 reports the quantitative results. Comparison between Tables 6 and 7 reveals that most of the model's explanation power on gender ratios comes from taxes. A closer look reveals that the main effect of subsidies are on gender hour ratios in Nordic countries. Qualitatively, high subsidies in Nordic countries operate in opposite direction to their high taxes and generate higher gender hour ratios. Although the model with subsidies does produce smaller differences in gender hour ratios between Nordic countries and the U.S., and therefore improves the model

[20] This number is calculated from Table 2 in Olivetti and Petrongolo (2008).

predictions as measured by the correlation coefficient and the coefficient of determination, the quantitative effects are relatively small compared to taxes and thus are unable to produce as high gender hour ratios in Nordic countries as observed in the data.

Our measure of social subsidies underestimates the government support to households, as it only includes non-cash benefits from the OECD SOCX database. Nordic countries also have many other family-friendly policies, such as larger tax credits and exemptions for domestic services.[21] If these policies were quantified, they would lead to higher female market hours than the ones predicted by our model, and so improve further the model's prediction for Nordic countries.

To summarize, taxes and subsidies make important contributions to the cross-country differences in both gender hour and wage ratios and account for the negative correlation between them. The explanation power is stronger for Non-Nordic countries.

5.1.3 Discussion of Gender Wage Ratios

The quantitative analysis has shown that taxes and subsidies account for about 15% of the average cross-country difference in the gender wage ratio from the United States. To explore other factors that may also contribute to the differences in gender wage ratios, we calibrate the model to each country and target the same set of moments. This alternative calibration matches time allocations and, more importantly, wage ratios to the data values for each country. We then set the taxes and subsidies in each country to the U.S. values in the counterfactuals. The effects of taxes and subsidies are given by the differences in gender ratios between the counterfactual and the calibration. This alternative takes into account cross-country differences not only in taxes and subsidies (τ, t_j) but also in the shares of workers by gender and skill (L_{ig}), gender-skill intensities (ξ_{ij}, λ_j), productivity (A_j) and preference for leisure (φ). Because the calibration requires time use data, we can only perform this analysis on the countries with available time use data. The quantitative effects of taxes and subsidies on the gender ratios from this alternative calibration are quite similar to the baseline calibration.

Because the alternative calibration matches perfectly the gender wage ratio in each country, we can use it to investigate the effect of cross-country differences in parameter values on the gender wage ratio. In particular, we set the parameters for each country to the calibrated U.S. values one by one while holding all other parameters at their values from the alternative calibration. We then measure the effects of that parameter by the differences in the gender wage ratio between the counterfactual and the alternative calibration, as for the

[21] Carbonnier and Morel, eds (2015) discuss the potential consequences on the labor market of alternative policies, including tax credits and exemptions on the purchases of care services in the private market.

effects of taxes and subsidies. The results are reported in Table 8. We find that among the parameters differing across countries $(\tau, t_j, L_{ig}, \xi_{ij}, \lambda_j, A_j, \varphi)$, ξ_{ij} is the only one that has a larger effect on the gender wage ratio than taxes and subsidies. ξ_{ij} determines the relative intensity of the two gender inputs in the production function. The cross-country differences in ξ_{ij} may reflect cross-country differences in women's productivity, social norms, or discrimination against working women. Hence these factors may have important implications on cross-country differences in gender wage ratios.

5.2 Model Prediction on Time Allocation

5.2.1 Market Hours

In addition to the predictions on the gender ratios, the model makes a series of predictions on time allocation. Table 9 summarizes the key results in this front. In this table we observe that, consistent with the data patterns, the model can generate lower European market hours for each gender-skill group and each sector, and it can also account for most of the differences in market hours from the U.S. along these dimensions. The model can also generate larger differences in female, especially in low-skilled female market hours. Measured by the correlation coefficient and the coefficient of determination, the model matches well the cross-country variations in market hours by gender, skill, and sector. Consequently, the model produces a correlation of 0.64 with the data for total market hours. Taxes play a dominant role for the quantitative effects on market hours of both genders and social subsidies have some effects on female market hours and almost no effects on male market hours. The differential effects of taxes and subsidies on men and women are consistent with the regression of market hours by gender and skill groups on the effective taxes and subsidies, as shown in the panel A of Table 3.

Turning to the sectoral hours, section 2 documented that European market hours differ the most from the U.S. in the substitutable service sector. Our model is able to account for this fact because higher taxes in Europe lead to the substitution from substitutable market services to home services. The substitution between these two types of services also implies that more home services and less market-substitutable services will be produced in countries with higher taxes. This implies a higher value-added ratio of the home sector to the substitutable service sector for European countries. Using data on value-added of home and market production from Bridgman, Duernecker and Herrendorf (2018), we find a cross-country correlation of 0.34 in the home-to-substitutable value-added ratio between the model and the data.[22]

[22]We use value-added of home and total market production from Bridgman et al. (2018) and constructed

5.2.2 Home Hours and Leisure

The bottom two panels of Table 9 report the model performance along the two substitution margins. The model predicts well the female share of market hours in total work hours, and the correlation coefficients between model predictions and data improve with social subsidies included. This improvement again comes mainly from the better prediction for women in Nordic countries. The correlation for the male share of market hours in total work is small regardless of social subsidies. This is not surprising since the marketization channel is not important for men in the model which is consistent with the data evidence presented in the panel B of Table 3.

The model also predicts well the share of total work in total available time for both genders as measured by all three reported statistics. Since leisure is the difference between total available time and total work hours, the model also predicts well leisure hours for both genders. Moreover, whether to include subsidies almost has no effect on the model prediction on the share of total work. The model predictions on the two margins are consistent with the data evidence that the effects of taxes and subsidies through the marketization margin are important for women, while the effects of taxes through the work-leisure margin are important for men.

5.3 Robustness

5.3.1 Alternative Parameter Values

This subsection discusses the robustness of the benchmark results to alternative values of $\{\sigma, \eta, \eta_l, \rho_l, \rho\}$. For each alternative, we recalibrate the model to the same set of targets as before and report the average percentage of the gender ratios explained by the model in Tables 10 and 11. As section 4 discussed, the literature finds an estimate for σ between 1.5 and 2.3 and an estimate for η between 2.5 and 4. We use the lower and upper bounds as alternative values. The literature also argues for complementarity for male and female leisure time and thus we explore alternative values of 0.1 and 0.9 for η_l. There is no good estimates for ρ_l and we explore two alternative values of 0.5 and 2. The alternative values for these parameters do not change the mechanism of the model and thus do not change the qualitative predictions for gender hour and wage ratios and therefore the negative correlation between them still holds under the alternatives. In addition, Tables 10 and 11 show that the quantitative results for gender ratios are similar to the benchmark case.

In the benchmark case, we have assumed that the elasticity of substitution between

the value-added share of substitutable services using WIOD data.

high-skilled and low-skilled labor (ρ) is constant across sectors. One may expect that the two skill types are more substitutable in the home sector but less substitutable in the non-substitutable sector, since the non-substitutable sector is the most skill-intensive sector. As robustness checks, we perform two alternative experiments. The first one sets $\rho = 2$ in the home sector and the second one sets $\rho = 0.9$ in the non-substitutable sector. As Tables 10 and 11 show, the resulted gender ratios from both cases are similar to the benchmark case. In the benchmark case, we have also assumed that the elasticity of substitution between female and male labor (η) is constant across skill groups and across sectors. One may expect that male and female labor are more substitutable in service sectors than in the goods sector. As a robustness check, we set η to 4 in the two market service sectors while holding it at the benchmark values elsewhere. The predicted differences in gender ratios from the U.S. are quite similar to those in the benchmark case.

6 Conclusion

Using micro data from 17 OECD countries, this paper documents a negative cross-country correlation between gender ratios (female relative to male) in market hours and wages. The gender hour ratios are higher in the U.S. than in Europe while the opposite occurs for the wage ratios. We find that the gender differences in aggregate market hours across Europe and U.S. are mostly accounted for by the differences in market hours of women (especially low-skilled women) and the size of the service sector that produces close substitutes to home production.

Using a multi-sector model with gender and skill differences, we show that income and consumption taxes can account for a substantial fraction of the cross-country differences in the gender ratios in market hours and wages and also account for the negative correlation between the two ratios. The marketization of female home hours is important for the results. Higher taxes and lower subsidies to family care reduce the marketization of home production and therefore reduce market hours. The effect is larger for women because of their comparative advantage in producing home services and the corresponding market substitutes.

Our study has implications that go beyond the European context and that concern more generally the types of policies that can be used to promote the participation of women in the market. For instance, the International Labour Organization (2016) documents that the gender gap in employment is much larger in many developing countries, and as in the case of Europe, women do most of the housework. That report also suggests that higher government spending on family policies, such as social care services, policies on family leave and family-

friendly work schedules, are associated with higher female employment-to-population ratios. This is consistent with our finding that the key to increase female market hours is to establish policies that reduce the cost of marketizing home production.

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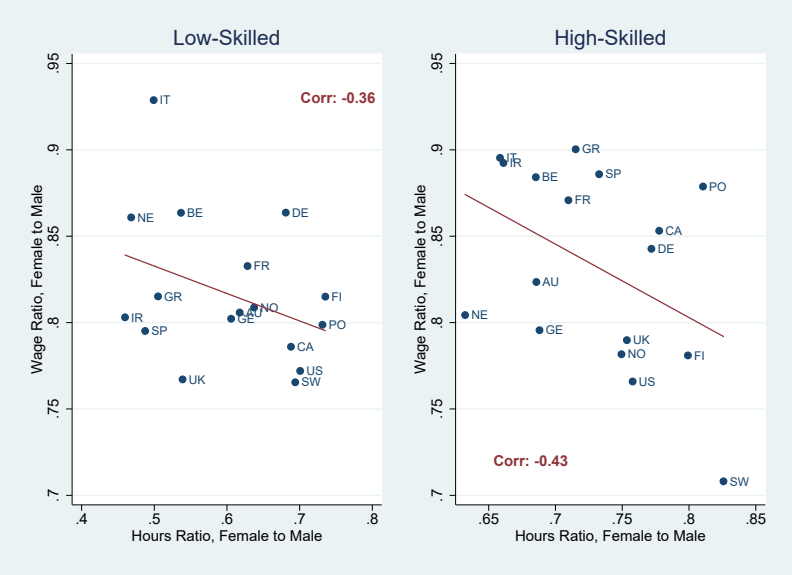
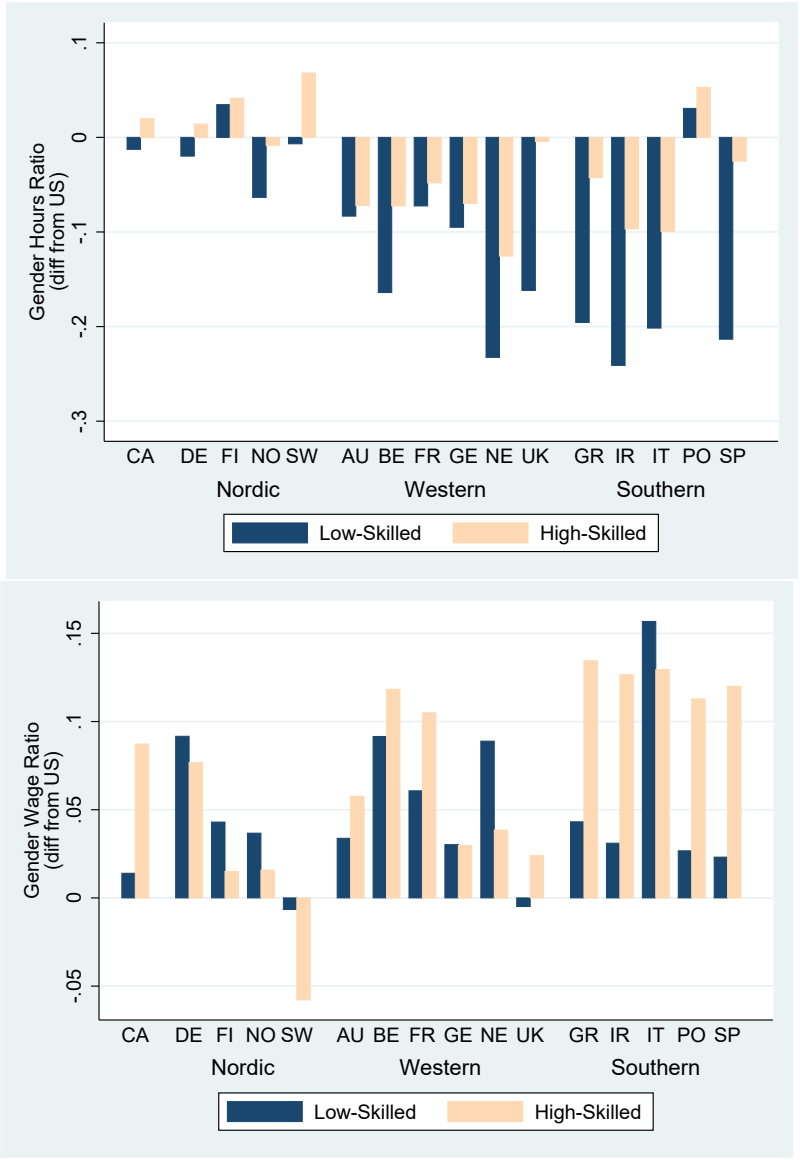
Figures and Tables

Figure 1: Gender Gaps in Market Hours and Wages



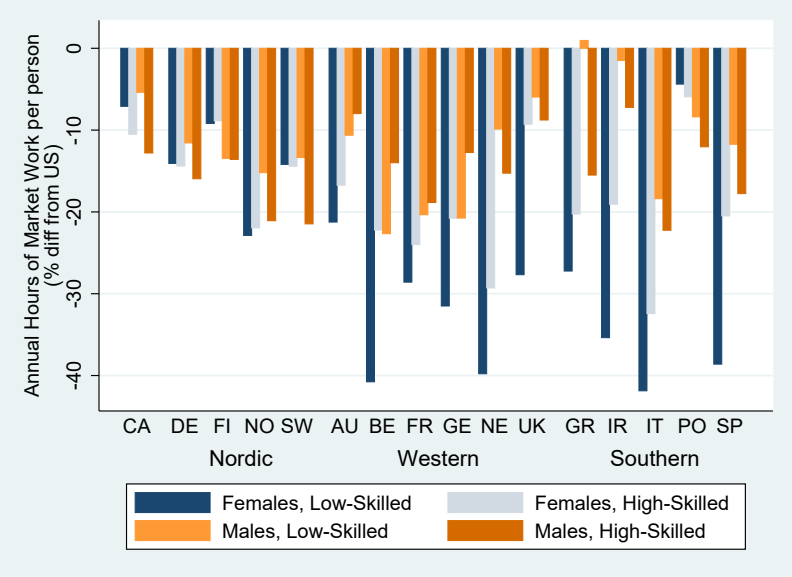
Hours are adjusted for demographic differences across countries. Hourly wage gaps are obtained from a Mincerian regression that controls for age and marital status. Low-skilled individuals are those without a college degree. All values are relative to those in the United States. Data cover years 2000-2004.

Figure 2: Gender Ratios in Market Hours and Wages Relative to the US



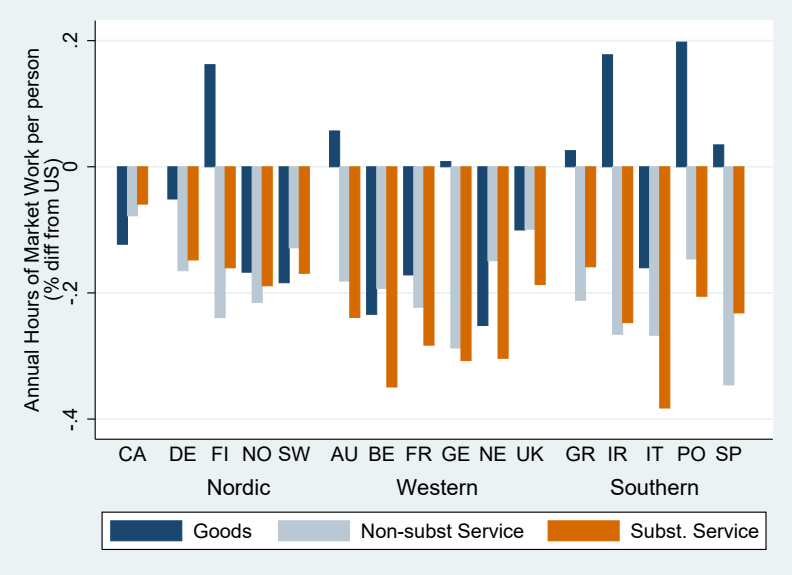
Gender Hour and Wage ratios are adjusted for age and marital status. Data cover years 2000-2004. Low-skilled individuals are those without a college degree.

Figure 3: Hours Worked in the Market by Population Group Relative to the U.S.



Hours are adjusted for demographic differences across countries. Low-skilled individuals are those without a college degree. Data cover years 2000-2004.

Figure 4: Hours Worked by Sector Relative to the U.S.



Hours are adjusted for demographic differences across countries. Data cover years 2000-2004.

Table 1: Decomposition of Difference in Market Hours With Respect to the U.S.

			Share of Difference in Annual Hours wrt U.S.						
			Population Group				Sector		
	Weekly Hours	Fraction of U.S.	Females Low-Skilled	Females High-Skilled	Males Low-Skilled	Males High-Skilled	Substit. Services	Non-Substit. Services	Goods
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Canada	26.1	0.92	0.21	0.23	0.22	0.34	0.21	0.41	0.38
Nordic									
Denmark	24.6	0.86	0.25	0.19	0.29	0.26	0.33	0.56	0.10
Finland	25.2	0.88	0.20	0.14	0.40	0.26	0.42	0.96	-0.38
Norway	22.9	0.80	0.29	0.20	0.27	0.24	0.28	0.49	0.22
Sweden	24.0	0.84	0.22	0.17	0.30	0.31	0.32	0.37	0.31
Western									
Austria	24.5	0.86	0.38	0.22	0.27	0.13	0.52	0.59	-0.11
Belgium	21.3	0.75	0.40	0.16	0.31	0.13	0.41	0.34	0.25
France	22.0	0.77	0.31	0.19	0.31	0.19	0.37	0.44	0.20
Germany	22.3	0.78	0.36	0.18	0.33	0.13	0.42	0.59	-0.01
Netherlands	22.2	0.78	0.45	0.24	0.16	0.16	0.40	0.30	0.30
United Kingdom	24.9	0.87	0.54	0.14	0.16	0.16	0.44	0.35	0.21
Southern									
Greece	24.6	0.86	0.50	0.27	-0.02	0.26	0.35	0.70	-0.05
Ireland	24.4	0.86	0.61	0.24	0.04	0.11	0.50	0.82	-0.32
Italy	20.6	0.72	0.37	0.21	0.23	0.18	0.41	0.44	0.15
Portugal	26.2	0.92	0.14	0.14	0.37	0.35	0.82	0.89	-0.71
Spain	22.4	0.79	0.45	0.18	0.19	0.19	0.32	0.72	-0.04

Weekly hours are the annual market hours per person divided by 52. In the U.S. these hours are 28.4. All estimates hold constant the distribution of demographic characteristics to its U.S. value and keep the age and marital distribution of the population fixed across gender and skill groups (see Data Appendix for details). Columns 3-6 report the contribution (share) of each labor input to the difference in annual hours. Columns 7-9 report the contribution of each sector to this difference. Low-skilled individuals are those without a college degree. Data cover the years 2000-2004 and correspond to a population with 20-64 years of age.

Table 2: OLS Regressions of Gender Ratios against Taxes and Subsidies

	A. Market Hours		**B. Wages**	
	Low-Skilled	High-Skilled	Low-Skilled	High-Skilled
Effective Tax Rate	-0.316	-0.383*	0.342**	0.212
	(0.416)	(0.077)	(0.049)	(0.283)
Subsidy Rate	0.770	0.629**	-0.254	-0.646**
	(0.102)	(0.018)	(0.193)	(0.011)
R^2	0.184	0.344	0.248	0.397
Observations	17	17	17	17
	C. Marketization		**D. Total Work**	
	Low-Skilled	High-Skilled	Low-Skilled	High-Skilled
Effective Tax Rate	-0.773**	-0.578**	0.553	0.456
	(0.038)	(0.034)	(0.187)	(0.167)
Subsidy Rate	1.346***	1.161***	-0.926*	-0.403
	(0.007)	(0.003)	(0.075)	(0.284)
R^2	0.675	0.744	0.390	0.264
Observations	10	10	10	10

All ratios are Female to Male values. Low-skilled individuals are those without a college degree. p-values in parentheses. * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table 3: Linear Regressions of Hours against Taxes and Subsidies

	Females		Males	
	Low-Skilled	High-Skilled	Low-Skilled	High-Skilled
A. Market Hours				
Effective Tax Rate	-1238.7**	-1153.9**	-1283.5***	-720.9*
	(0.050)	(0.015)	(0.002)	(0.070)
Subsidy Rate	1300.7*	806.9	327.0	-236.0
	(0.074)	(0.118)	(0.412)	(0.590)
R^2	0.271	0.355	0.575	0.390
Observations	17	17	17	17
	Females		Males	
	Low-Skilled	High-Skilled	Low-Skilled	High-Skilled
B. Market / Total Work				
Effective Tax Rate	-0.53**	-0.37**	0.08	0.11
	(0.018)	(0.020)	(0.661)	(0.519)
Subsidy Rate	0.81***	0.59***	-0.33	-0.38*
	(0.005)	(0.005)	(0.167)	(0.090)
R^2	0.707	0.714	0.272	0.371
Observations	10	10	10	10
C. Total Work Share				
Effective Tax Rate	-0.03	-0.12	-0.18**	-0.26**
	(0.782)	(0.251)	(0.041)	(0.029)
Subsidy Rate	-0.18	-0.04	0.08	0.09
	(0.221)	(0.763)	(0.371)	(0.467)
R^2	0.326	0.304	0.483	0.544
Observations	10	10	10	10
D. Sector Hours	Total Market	Substitutable Service	Non-Substitutable Service	Goods
Effective Tax Rate	-1145.1***	-512.6***	-455.4**	-170.1
	(0.004)	(0.001)	(0.047)	(0.464)
Subsidy Rate	629.2	422.4**	341.8	-122.4
	(0.127)	(0.011)	(0.184)	(0.650)
R^2	0.468	0.557	0.252	0.124
Observations	17	17	17	17

p-values are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Effective Taxes in the Substitutable Service sector is net of subsidies.

Table 4: Data Moments

Targets						
Time Allocation		Goods	Non-substitutable Services	Substitutable Services	Home	Leisure
Low-Skilled Females	L_{nfj}/L_{nf}	0.024	0.060	0.064	0.169	0.684
High-Skilled Females	L_{efj}/L_{ef}	0.017	0.101	0.065	0.155	0.662
Low-Skilled Males	L_{nmj}/L_{nm}	0.100	0.081	0.048	0.085	0.687
High-Skilled Males	L_{emj}/L_{em}	0.064	0.145	0.059	0.089	0.643
Relative Wages		Gender Ratio		Skill Premium		
		Low Skilled	High Skilled	Women	Men	
		0.77	0.77	1.63	1.64	
Non-Targets						
Time Allocation				Goods	Non-substitutable	Substitutable
Total Low-skilled	$(L_{nfj} + L_{nmj})/(L_{nf} + L_{nm})$					
	Model			0.33	0.37	0.30
	Data			0.33	0.38	0.30
Total High-skilled	$(L_{efj} + L_{emj})/(L_{ef} + L_{em})$					
	Model			0.18	0.55	0.28
	Data			0.17	0.55	0.28
Total	$(L_{efj} + L_{emj} + L_{nfj} + L_{nmj})/(L_{ef} + L_{em} + L_{nf} + L_{nm})$					
	Model			0.27	0.44	0.29
	Data			0.26	0.44	0.29

Table 5: Calibration

Parameters	Values	Targets
Model Free Parameters		
σ	1.9	Aguiar et al. (2012)
ϵ	0	Herrendorf et al. (2013) and Moro et al. (2017)
ρ	1.42	Katz and Murphy (1992)
η	3	Weinberg (2000) and Acemoglu et al. (2004)
η_l	0.2	Baseline based on Ngai and Petrongolo (2017)
Calibrated Parameters		
$\frac{L_{ef}}{L_{em}}, \frac{L_{nf}}{L_{nm}}, \frac{L_{ef}}{L_{nf}}$	1.07, 1.02, 0.60	Shares of market hours in substitutable services as a fraction of total high-skilled hours, total low-skilled hours and total hours
ξ_{nj}	0.33, 0.41, 0.46, 0.49, 0.45	Low-skilled gender hour ratios across sectors
ξ_{ej}	0.34, 0.41, 0.45, 0.49, 0.56	High-skilled gender hour ratios across sectors
λ_j	0.45, 0.62, 0.55, 0.52, 0.52	The ratio of high-skilled to low-skilled female hours across sectors
$\hat{A}_{3h}$	0.82	Relative hours between substitutable services and home
$\hat{A}_{23}$	4.45	Relative hours between non-substitutable services and substitutable services
$\hat{A}_{12}$	1.54	Relative hours between goods and non-substitutable services
φ	1.66	Relative hours between leisure and goods

Table 6: Gender Gaps: Model With Taxes and Subsidies

	Gender Hour Ratio				Gender Wage Ratio			
	Low Skilled		High Skilled		Low Skilled		High Skilled	
Country	Data	Model	Data	Model	Data	Model	Data	Model
Canada	-0.01	-0.03	0.02	-0.02	0.01	0.00	0.09	0.00
Nordic								
Denmark	-0.02	-0.05	0.01	-0.05	0.09	0.01	0.08	0.01
Finland	0.03	-0.06	0.04	-0.06	0.04	0.01	0.02	0.01
Norway	-0.06	-0.04	-0.01	-0.04	0.04	0.01	0.02	0.01
Sweden	-0.01	-0.08	0.07	-0.07	-0.01	0.01	-0.06	0.01
Western Europe								
Austria	-0.08	-0.09	-0.07	-0.08	0.03	0.01	0.06	0.02
Belgium	-0.16	-0.08	-0.07	-0.07	0.09	0.01	0.12	0.01
France	-0.07	-0.08	-0.05	-0.07	0.06	0.01	0.10	0.01
Germany	-0.10	-0.07	-0.07	-0.06	0.03	0.01	0.03	0.01
Netherlands	-0.23	-0.05	-0.13	-0.04	0.09	0.01	0.04	0.01
United Kingdom	-0.16	-0.03	0.00	-0.03	0.00	0.00	0.02	0.01
Southern Europe								
Greece	-0.20	-0.05	-0.04	-0.04	0.04	0.01	0.13	0.01
Ireland	-0.24	-0.03	-0.10	-0.03	0.03	0.00	0.13	0.01
Italy	-0.20	-0.07	-0.10	-0.06	0.16	0.01	0.13	0.01
Portugal	0.03	-0.03	0.05	-0.03	0.03	0.00	0.11	0.01
Spain	-0.21	-0.04	-0.03	-0.03	0.02	0.01	0.12	0.01
Western and Southern								
Mean	-0.14	-0.06	-0.05	-0.05	0.05	0.01	0.09	0.01
Percent explained		40%		97%		16%		10%
Correlation		0.23		0.57		0.60		0.26
Coeff. of Determ.		0.44		0.62		0.21		0.16
All								
Mean	-0.11	-0.06	-0.03	-0.05	0.05	0.01	0.07	0.01
Percent explained		52%		166%		17%		14%
Correlation		0.07		0.23		0.46		-0.03
Coeff. of Determ.		0.40		0.14		0.20		0.15

Cells report differences from U.S. values. Low-skilled individuals are those without a college degree. Data cover years 2000-2004. The percent explained refers to the ratio of the average model predictions (in the listed countries) to the corresponding average in the data.

Table 7: Gender Gaps: Model With Taxes Only

	Gender Hour Ratio				Gender Wage Ratio			
	Low Skilled		High Skilled		Low Skilled		High Skilled	
Country	Data	Model	Data	Model	Data	Model	Data	Model
Canada	-0.01	-0.02	0.02	-0.02	0.01	0.00	0.09	0.00
Nordic								
Denmark	-0.02	-0.08	0.01	-0.07	0.09	0.01	0.08	0.01
Finland	0.03	-0.08	0.04	-0.07	0.04	0.01	0.02	0.01
Norway	-0.06	-0.07	-0.01	-0.06	0.04	0.01	0.02	0.01
Sweden	-0.01	-0.11	0.07	-0.09	-0.01	0.02	-0.06	0.02
Western Europe								
Austria	-0.08	-0.09	-0.07	-0.08	0.03	0.01	0.06	0.02
Belgium	-0.16	-0.09	-0.07	-0.08	0.09	0.01	0.12	0.02
France	-0.07	-0.08	-0.05	-0.07	0.06	0.01	0.10	0.01
Germany	-0.10	-0.07	-0.07	-0.06	0.03	0.01	0.03	0.01
Netherlands	-0.23	-0.06	-0.13	-0.05	0.09	0.01	0.04	0.01
United Kingdom	-0.16	-0.04	0.00	-0.03	0.00	0.01	0.02	0.01
Southern Europe								
Greece	-0.20	-0.05	-0.04	-0.04	0.04	0.01	0.13	0.01
Ireland	-0.24	-0.03	-0.10	-0.03	0.03	0.01	0.13	0.01
Italy	-0.20	-0.07	-0.10	-0.06	0.16	0.01	0.13	0.01
Portugal	0.03	-0.03	0.05	-0.03	0.03	0.00	0.11	0.01
Spain	-0.21	-0.04	-0.03	-0.03	0.02	0.01	0.12	0.01
Western and Southern								
Mean	-0.14	-0.06	-0.05	-0.05	0.05	0.01	0.09	0.01
Percent explained		41%		100%		17%		11%
Correlation		0.25		0.59		0.59		0.21
Coeff. of Determ.		0.46		0.63		0.22		0.16
All								
Mean	-0.11	-0.06	-0.03	-0.05	0.05	0.01	0.07	0.01
Percent explained		60%		187%		20%		16%
Correlation		-0.09		0.05		0.36		-0.22
Coeff. of Determ.		0.38		-0.06		0.23		0.15

Cells report differences from U.S. values. Low-skilled individuals are those without a college degree. Data cover years 2000-2004. The percent explained refers to the ratio of the average model predictions on the differences from the U.S. (in the listed countries) to the corresponding average in the data.

Table 8: Calibration to Each Country: Contribution to Gender Wage Ratios

	Gender Wage Ratio, % Explained	
	Low Skilled	High Skilled
τ, t_j	23%	16%
L_{ig}	0	1%
ξ_{ij}	91%	88%
λ_j	7%	-2%
A_j	-7%	-3%
φ	0	0

Each row represents a counterfactual experiment of setting the variable in that row to the U.S. values. The reported numbers are the ratio of the average model predictions on the difference in the gender wage ratio from a country's own value in the data (for countries with time use data) to the average difference in gender wage ratio from the U.S. in the data. Low-skilled individuals are those without a college degree.

Table 9: Model Predictions on Time Allocation

	With Subsidies			Without Subsidies			
	Corr	Determ	Model	Corr	Determ	Model	Data
Total Market Hours	0.64	0.85	-0.20	0.60	0.79	-0.21	-0.17
Market Hours by Gender-Skill							
Low-skilled Women	0.35	0.76	-0.24	0.28	0.72	-0.26	-0.25
High-skilled Women	0.53	0.76	-0.22	0.48	0.68	-0.24	-0.18
Low-skilled Men	0.75	0.70	-0.17	0.74	0.63	-0.18	-0.12
High-skilled Men	0.58	0.84	-0.16	0.61	0.82	-0.17	-0.15
Market Hours by Sector							
Goods	0.33	-0.10	-0.13	0.34	-0.13	-0.14	-0.05
Non-substitutable	0.38	0.75	-0.13	0.36	0.75	-0.14	-0.20
Substitutable	0.65	0.57	-0.35	0.55	0.29	-0.38	-0.23
Market Hours/Total Work							
Low-skilled Women	0.50	0.62	-0.07	0.20	0.33	-0.08	-0.06
High-skilled Women	0.47	-0.14	-0.06	0.16	-1.27	-0.07	-0.03
Low-skilled Men	-0.06	-2.11	-0.04	0.17	-3.02	-0.05	0.01
High-skilled Men	-0.10	-1.20	-0.04	0.16	-1.78	-0.05	-0.01
Total Work/Total Time							
Low-skilled Women	0.38	0.51	-0.03	0.38	0.51	-0.03	-0.03
High-skilled Women	0.52	0.79	-0.04	0.53	0.80	-0.04	-0.04
Low-skilled Men	0.65	0.70	-0.03	0.64	0.70	-0.03	-0.03
High-skilled Men	0.71	0.81	-0.04	0.70	0.81	-0.04	-0.06

Column "Corr" reports the correlation coefficient between model predictions and data. Column "Determ" reports the coefficient of determination. Column "Data" reports the average difference relative to the values observed in the U.S. and column "Model" reports the corresponding average difference for the model predictions.

Table 10: Robustness: % of Gender Ratios Explained for Western and Southern Europe

	Gender Hour Ratio		Gender Wage Ratio	
	Low Skilled	High Skilled	Low Skilled	High Skilled
Benchmark	40%	97%	16%	10%
$\sigma = 1.5$	31%	75%	13%	9%
$\sigma = 2.3$	46%	104%	19%	12%
$\eta = 2.5$	38%	88%	18%	13%
$\eta = 4$	39%	91%	12%	8%
$\eta_l = 0.1$	39%	93%	17%	12%
$\eta_l = 0.9$	34%	76%	10%	7%
$\rho_l = 0.5$	38%	90%	16%	11%
$\rho_l = 2$	38%	90%	16%	11%
$\rho_h = 2$	37%	87%	15%	10%
$\rho_2 = 0.9$	38%	90%	16%	11%
$\eta_2 = \eta_3 = 4$	40%	95%	15%	9%

Low-skilled individuals are those without a college degree. The percent explained refers to the ratio of the average model predictions on the differences from the U.S. (in the listed countries) to the corresponding average in the data.

Table 11: Robustness: % of of Gender Ratios Explained for All Countries

	Gender Hour Ratio		Gender Wage Ratio	
	Low Skilled	High Skilled	Low Skilled	High Skilled
Benchmark	52%	166%	17%	14%
$\sigma = 1.5$	42%	138%	14%	12%
$\sigma = 2.3$	62%	193%	20%	15%
$\eta = 2.5$	52%	164%	20%	12%
$\eta = 4$	53%	169%	13%	11%
$\eta_l = 0.1$	54%	172%	19%	15%
$\eta_l = 0.9$	46%	140%	11%	9%
$\rho_l = 0.5$	52%	166%	17%	14%
$\rho_l = 2$	52%	166%	17%	14%
$\rho_h = 2$	51%	161%	16%	13%
$\rho_2 = 0.9$	52%	167%	17%	14%
$\eta_2 = \eta_3 = 4$	55%	176%	16%	12%

Low-skilled individuals are those without a college degree. The percent explained refers to the ratio of the average model predictions on the differences from the U.S. (in the listed countries) to the corresponding average in the data.

Data Appendix

A Hours of Work in the Market

To analyze the hours of work in the market we use the European Union Labor Force Survey (EU-LFS) (Eurostat 2015), the March (ASEC) CPS for the United States (Flood, King, Ruggles and Warren 2015), and the 2001 Population Census for Canada (Minnesota Population Center 2017). Our sample is restricted to individuals between the age of 20-64. We classify individuals as high-skilled if they completed college.[23]

The EU-LFS contains information on weekly hours worked both in the main and in a secondary job. In order to construct a consistent measure of annual hours of work per person, we follow the procedures outlined by Bick et al. (2019), including the use of their estimated weeks of effective work over a calendar year. In the case of Finland and Canada, we scale up the weekly hours to match the aggregate annual hours as reported by the OECD, since the aforementioned paper does not include these countries in their sample. From the March CPS we estimate annual hours for the U.S. using information on weekly hours and the number of weeks worked in the previous calendar year. These estimates are then scaled to match the aggregate annual hours reported by Bick et al. (2019), who constructed their estimates using weekly hours from the CPS ORG samples and external information on the number of weeks worked.

To control for demographic differences across countries, we partition each country's population according to skill, gender, age (nine 5-year groups), and marital status. As a result, there are 72 population groups for each year/country pair. For each one of the population groups we calculate average hours and we aggregate them at the gender-skill level using as weights the U.S. population shares. Prior to the aggregation, we adjust the U.S. population shares to ensure that the distribution of age and marital status is constant across gender-skill groups. This is done as follows.

Denote by g a member of the 72-group partition. For any given g, there is a corresponding gender-skill group GS_k such that $g \in GS_k$, and a corresponding age-marital status group AM_l such that $g \in AM_l$. Let $f(g)$, $f(GS_k)$ and $f(AM_l)$ be the fraction of the population in these groups respectively. Then $f(g)$ can be rewritten as:

$$f(g) = f(GS_k)f(AM_l|GS_k), \tag{A.1}$$

where $f(AM_l|GS_k)$ is the fraction of group GS_k with age-marital status AM_l. This fraction

[23] Olivetti and Petrongolo (2014) find that high-school dropouts and high-school graduates are equivalent labor inputs based on their average wages.

$f(AM_l|GS_k)$ varies depending on the gender-skill group. To hold constant the distribution of age and marital status across different gender-skill groups, we replace $f(AM_l|GS_k)$ by $f(AM_l)$. This gives the weights to aggregate the 72 groups:

$$\tilde{f}(g) = f(GS_k)f(AM_l). \tag{A.2}$$

The weight $\tilde{f}(g)$ is constructed from the U.S. population and is then applied to all countries to estimate average hours that control for differences in the demographic composition of the population.

Table A1 presents evidence on the importance of the demographic adjustment. The first column reports the weekly market hours per person for each country before any adjustment for demographics.[24] Following equation (A.2), we construct the adjusted hours for the U.S. holding constant the age and marital status composition across gender-skill groups. For the U.S., the difference between the adjusted values and the raw hours is reported at the bottom of the second column.[25] The values in the second column for countries other than the U.S. are the differences between the raw hours in the first column and the adjusted U.S. hours.

The third column reports the percentage of the cross-country differences accounted for by differences in the composition of the population. This composition effect is estimated as follows. The average hours in a country c, $\bar{h}_c$, can be expressed as a weighted average of the average hours of different demographic groups, i.e. $\bar{h}_c = f_c(g)'\bar{h}_c(g)$, where $f_c(g)$ is the vector of population group shares in country c, and $\bar{h}_c(g)$ is the vector of group-specific average hours. The average hours in the U.S. holding the age and marital status composition constant across gender-skill groups is $\tilde{\bar{h}}_{US} = \tilde{f}_{US}(g)'\bar{h}_{US}(g)$, where $\tilde{f}_{US}(g)$ is the vector of population group shares in equation (A.2) for the U.S. We can express the difference in average hours relative to the adjusted U.S. value as:

$$\tilde{\bar{h}}_{US} - \bar{h}_c = \tilde{f}_{US}(g)'(\bar{h}_{US}(g) - \bar{h}_c(g)) + (\tilde{f}_{US}(g) - f_c(g))'\bar{h}_c(g). \tag{A.3}$$

The second term in the right-hand side of the equation is the contribution of demographic differences to the overall hour gap. Column 3 shows that depending on the country, demographic differences account for between 2 and 33 percent of the cross-country difference in hours.

Table A2 reports market hours after adjusting in addition for compositional differences due to the presence of small children (age 5 or less) in the household.[26] The table shows

[24]The weekly hours are equal to annual market hours per person divided by 52.

[25]The small difference, 0.02, implies that in the U.S. the compositional differences in age and marital status across gender-skill groups have almost no effect on the aggregate hours

[26]This adjustment is not made for Nordic countries nor Canada due to the lack of data.

that the hours obtained are very similar to the ones when the presence of small children is ignored in the demographic adjustment.

A.1 Sectoral Hours

The detailed sectoral classification is presented in Table A3. Given the available industry classification in most household surveys, a more detailed disaggregation is not possible.[27] Sectoral hours are estimated by multiplying the average market hours per person with the share of hours in a given sector. To be consistent with the previous estimates, we also hold the demographics constant across countries in constructing the sectoral hour shares. The procedure is as follows.

Denote by P the total population in a given country, let $p(g)$ be the population size of group g, denote by $p(s,g)$ the number of persons in group g employed in sector s, and let $\bar{h}(s,g)$ be their average hours of work. As before, let $\bar{h}(g)$ be the average market hours per person in group g, and denote by H and H_s the total number of hours worked in the economy, and in sector s, respectively. The sectoral share of hours can be expressed as:

$$\begin{aligned}
\nu_s &= \frac{H_s}{H} \\
&= \frac{\sum_g p(s,g)\bar{h}(s,g)}{\sum_g p(g)\bar{h}(g)} \\
&= \frac{\sum_g \frac{p(s,g)}{p(g)}\frac{p(g)}{P}\bar{h}(s,g)}{\sum_g \frac{p(g)}{P}\bar{h}(g)} \\
&= \frac{\sum_g f(s|g)f(g)\bar{h}(s,g)}{\sum_g f(g)\bar{h}(g)},
\end{aligned} \tag{A.4}$$

where $f(s|g) = \frac{p(s,g)}{p(g)}$ is the fraction of group g who works in sector s, and $f(g) = \frac{p(g)}{P}$ is the population share of group g. To estimate the sectoral shares holding constant the demographics of the population at the U.S. level, we can replace $f(g)$ in the above equation with $\tilde{f}_{US}(g)$ from equation (A.2):

$$\hat{\nu}_s = \frac{\sum_g f(s|g)\tilde{f}_{US}(g)\bar{h}(s,g)}{\sum_g \tilde{f}_{US}(g)\bar{h}(g)}. \tag{A.5}$$

Since the EU-LFS reports hours at the main and secondary job, and these jobs can be in

[27] EU-LFS do not separate wholesale trade with retail trade. We assign the hours going to "Retail Trade" by using detailed hours information from the EU-KLEMS database (see Timmer, O'Mahony and van Ark (2007)), and in the case of France and the UK, by using the national versions of their labor surveys.

different sectors, the above procedure needs to be adjusted to handle this type of information. This additional adjustment does not change the main logic of the above procedure, hence we include its details in the Online Appendix.

B Time Use Data

The time use classification used in this paper follows closely the one of Aguiar and Hurst (2007b) with a few minor adjustments. First, our market hours correspond to the total market work in Aguiar and Hurst (2007b). Second, our home hours is the sum of total nonmarket work and child care time in Aguiar and Hurst (2007b). Third, we assign time spent on gardening and caring for pets to leisure while Aguiar and Hurst (2007b) include it in both home hours and leisure.

C Taxes and Subsidies

The labor income and consumption taxes (τ, t_j) are from McDaniel (2007). Labor income taxes include Federal and State income taxes, as well as Social Security taxes. We use the average rates for the period of 2000-04, except for Ireland and Greece, where, for data availability reasons, we use data from 2002-04, and 2005, respectively.

The expenditures on "in-kind" social subsidies, S, are obtained from the OECD Social Expenditure Database (SOCX). The SOCX includes Old-Age, Incapacity, and Family benefits. The "in-kind" expenditures S are the non-cash public benefits in these three categories, and include expenditures on residential care, home-help services, rehabilitation, and early childhood education and care (e.g. day-care and pre-school services) (see Adema, Fron and Ladaique (2011) for a description of the SOCX database).

The subsidy rate s is given by:

$$s = \frac{S}{GO_{SS}},$$

where GO_{SS} is the gross output in the substitutable service sector. GO_{SS} is constructed using the WIOD input-output matrices (see Timmer, Dietzenbacher, Los, Stehrer and de Vries (2015)). As in Prescott (2004), the effective tax rate is:

$$\tau_e = \frac{t_j + \tau}{1 + t_j}.$$

The net consumption tax in the substitutable service sector is $t_3 = t_1 - s$. The resulting tax and subsidy rates are reported in Table A4. In this table we also show the detailed

components that make up the social subsidy.[28]

D Wages

We construct hourly wage rates using the Labor Force Surveys for France and the UK (Insee 2014, ONS 2015), the Socioeconomic Panel (SOEP) for Germany (Socio-Economic Panel (SOEP) 2015, Wagner, Frick and Schupp 2007), the 2001 population Census for Canada, and the March CPS for the United States. For the rest of Europe, we use the European Community Household Panel (ECHP) (Eurostat 2003) for 2000-2001, and the European Union Statistics on Income and Living Conditions (EU-SILC) (Eurostat 2014) for 2003-2004.[29] In all cases, wages are estimated using the earnings of employees only.

Most surveys provide a measure of current monthly earnings, which is converted to hourly wages by dividing by the product of 4.33 and the weekly hours of work. However, monthly earnings are not available for the U.S. and some countries in SILC, in which case hourly wages are constructed using earnings from the previous year.[30] For the U.S., we divide the previous year earnings by the product of usual weekly hours and weeks worked in that year. For the SILC countries, we divide the previous year earnings by the product of the number of months worked in that year and the current number of weekly hours $\times$ 4.33, because the number of weekly hours worked in the previous year are not available. For this reason, we exclude individuals who changed jobs between the income reference period and the time of the interview.

Gender wage ratios are estimated controlling for age and marital status through a standard Mincerian regression. More specifically, we regress log-wages on a second-order age polynomial, a marital status dummy, and interacted dichotomous indicators for college and gender.[31] The predicted gender wage ratios are obtained by taking the exponential of the corresponding skill-gender interaction parameters.

[28]The SOCX database does not report the Incapacity care expenditures in Canada and the U.S., and the expenditures on Old-Age care in Canada. We impute these missing components by assuming that their share out of the total care expenditures equals the average shares (for each respective component) in countries with complete data. Similar results are obtained by assuming these components equal zero.

[29]The EU-LFS does not contain detailed earnings information.

[30]In SILC these countries include Belgium, Denmark, Finland, The Netherlands, Norway, and Sweden.

[31]Each regression is estimated separately by country. More precisely, for each survey we pool the data for years 2000-4, and include year fixed effects in the estimations whenever more than one year is pooled. In the case of the ECHP and SILC surveys, we estimate separate regressions for each survey-country pair, and the estimated wage gaps are then averaged together. In all cases, the regressions are estimated using the surveys' sampling weights.

Table A1: Contribution of Demographics to Differences in Hours With the U.S.

	Raw Effective Weekly Hours	Market Hours Difference wrt adjusted U.S.	Composition Effect (%)
	(1)	(2)	(3)
Canada	25.9	2.5	5.5
Nordic			
Denmark	24.1	4.3	10.2
Finland	24.2	4.2	21.6
Norway	22.7	5.7	2.0
Sweden	23.7	4.8	7.6
Western			
Austria	22.9	5.6	29.5
Belgium	20.2	8.3	13.7
France	21.0	7.4	13.0
Germany	20.6	7.8	21.2
Netherlands	21.6	6.8	8.2
United Kingdom	23.8	4.6	23.0
Southern			
Greece	23.4	5.0	23.1
Ireland	23.9	4.5	9.7
Italy	18.8	9.6	18.5
Portugal	25.1	3.3	33.4
Spain	21.3	7.1	15.1
United States	28.4	0.02	100

The raw effective weekly hours are the annual market hours per person divided by 52, without adjusting for demographic differences between countries. Column (2) is the difference between column (1) and the hours in the U.S. obtained after holding constant the demographic composition of the population as described in Appendix section A. The non-zero quantity reported for the U.S. arises because of the difference between raw hours and the adjusted hours for the U.S. which is obtained by holding constant the age-marital composition across gender-skill cells. The composition effect in column (3) is the percentage of the value in column (2) due to demographic differences relative to the U.S. (see equation (A.3)). Data cover individuals aged 20-64 years, over the years 2000-2004.

Table A2: Market Hours by Population Group Adjusting for Compositional Differences in Age, Marital Status, and Presence of Small Children

	Females				Males			
	Low-Skilled		High-Skilled		Low-Skilled		High-Skilled	
	Hours	abs(% Diff)	Hours	abs(% Diff)	Hours	abs(% Diff)	Hours	abs(% Diff)
Western								
Austria	17.2	0.60	22.4	1.77	28.1	0.33	33.4	0.55
Belgium	12.9	0.71	20.9	1.63	24.2	0.26	31.7	2.28
France	15.9	1.39	21.0	0.98	25.0	0.00	29.4	0.41
Germany	14.9	1.23	21.2	2.06	25.0	0.62	31.6	0.38
Netherlands	13.3	0.41	19.0	1.51	28.3	0.18	30.8	0.86
United Kingdom	16.4	2.98	24.5	1.44	29.6	0.18	33.1	0.53
Southern								
Greece	15.9	0.73	21.6	0.84	31.9	0.78	30.8	0.88
Ireland	14.8	3.83	22.2	0.51	30.9	0.06	33.5	0.13
Italy	12.7	0.78	18.4	0.20	25.7	0.35	28.2	0.48
Portugal	21.0	0.08	25.3	1.49	28.8	0.04	31.8	0.12
Spain	13.4	0.54	21.5	1.06	27.7	0.19	29.9	0.83
United States	22.0	0.14	27.3	0.34	31.4	0.03	36.1	0.08
Concordance Corr.	0.997		0.993		0.999		0.992	

Columns "Hours" report weekly market hours holding constant the population composition by age, marital status, and presence of small children (age 5 or less). Columns abs(% Diff) report the absolute percentage difference between the Hours column and the hours obtained without the adjustment for the presence of small children. The last row reports the concordance correlation for the hours with and without adjustment for the presence of small children.

Table A3: Sector Classification

Sector	**ISIC (v. 3) Code**
Goods	Agriculture, Hunting, Forestry and Fishing (A,B) Mining and Quarrying (C) Manufacturing (D) Electricity, Gas, and Water (E) Construction (F)
Non-Substitutable Services	Wholesale Trade and Sale of Motor vehicles (50,51) Transport and Communications (I) Financial Intermediation (J) Real Estate and Business Activities (K) Public Administration, Defense, Compulsory Soc. Sec. (L) Education (M)
Substitutable Services	Retail Trade (52) Hotels and Restaurants (H) Health and Social Work (N) Other Personal and Community Services (O) Private Households as Employers (P)

Table A4: Taxes and Subsidies

	Taxes		Subsidies on Care			
	Income	Consumption	Old-Age	Incapacity	Family	Total
Canada	0.22	0.17	0.003	0.003	0.007	0.01
Nordic						
Denmark	0.33	0.31	0.070	0.046	0.081	0.20
Finland	0.37	0.23	0.038	0.036	0.056	0.13
Norway	0.32	0.25	0.096	0.042	0.058	0.20
Sweden	0.41	0.32	0.099	0.064	0.062	0.22
Average Nordic	*0.36*	*0.28*	*0.076*	*0.047*	*0.064*	*0.19*
Western						
Austria	0.40	0.21	0.015	0.012	0.017	0.04
Belgium	0.41	0.20	0.006	0.033	0.037	0.08
France	0.38	0.23	0.010	0.007	0.062	0.08
Germany	0.39	0.15	0.000	0.029	0.030	0.06
Netherlands	0.32	0.18	0.028	0.009	0.035	0.07
United Kingdom	0.26	0.17	0.017	0.011	0.031	0.06
Average Western	*0.36*	*0.19*	*0.013*	*0.017*	*0.036*	*0.07*
Southern						
Greece	0.30	0.15	0.002	0.002	0.013	0.02
Ireland	0.22	0.23	0.015	0.004	0.023	0.04
Italy	0.35	0.20	0.003	0.002	0.025	0.03
Portugal	0.24	0.18	0.005	0.002	0.021	0.03
Spain	0.28	0.15	0.009	0.005	0.021	0.04
Average Southern	*0.28*	*0.18*	*0.007*	*0.003*	*0.021*	*0.03*
United States	0.21	0.07	0.001	0.006	0.022	0.03

Labor income and consumption taxes are obtained from McDaniel (2007). Subsidies are constructed following Ngai and Pissarides (2011), and are expressed as fraction of the Gross Output of the Substitutable Service sector. Incapacity care subsidy is imputed for the U.S. and Canada, while Old-Age care expenditures are imputed for Canada. For more details see section C in this Appendix.