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ABSTRACT

Taxes and Market Hours: The Role of Gender and Skill*

Cross-country differences of market hours in 17 OECD countries are mainly due to the hours of women, especially low-skilled women. This paper develops a model to account for the gender-skill differences in market hours across countries. The model explains a substantial fraction of the differences in hours by taxes, which reduce market hours in favor of leisure and home production, and by subsidized care, which frees (mostly) women from home care in favor of their market hours. Low-skilled women are more responsive to policy because of their low market returns and their comparative advantage in home activities.

JEL Classification: E24, E62, J22

Keywords: cross-country differences in market hours, home production, subsidies on family care

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NON-TECHNICAL SUMMARY

Aggregate hours of market work in broadly similar countries across the OECD vary widely. For example, during the early 2000s, weekly market hours per adult aged 20-64 in the U.S. were about 28 while they ranged from 19 to 25 in a sample of European countries. The majority of these differences are driven by the responses of different demographic groups to different incentives in the labor market.

We document that differences in aggregate market hours are mainly due to differences in the hours of women, especially women without a college degree. We also find that market hours in European countries are particularly lower in the service sector.

Our paper shows that differences in taxes and social subsidies on family care account for a substantial fraction of the observed cross-country differences in market hours by gender, skill, and economic sector.

As taxes increase, households decrease their market hours and devote more time to leisure and home production. The reduction in market hours is especially large in the service sectors producing close substitutes to home services. This shift of hours from market to home is larger for women, since home production is mainly performed by women. Moreover, as low-skilled women have lower wages, and therefore the lowest opportunity cost of not working in the market, the shift of time away from the market is the largest for them.

In contrast, social subsidies on family care reduce the price of market services that are close substitutes with the ones produced at home, and thus increase the incentive to marketize home services. This results in more female market hours, especially among the low-skilled. The role played by subsidies helps reconcile the labor supply patterns observed in Nordic countries, where both taxes and subsidies are high, and women have relatively high market hours of work.

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. In particular, our research highlights the key role of policies that reduce the cost of marketizing home production, such as subsidies on family care. This seemingly gender-neutral policy is effectively gender-biased, given women's greater involvement in housework activities.

1 Introduction

Aggregate hours of market work in broadly similar countries across the OECD vary widely. For example, during the early 2000s, weekly market hours per adult aged 20-64 in the U.S. were about 28 while they ranged from 19 to 25 in the European countries in our sample. While some of these differences can be attributed to a different demographic composition across countries along dimensions such as age, marital status, gender, and education, the majority of the differences are driven by responses of different demographic groups to different incentives in the labor market.

The objective of this paper is to delve deeper into the cross-country relationship between tax-subsidy and market hours, by paying particular attention to the different responses across gender and skill groups. Using labor force surveys from 17 OECD countries, this paper compares market hours by gender-skill group across countries, controlling for differences in their demographic composition. Empirically, it documents that differences in aggregate market hours are mainly due to differences in the hours of women, especially women without a college degree (hereafter, referred as low-skilled women).[1] It also finds that market hours in European countries are particularly lower in the service sector than in the goods sector. It shows that taxes are negatively associated with market hours for each of the gender-skill groups. More importantly, when account is taken for the presence of social subsidies on family care, this negative association becomes even stronger for low-skilled women and for service sectors that produce close substitutes to home services. These empirical findings suggest that gender, skill, and sector of employment are important dimensions for understanding how taxes and subsidies affect cross-country differences in aggregate market hours.

Lower market hours could either reflect more time devoted to leisure or to home production. The main hypothesis of this paper is that taxes and subsidies affect market hours differently across gender-skill groups through two substitution margins: across market and home and across work (market plus home) and leisure. Using harmonized time use data, this paper finds that while the substitution between work and leisure is important in understanding cross-country differences of market hours for all gender-skill groups, the substitution between market and home is more important for women, especially for low-skilled women.[2]

Motivated by these empirical findings, we develop a multi-sector model to study the quantitative effects of taxes and subsidies on market hours through the two substitution margins.

[1] Fang and McDaniel (2017) also find that differences in cross-country market hours are dominated by the market hours of women.

[2] Both Freeman and Schettkat (2005) and Burda, Hamermesh and Weil (2013) emphasized the importance of substitution between home and market production in understanding cross-country differences in market hours.

The model consists of three market sectors producing goods, non-substitutable services, and substitutable services. Substitutable services and home services are good substitutes, with an elasticity of substitution greater than one, while goods and services are poor substitutes. There are four types of labor inputs, male and female with low or high skill. Production in each sector involves all four types of labor inputs. The representative household allocates time to market work, home production, and leisure for each gender-skill group.

The calibrated model implies that differences in taxes and social subsidies on family care can account for a substantial fraction of the observed cross-country differences in market hours by gender, skill, and sector. The combination of preferences and comparative advantages of production factors is critical in producing the model results. In particular, the effects of taxes and subsidies occur through the two substitution margins between work and leisure on the one hand; and market and home work on the other. The first margin is equally important for all population groups, while the second margin is more important for women if they have a comparative advantage in producing services such as adult and child care, both in the market and at home.[3]

Income and consumption taxes discourage market hours through both substitution margins. In particular, as taxes increase, households decrease their market hours and devote more time to leisure and home production. The reduction in market hours is especially large in the substitutable service sector because it produces close substitutes to home services. If women have a relative comparative advantage in producing home and substitutable services, the shift of hours from market to home will be larger for women than for men. The fall in women's labor supply relative to men drives up the female wage relative to the male wage, resulting in a higher gender wage ratio (women relative to men) for the countries with high taxes. Moreover, as low-skilled women have lower wages, and therefore the lowest opportunity cost of not working in the market, the shift of time away from the market is the largest for them.

In contrast, social subsidies on family care operate mainly through the substitution margin between market and home work. They reduce the relative price of substitutable market services and thus increase the incentive to marketize home services, resulting in more female market hours, especially among the low-skilled.

The model is calibrated to match time allocation by gender and by skill in the U.S. economy. The observed sector-specific gender intensity implies that women have comparative advantages in producing home and substitutable market services, while men have compar-

[3]For references on women's comparative advantage in services relative to men, see for example, Weinberg (2000) on interpersonal and communication skills; and Galor and Weil (1996) and Rendall (2017a) on brain versus brawn skills.

ative advantages in producing goods and non-substitutable services. We then simulate the model with the taxes (income and consumption) and subsidies observed in European countries. On average, taxes alone can account for almost all the differences in aggregate market hours between Central European countries, Canada and the U.S., and 89% of the difference between Southern European countries and the United States. Nordic countries in contrast have higher taxes, but also higher female market hours than Southern European countries, and thus taxes alone cannot explain this pattern. Allowing for the higher social subsidies on family care observed in Nordic countries goes a long way in reconciling the patterns observed in the data. The quantitative results show that taxes and social subsidies together do a good job in accounting for the cross-country variation in market hours by gender, skill, and sector. Taxes affect market hours of all demographic groups and all sectors, while social subsidies affect mainly market hours of women and hours in the substitutable market service sector. This result is consistent with the descriptive evidence from the time use data.

Finally, the model predicts higher gender wage ratios (women relative to men) for both high-skilled and low-skilled groups in European countries. This is an unique feature of the model that is consistent with the data. Quantitatively, however, taxes and subsidies account for only 16% of the difference in the low-skilled gender wage ratio and 14% of the difference in the high-skilled gender wage ratio between the European average and the U.S.; which suggests that other complementary factors are important in determining the cross-country differences in gender pay gaps (see for instance Blau and Kahn (2000) and Blau and Kahn (2003)).

There is a large literature analyzing the relation between taxes and cross-country differences in aggregate market hours, beginning with the one-sector models of Prescott (2004) and Ohanian, Raffo and Rogerson (2008). Rogerson (2008), Olovsson (2009), McDaniel (2011) and Duernecker and Herrendorf (2017) argue that home production is important in propagating the effect of taxes. Ngai and Pissarides (2011) and Ragan (2013) both find that social subsidies on family care play an important role in accounting for differences in market hours between European countries and the U.S., especially for Nordic countries.[4] However, none of these papers study cross-country differences in market hours by demographic group, which we show here to be critical in our understanding of differences in aggregate hours.

Recent works by Chakraborty, Holter and Stepanchuk (2015), Bick and Fuchs-Schündeln (forthcoming) and Rendall (2017b) have explicitly taken into account the role of gender. Chakraborty et al. (2015) study the role of divorce and taxes and Bick and Fuchs-Schündeln (forthcoming) study the role of the non-linearity of labor income taxes in accounting for

[4]This is in line with the view of Rogerson (2007) that the way in which the government spends the tax revenue is important for understanding the effects of taxes on market hours.

the cross-country differences in market hours by gender. In contrast to these two papers, which focus on the structure of the tax system, we study how taxes and subsidies alter the cost of outsourcing home production. Our distinction between home production and leisure as competing non-market activities enables us to analyze separately the adjustment of hours along the margin of total work and leisure and the margin of market work and home work, which, as we show, is important in understanding aggregate differences across countries. Among the cited papers, Rendall (2017b) also separates non-market hours into home hours and leisure but her focus is different from ours, being the potential impact of different taxation regimes on the structural transformation and the rise of female and service employment in the United States.[5]

Our emphasis on the important role played by social subsidies on family care for the explanation of outcomes for low-skilled women is consistent with the findings of Guner, Kaygusuz and Ventura (2016), who show that increasing child-care subsidies in the U.S. has substantial positive effects on female labor supply, especially for low-skilled women. For adult care, Barczyk and Kredler (2016) documented that countries with low public spending on long-term care are less likely to use market-provided care services, and instead rely on care provided by family members, which is also consistent with our findings.

The rest of the paper is organized as follows. Section 2 presents the cross-country facts that motivate the paper. Section 3 presents the model and section 4 summarizes its qualitative results. Section 5 calibrates the model and presents the quantitative results. Finally, 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] This section briefly describes the data used in the analysis and presents a set of key stylized facts. For a more detailed description of the data sources and construction procedures, please refer to the Data Appendix.

[5]Another difference between our paper and Chakraborty et al. (2015), Bick and Fuchs-Schündeln (forthcoming) and Rendall (2017b) is that we endogenize the gender wage ratio by allowing male and female labor inputs to be imperfect substitutes in production, whereas they assume that the gender wage ratio is exogenous. See also Ngai and Petrongolo (forthcoming) for the implications of an endogenous gender wage ratio for trends in market hours in the U.S. labor market.

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

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 (2016), we construct consistent measures of annual hours worked per person across countries.

It is well-known that market hours differ across demographic groups. For instance, high-skilled individuals work more than low-skilled individuals, prime-age individuals work more than young and old individuals, and married women work less than single women. It is therefore potentially important to control for differences in the demographic composition when making cross-country comparisons. 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. Thus, cross-country differences in hours worked within the same demographic group explain most of the differences in aggregate market hours across countries.

To understand the effect of taxes and subsidies on each gender-skill group, estimates of market hours are constructed 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 constant population shares constructed from the U.S. data. The population shares also control for differences in age and marital composition across gender-skill cells. Thus we control for differences in marriage rates across education groups and across countries, which were analyzed by Chakraborty et al. (2015), Bick and Fuchs-Schündeln (forthcoming) and Rendall (2017b).

In the Data Appendix, we checked for the impact of one additional partition of the population depending on the presence of small children in the household. The analysis excludes Nordic countries and Canada due to the lack of data. The resulting hours by gender-skill for the remaining 12 countries only change slightly relative to the ones obtained under the original partition.[7] We abstract from this dimension in our data partition, given

[7] 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 differences in the

our objective of understanding the role of social subsidies on family care (adult and child care), which is a key feature in Nordic countries.

To study the implications of policy through the market and home margin, market hours are estimated for three 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 the service sector can be substituted with home production. Broadly speaking, a service industry is classified as "substitutable" if its product can be replaced by activities performed at home.[8] To be consistent, in the construction of sectoral hours we also control for differences in the demographic composition across countries.[9]

2.1.2 Time Allocation across Market, Home and Leisure

To examine the two margins of substitution across work and leisure and across market and home, the share of market hours as a fraction of total work (market plus home), and the fraction of total work out of total time are constructed using the American Time Use Survey (ATUS) and the Multinational Time Use Study (MTUS). For the years we study, time use surveys are available for ten of the sample countries, which we can use to examine the two margins of substitutions.[10] The construction of market and home hours follows closely the classification of Aguiar and Hurst (2007b) with the key exception that we include child care in home hours. Other differences due to the time use classification of MTUS relative to the one in ATUS are reported in the Data Appendix. 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

Hourly wage rates are constructed 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

working hours of women.

[8]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.

[9]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.

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.

2.1.4 Taxes and Social Subsidies

The labor income and consumption taxes are from McDaniel (2007). Average 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. Following Ngai and Pissarides (2011), the subsidy rate is computed as the "in-kind" expenditures on social services as a fraction of the gross output of the substitutable service sector. Expenditures on social subsidies are obtained from the OECD Social Expenditure Database (SOCX), and include old-age, incapacity, and other family benefits.[11] The constructed subsidy rates are much larger in Nordic countries than in other European countries and the United States.[12] In addition, on average, 40% of the total expenditure on social subsidies is accounted for by old-age and incapacity benefits, and this number rises to almost 65% in Nordic countries. The rest is accounted for by other family benefits, like day-care.

2.2 Cross-Country Facts

2.2.1 Market Hours

Table 1 presents weekly market hours per person. As reported in the literature, the U.S. has the highest weekly hours per person among the studied countries. In European countries weekly hours range between 72-92% of the hours in the United States.[13] Among them, Italy has the lowest weekly hours.

Figure 1 presents the percentage difference in hours worked relative to the U.S. for each of the four population groups. In most 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 exceptions occur for Nordic countries, Canada, and Portugal, where the largest proportional differences are observed among high-skilled men. 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 Central and Southern European countries on average 44% of the difference in market hours is accounted for by the hours of low-skilled women and 64%

[11] The categories included are expenditures on residential care, home-help services, rehabilitation, and day-care, among others. See Adema, Fron and Ladaique (2011) for a description of the SOCX database.

[12] The country-specific taxes and subsidy rates are reported in Table A4 of the Data Appendix.

[13] Similar to Chakraborty et al. (2015) we group Ireland together with Southern European countries based on the similarity of the labor supply of women among these countries.

by women in total; while in Nordic countries, Canada and Portugal low-skilled women only account for one-fifth of the difference and women in total account for 40%.

Turning now to the sectoral dimension, Figure 2 displays the proportional differences in sectoral hours relative to the United States. Consistent with Rogerson (2008), lower aggregate market hours are mostly due to lower hours in service sectors. In fact, a few European countries even have higher hours in the goods sector than the United States. 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 Central 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 falls to one-third and one-fifth, respectively.

2.2.2 Market Hours and Taxes

Regarding the relationship between market hours and taxes, Figure 3 plots annual market hours per person for the four demographic groups against the effective tax rate. The effective tax rate, as in Prescott (2004), is $\frac{\text{consumption tax rate + labor income tax rate}}{\text{1+consumption tax rate}}$. The top panel in the figure presents the unconditional plots between hours and taxes, while the bottom panel displays the partial regression plots that control for social subsidies.[14] The straight line is the OLS regression line, b is the regression coefficient, and t is the t-statistic. The regression results are also reported in Table 2.

From Figure 3, it is apparent that higher taxes are associated with lower market hours for all the four demographic groups. More importantly, after controlling for the impact of subsidies, the negative association increases significantly for women and is particularly more than doubled for low-skilled women, as measured by the regression coefficient; while there is no significant change for men. This finding contrasts with that of Chakraborty et al. (2015) which 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.[15] Furthermore, subsidies are positively associated

[14]Partial regression plots display the relationship between a dependent variable y and a regressor x, after controlling for other variables z. This is achieved by plotting the residuals of a regression between y and z, against the residuals of a regression between x and z. In other words, it is a visual way of representing a relationship between two variables after controlling for the impact of other factors. More importantly, the slope of the linear fit between these two residuals equals the coefficient of variable x in a regression of y against x and z. This is a consequence of the Frisch-Waugh-Lovell Theorem (Frisch and Waugh 1933). Partial regression plots are sometimes also known as "added-variable" plots and "individual coefficient" plots.

[15]See Figure 1 in Chakraborty et al. (2015). In addition to the above reasons, we follow the procedures outlined by Bick et al. (2016) and control for demographic composition differences to obtain more comparable market hours across countries.

with the market hours of low-skilled women as shown in the top panel of Table 2.

Chakraborty et al. (2015) and Bick and Fuchs-Schündeln (forthcoming) both find that separate or joint taxation on household income is an important factor in accounting for cross-country differences in the market hours of women. Table A5 in the Data Appendix reports the same regression results as in Table 2 while conditioning on a measure of jointness of the tax system constructed by Chakraborty et al. (2015). Conditioning on jointness only alters slightly the regression coefficients of market hours on effective taxes and subsidies. This provides evidence that effective taxes and subsidies are important for understanding female market hours even after controlling for the degree of jointness in the tax system. It is also worth noting that progressivity of the tax code only matters in the joint taxation system. In a separate taxation system, more progressive taxes in Europe, as documented by Guvenen, Kuruscu and Ozkan (2014), may actually reduce the gender-hours gap because couples can avoid higher tax brackets by earning similar income.

Figure 4 plots sectoral hours against taxes. 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 present the correlations of market hours with the effective tax rate as well as with the effective tax rate net of the subsidy rate. The figure shows that market hours in all the three sectors are negatively correlated with taxes, and that the largest negative association occurs for the substitutable service sector when subsidies are netted out. Without subsidies, the size of the negative association in the substitutable service sector will be similar to that in the other two sectors. This implies the potential importance of subsidies in driving the level of market hours in the substitutable service sector.

2.2.3 Two Margins of Substitution

Using the market hours, home hours and leisure constructed in section 2.1.2, Figure 5 plots the share of market hours in total work hours (market plus home) against the effective tax. The plots that correct for the impact of subsidies display a negative correlation between the share of market hours and the effective tax for women, especially for low-skilled women. This can also be observed from the regression results in the middle panel of Table 2, which also shows for women a positive correlation between the share of market hours and subsidy rates. This suggests that for women higher taxes induce the substitution from market hours to home hours, while social subsidies lead to the opposite substitution. For men, the correlations between the share of market hours and the effective tax and subsidies are small, which implies that the substitution margin between market and home is not as important for them.

Figure 6 plots the share of total work hours in total available time (market plus home plus leisure) against the effective tax. The share of total work is negatively correlated with

effective taxes for both genders and controlling for subsidies only changes the correlations slightly. The correlations between the share of total work and subsidies are in general small as shown in the bottom of Table 2. This suggests that taxes are the dominant factor for the substitution margin between total work and leisure.

2.2.4 Gender Wage Ratio

Figure 7 plots the cross-country difference in the gender wage ratio (female/male) by skill level. Almost all countries have higher gender wage ratios (i.e. lower gender wage gaps) for both skill levels, than the U.S. does.[16]

To summarize, this section documents that market hours in European countries are much lower for women, especially for low-skilled women. Our hypothesis is that higher taxes induce households to substitute certain market services with home services, which leads to lower market hours in the substitutable service sector. If women have a comparative advantage in home production, this substitution margin will be stronger for them, especially for low-skilled women who have lower market wages and thus a lower opportunity cost of not working in the market. Hence, this substitution margin reduces women's hours relative to men. The fall in the relative supply of female market hours leads to higher gender wage ratios in countries with high taxes. The evidence presented in this section is broadly consistent with this mechanism. The evidence also suggests that the previous mechanism will be attenuated in economies with a higher subsidy to family care, such as in the Nordic countries, as these subsidies generate the opposite substitution between market and home relative to the one induced by taxes.

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 by a representative household to each sector 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 any subsidy and j takes values $1, 2, 3$, denoting the goods sector, the non-substitutable service sector, and the substitutable

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

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. The disutility from work is independent of sectors, and labor moves freely across sectors.

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. 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:

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

where A_j is labor productivity and 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:

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

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. The parameter ξ_{ij} affects the intensity of female labor input in producing the composite L_{ij}. We allow ξ_{ij} to differ across skill and sectors. The parameter ρ is the elasticity of substitution between low-skilled and high-skilled labor, and η is the elasticity of substitution between female and male labor.

3.2 The Representative Household

The representative household consists of four types of labor, with a joint utility function:

$$U\left(c_1, c_2, c_3, c_h, L_l\right) = \ln c + \varphi \ln L_l, \tag{3}$$

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

$$c \equiv \left[\sum_{j=1,2,s} \omega_j c_j^{\frac{\epsilon-1}{\epsilon}}\right]^{\frac{\epsilon}{\epsilon-1}}; \quad c_s = \left[\psi c_3^{\frac{\sigma-1}{\sigma}} + (1-\psi)\, c_h^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}, \tag{4}$$

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 (1)-(2)):

$$c_h = A_h L_h, \quad L_h = \left[\lambda_h L_{eh}^{\frac{\rho-1}{\rho}} + (1-\lambda_h) L_{nh}^{\frac{\rho-1}{\rho}}\right]^{\frac{\rho}{\rho-1}}, \tag{5}$$

where

$$L_{ih} = \left[\xi_{ih} L_{ifh}^{\frac{\eta-1}{\eta}} + (1-\xi_{ih}) L_{imh}^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}}, \; i = n, e, \tag{6}$$

and A_h is labor productivity for the home sector.

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

$$L_l = L_l\left(L_{nl}, L_{el}\right) = \left[\lambda_l L_{el}^{\frac{\rho_l-1}{\rho_l}} + (1-\lambda_l)\, L_{nl}^{\frac{\rho_l-1}{\rho_l}}\right]^{\frac{\rho_l}{\rho_l-1}}, \tag{7}$$

where

$$L_{il} = \left[\xi_{il} L_{ifl}^{\frac{\eta_l-1}{\eta_l}} + (1-\xi_{il})\, L_{iml}^{\frac{\eta_l-1}{\eta_l}}\right]^{\frac{\eta_l}{\eta_l-1}}, \; i = n, e, \tag{8}$$

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

The household is endowed with L_{ig} ($g = m, f$ and $i = n, e$) units of labor of skill i and gender g. 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 (3) subject to (4)-(8) and the household budget constraint:

$$\sum_{j=1,2,3}(1+t_j)p_j c_j = T + (1-\tau)\sum_{i,g} w_{ig}(L_{ig} - L_{igh} - L_{igl}). \tag{9}$$

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 (1)-(2); and the representative household maximizes utility (3) subject to (4)-(9).

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

$$c_j = Y_j, \qquad j = 1,2,3, \tag{10}$$

$$\sum_{j=1,2,3} L_{igj} = L_{ig} - L_{igh} - L_{igl}, \qquad i = n,e; \quad g = f,m. \tag{11}$$

3. Government budget constraint is satisfied:

$$T = \tau \sum_{i,g} w_{ig}(L_{ig} - L_{igh} - L_{igl}) + \sum_{j=1,2,3} t_j p_j c_j. \tag{12}$$

4 Qualitative Results

The full derivation of the competitive equilibrium is provided in the Online Appendix. This section highlights some important qualitative results regarding the effect of taxes and subsidies on the time allocation across sectors and genders. The consumption of goods and non-substitutable services is taxed at the same rate, i.e., $t_1 = t_2$, while the consumption of substitutable services could be taxed at a lesser rate and the difference between t_3 and t_1 or t_2 captures the subsidy from the government.

Given free labor mobility, profit maximization of the firms and utility maximization of the household imply that marginal rates of technical substitution across genders are equal to the gender wage ratio, which gives:

$$\frac{L_{imj}}{L_{ifj}} = \alpha_{ij}^{-\eta} x_i^{\eta}; \qquad \alpha_{ij} \equiv \frac{\xi_{ij}}{1-\xi_{ij}}, \qquad x_i \equiv \frac{w_{if}}{w_{im}}, \quad j = 1,2,3,h; \quad i = n,e, \tag{13}$$

where x_i is the gender wage ratio across skill group i. Thus the effects of taxes and subsidies on gender hour ratios only work through their effects on the equilibrium gender wage ratio x_i.

In a similar vein, given free labor mobility, profit and utility maximization imply that marginal rates of technical substitution across skills are equal to the skill premium, which gives:

$$\frac{L_{efj}}{L_{nfj}} = \left(\frac{\lambda_j}{1-\lambda_j}\right)^{\rho} \left(\frac{\xi_{ej}}{\xi_{nj}}\right)^{\frac{\eta(\rho-1)}{\eta-1}} \left(\frac{I_{ej}(x_e)}{I_{nj}(x_n)}\right)^{\frac{\eta-\rho}{\eta-1}} \pi_f^{-\rho}, \qquad \pi_f \equiv \frac{w_{ef}}{w_{nf}}, \quad j = 1,2,3,h, \tag{14}$$

where π_f is the female skill premium and $I_{ij}(x_i)$ denotes the share of the female wage bill in total income from skill i in sector j: $I_{ij}(x_i) \equiv \frac{w_{if}L_{ifj}}{w_{im}L_{imj}+w_{if}L_{ifj}} = \frac{1}{1+\alpha_{ij}^{-\eta}x_i^{\eta-1}}$. Equation (14) implies that the effects of taxes and subsidies on the hour ratios across skills only work through their effects on equilibrium relative wages (x_e, x_n, π_f). For the ease of notation, define $X \equiv (x_e, x_n, \pi_f)$.

4.1 Market Hours by Sector

As the market hours of low-skilled women differ the most across countries, we now focus on discussing the time allocation of this population group. Time allocation for the other three types of labor follows from equations (13) and (14). We first derive the time allocation across substitutable and home services before turning to time allocation across the market sectors.

By equalizing the marginal rate of substitution between substitutable market services and home hours to their relative prices, we obtain the relative time allocation for low-skilled women across home and the substitutable sector:

$$\frac{L_{nf3}}{L_{nfh}} = \hat{A}_{3h}^{\sigma-1}\left(\frac{1-\tau}{1+t_3}\right)^{\sigma} R_{3h}(X), \quad \hat{A}_{3h} \equiv \left(\frac{A_3}{A_h}\right)\left(\frac{\psi}{1-\psi}\right)^{\frac{\sigma}{\sigma-1}}, \tag{15}$$

where $\hat{A}_{3h}$ is the effective relative productivity. Equation (15) states that the relative time allocation between sector 3 and h depends on the relative sector-specific productivity, the relative sector-specific taxes, and a function $R_{3h}(X)$ that only depends on the relative wages and parameters in the production functions of sector 3 and h.

Higher taxes (higher income tax τ or higher consumption tax t_3, thus lower $\frac{1-\tau}{1+t_3}$) induce a shift of low-skilled female hours from the substitutable market service sector to the home sector. Intuitively, as substitutable market services and home services are, by construction, good substitutes $(\sigma > 1)$, a fall in the opportunity cost of home services (due to higher taxes) reduces the incentive to "marketize" these services. This effect is also present for the other

three demographic groups.

The relative time allocation across non-substitutable and substitutable services can be derived similarly:

$$\frac{L_{nf2}}{L_{nf3}} = \hat{A}_{23}^{\varepsilon-1}\left(\frac{1+t_3}{1+t_2}\right)^{\varepsilon} R_{23}\left(X;\frac{1-\tau}{1+t_3}\right), \quad \hat{A}_{23} \equiv \frac{A_2}{A_3}\left(\frac{\omega_s}{\omega_2}\right)^{\frac{\varepsilon}{1-\varepsilon}} \psi^{\frac{\sigma}{1-\sigma}}, \tag{16}$$

where $\hat{A}_{23}$ is the effective relative productivity and $R_{23}\left(X;\frac{1-\tau}{1+t_3}\right)$ is a decreasing function of $\frac{1-\tau}{1+t_3}$. According to equation (16) taxes and subsidies affect time allocation across non-substitutable and substitutable service sectors through two mechanisms. The first mechanism is due to the term $R_{23}\left(X;\frac{1-\tau}{1+t_3}\right)$, which reflects the substitution margin across substitutable and home services, namely the decision to marketize home services. As home services are a better substitute to substitutable services than to non-substitutable services, i.e. $\sigma > 1 > \varepsilon$, a higher tax implies fewer home services are marketized, resulting in a fall in market hours in the substitutable service sector relative to the non-substitutable services sector: a lower $\frac{1-\tau}{1+t_3}$ leads to a higher $R_{23}\left(X;\frac{1-\tau}{1+t_3}\right)$. The second mechanism is the substitution margin across non-substitutable and substitutable services as relative sector-specific taxes $\left(\frac{1+t_3}{1+t_2}\right)$ affect their relative prices. Because of subsidies to the consumption of substitutable services, t_3 is less than t_2, resulting in a shift in hours from sector 2 to sector 3.

The relative time allocation between goods and non-substitutable service sectors is:

$$\frac{L_{nf1}}{L_{nf2}} = \hat{A}_{12}^{\varepsilon-1}\left(\frac{1+t_2}{1+t_1}\right)^{\varepsilon} R_{12}(X), \quad \hat{A}_{12} \equiv \frac{A_1}{A_2}\left(\frac{\omega_2}{\omega_1}\right)^{\frac{\varepsilon}{1-\varepsilon}}. \tag{17}$$

Equation (17) implies that the relative time allocation across goods and non-substitutable services depends on the relative productivity, the relative consumption taxes and a function of relative wages $R_{12}(X)$. Given equal consumption taxes across goods and non-substitutable services, it follows that taxes have no direct effect on the relative time allocation across these two sectors, except through their effects on equilibrium relative wages.

The effect of taxes on the distribution of working hours can be summarized as follows:

Result 1 *Ignoring the general equilibrium effect through the relative wages X, a higher labor income tax τ shifts hours from the substitutable service sector to home and the non-substitutable service sector, i.e., $\frac{L_{ig3}}{L_{igh}}$ decreases and $\frac{L_{ig2}}{L_{ig3}}$ increases, and has no direct effect on $\frac{L_{ig1}}{L_{ig2}}$, for $i = n, e$, and $g = m, f$. On the other hand, a higher net consumption tax t_j reduces market hours of sector j.*

Proof: See the Online Appendix.

The key implication of Result 1 is that higher income taxes reduce market hours in the substitutable service sector, while subsidies increase market hours in this sector. This prediction is consistent with the data facts presented in Section 2.2.

4.2 Market Hours by Gender

The effect of taxes on the relative hours of men and women is summarized as follows:

Result 2 *Ignoring the general equilibrium effect through the relative wages X, when women have a relative comparative advantage in producing substitutable services, i.e., $\xi_{i3} > \{\xi_{i1}, \xi_{i2}\}$, a higher income tax τ and a higher consumption tax t_3 both decrease the total market hours of women relative to men for both skill groups.*

Proof: See the Online Appendix.

Result 2 states that the gender-neutral tax τ has a gender-biased effect on market hours due to women's comparative advantage in producing substitutable services. Specifically, the negative effect of the income tax is larger for women than for men. Furthermore, the larger is ξ_{i3} relative to ξ_{i1} and ξ_{i2}, the bigger is the effect of the income tax on the relative market hours by gender. Intuitively, given $\sigma > 1$ and $\epsilon < 1$, a higher τ will lead to a greater shift of market hours from the substitutable service sector to the home sector, than from the other two market sectors. If women have a comparative advantage in producing substitutable services, a larger fraction of female market hours will be shifted to home.

The effect of t_3 is similar to τ. A higher t_3 induces the substitution of substitutable services with goods and other services. Given $\sigma > 1$ and $\epsilon < 1$, the substitution is larger from the home sector and the comparative advantage plays a similar role as in the case of the income tax.

To sum up, the key implication of Result 2 is that higher income taxes reduce female market hours more than male market hours, whereas subsidies have the opposite effect.

5 Quantitative Results

5.1 Calibration

The model is calibrated to match time allocation and wage ratios in the U.S. economy around the year 2000 (the average of 2000-2004). Predictions for other countries are obtained by simulating the model with the country-specific taxes and subsidies. 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 elasticity parameters $\{\sigma, \varepsilon, \rho, \eta, \rho_l, \eta_l\}$; the relative time endowment $\left\{\frac{L_{ef}}{L_{em}}, \frac{L_{nf}}{L_{nm}}, \frac{L_{ef}}{L_{nf}}\right\}$; 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 $\left\{\hat{A}_{3h}, \hat{A}_{23}, \hat{A}_{12}\right\}$ as defined in section 4.1.[17] Excluding the six elasticity parameters, the remaining twenty-two parameters are chosen to match the data targets on time allocation and relative wages across the four types of labor in the U.S. economy.

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 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 estimated 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, Petrongolo and Maurin (2014), and references therein), suggesting $\eta_l < 1$. Using time-use data for the U.S., Ngai and Petrongolo (forthcoming) find that $\eta_l = 0.19$ matches the response of the gender hour ratio to changes in gender wage ratio from 1970 to 2006 in the United States. This low value of η_l is due to the rather stable gender ratio in total work hours. Thus $\eta_l = 0.2$ is used as the benchmark.

The remaining twenty-two parameters are calibrated to match time allocation for each of the four types of labor inputs in the five sectors (three market sectors, a home sector, and leisure). There are a total of twenty-two independent data targets used to calibrate the twenty-two parameters. The Online Appendix explains how each of these parameters are uniquely pinned down by the data targets. In a nutshell, the data targets deliver the fraction of time allocated to each sector $\left\{\frac{L_{igj}}{L_{ig}}\right\}$. Given the time allocation, the share of market hours in the substitutable service sector as a fraction of total high-skilled hours, low-skilled

[17] Note that as shown in equation (15), (16) and (17), separate information on preference parameters $\{\psi, \omega_j\}$ are not needed for the prediction of relative time allocations.

[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).

hours and aggregate hours are used to derive the relative endowment $\left\{\frac{L_{ef}}{L_{em}}, \frac{L_{nf}}{L_{nm}}, \frac{L_{ef}}{L_{nf}}\right\}$. The equilibrium condition for gender wage ratios (13) is used to solve for $\{\xi_{ij}\}$. The equilibrium condition for skill premium (14) is used to solve for $\{\lambda_j\}$. Finally, the final four parameters $\left\{\varphi, \hat{A}_{12}, \hat{A}_{23}, \hat{A}_{3h}\right\}$ are calibrated to match the relative time allocation across the five sectors for low-skilled women. The baseline parameter values are summarized in Table 3. The data targets are reported in the Online Appendix following the discussion of the calibration procedures.

5.2 The Role of Taxes

This subsection reports the quantitative results using only the country-specific income and consumption taxes, i.e. setting $t_3 = t_1 = t_2$. The next subsection discusses the effect of social subsidies.

We first compare the prediction of the model on market hours for the four demographic groups with the data. Table 4 shows that the model predicts lower market hours for each gender-skill group in all European countries and Canada. More importantly, for European countries the model predicts larger percentage differences in female market hours, especially for the low-skilled, from the U.S., which is consistent with the data facts presented in Section 2.2. The model's predictions on sectoral market hours, as reported in Table 5, are also broadly consistent with the data. Predicted market hours in the two service sectors are uniformly lower than in the United States. Predicted market hours in the goods sector are also uniformly lower, while in the data they are higher in a few European countries. However, because market hours in the goods sector are only about 25%-30% of the total market hours in the sample countries, the opposite prediction does not lead to significant differences in the level of total hours.

As the discussion following Results 1 and 2 indicates, 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 leisure, and especially they substitute away from substitutable market services because of the good substitutability between such services and the ones produced at home. Because the calibrated $\{\xi_{i3}, \xi_{ih}\}_{\forall i}$ are greater than $\{\xi_{i1}, \xi_{i2}\}_{\forall i}$, women have a relative comparative advantage in producing substitutable services and home services, and therefore the shift in hours away from the market is larger for women than for men. Moreover, because low-skilled women have the lowest wage and thus the lowest opportunity cost of producing at home or enjoying leisure, the shift is the largest for them.

As shown in the first two columns of Table 5, on average the model closely predicts the

differences in aggregate market hours between Central European countries, Canada, and the U.S., and it also predicts 89% of the difference between Southern European countries and the U.S., while over-predicts the difference between Nordic Countries and the United States. Table 4 reveals that the model particularly over-predicts the difference in female market hours between Nordic Countries and the United States. In the next subsection we introduce social subsidies which as argued by several authors, are essential in understanding the impact of taxes on hours of work in the Nordic countries.

We next turn to the model prediction of the cross-country variation of market hours. Figure 8 plots the model predicted market hours by gender, skill and sector against the data. If the model accounts perfectly for the data, all the markers would align along the 45-degree line. To statistically evaluate the performance of the model, the bottom panels of Tables 4 and 5 report several goodness-of-fit statistics. As is well known, the correlation coefficient measures the linear association between the model predictions and the data. However, it is not a great measure to detect deviations from the 45-degree line. Chakraborty et al. (2015) use the coefficient of determination as a measure of goodness-of-fit, using the U.S. data as a reference point. The main disadvantage of this measure is that its scale is hard to interpret whenever it falls below zero. The concordance correlation is a statistic that measures precisely the mean square deviations from the 45-degree line and it always lies between -1 and 1 (Lin (1989) and Cox (2006)). Hence, the concordance correlation is the preferred measure to evaluate the model's fit with the data. Nonetheless, we also report the correlation coefficient and the coefficient of determination for comparison purposes with other papers in the literature.[19]

The concordance correlation is 0.35 for aggregate market hours and ranges from 0.03 for low-skilled women to 0.48 for low-skilled men.[20] The model predictions on sectoral market hours are also consistent with the data but slightly weaker. The concordance correlation is 0.17 for the goods sector, 0.15 for the substitutable service sector, and 0.05 for the non-substitutable service sector.

5.3 The Role of Social Subsidies

Tables 6 and 7 report the results when we allow social subsidies on the consumption of substitutable services. The inclusion of subsidies greatly improves the prediction of market hours in Nordic countries, especially for women, and has minimal effects on market hours in Central and Southern European countries. This is because the subsidy rate, as reported in

[19] We define and compare these three statistics in the Online Appendix.

[20] All the reported goodness-of-fit measures exclude the United States, as the model was calibrated to the U.S. values.

Table A4, is much larger in Nordic countries.

The inclusion of subsidies also improves most of the goodness-of-fit measures. The largest improvements occur for the predictions for low-skilled women and for the substitutable service sector. In the case of low-skilled women, the concordance correlation increases from 0.03 to 0.11 and for the substitutable sector this coefficient increases from 0.15 to 0.27. The prediction on total market hours also improves with subsidies, with the concordance correlation increasing from 0.35 to 0.42. The improvement is also evident in Figure 8, as the model predictions with subsidy are closer to the 45-degree line.

The goodness-of-fit measures indicate that social subsidies mainly affect female market hours and market hours in the substitutable service sector. Higher subsidies reduce the effective price of substitutable services and induce the substitution away from other goods and services. Because home services are a better substitute for substitutable services, the substitution away from home services is the largest and therefore home hours will be shifted to the substitutable service sector. Furthermore, since women have a comparative advantage in producing at home, this shift is larger for them.

As a demonstration of the predictive ability of the model, we note that Chakraborty et al. (2015) report a coefficient of determination of 0.45 for aggregate market hour, while we obtain a coefficient of 0.85. Our improvement in this statistic mainly comes from the disaggregation that we use and the model's predictions of female market hours. While Chakraborty et al. (2015) report coefficients of determination ranging between 0.1 and 0.2 for women, we obtain a coefficient of determination of 0.77 for high-skilled women and 0.76 for low-skilled women.

Our measure of social subsidies may underestimate the government support to households, as it is computed from the in-kind government expenditures in the SOCX database. Nordic countries also have many other family-friendly policies, such as larger tax credits and exemptions for domestic services, and flexible work schedules for employees to fulfill parental duties.[21] These policies, if they could be quantified, 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.

5.4 Two Margins of Substitution

In our model, taxes and subsidies work through the two substitution margins: market work versus home work (i.e. marketization), and total work versus leisure. The model predictions on the two margins are reported in Tables 8 and 9. The tables only contain nine countries

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

where time use surveys are available.

Table 8 shows that under higher taxes women shift their market hours to home production, and with higher subsidies they do the opposite. This is consistent with the data facts presented in Figure 5. In Nordic countries, the model again over-predicts the shift in female market hours to home production, and social subsidies reduce this over-prediction. The effect of subsidies on female market hours is also evident in Figure 9: When social subsidies are included, the model predictions on the share of female market hours move towards the 45-degree line and the concordance correlation increases from close to zero to 0.28 for low-skilled women and to 0.25 for high-skilled women. The concordance correlation for the share of male market hours is small regardless of social subsidies, which is not surprising, because as shown in Figure 5, taxes and subsidies are not correlated with the share of male market hours.

Figure 10 and Table 9 report time allocation along the total work versus leisure margin. As the table shows, in the data the share of total work is lower in European countries than in the U.S. for both men and women. The model with higher taxes can deliver this result because the substitution along the work-leisure margin is important for both genders, which is also consistent with the data facts presented in Figure 6. The concordance correlation ranges from 0.17 to 0.42, implying that the model also does a good job in predicting the cross-country variation in the share of total work. Because subsidies mainly affect the time allocation between market hours and home hours, they almost have no effect on the share of total work.

5.5 Gender Wage Ratio

Table 10 reports the gender wage ratio (women/men). When compared with the Unitied States, the model predicts higher gender wage ratios for both skill groups in all European countries and Canada. The intuition is that higher taxes lead to larger decreases in market hours for women and so, to clear the market female wages have to rise relative to male wages. Together with subsidies, the model on average can account for 16% of the difference in the low-skilled gender wage ratio and 14% of the difference in the high-skilled gender wage ratio between European countries and the United States.

Table 10 reveals that the concordance correlations are low, with or without subsidies. Figure 11 confirms that taxes and subsidies alone cannot account for the large variation in the gender wage ratio across countries. We view these results as an indication that other complementary factors such as labor market institutions, culture and discrimination are important for understanding the cross-country differences in this ratio (see Blau and Kahn

(2000) and Blau and Kahn (2003)). Another channel documented by Olivetti and Petrongolo (2008) is the self-selection of high ability women into the labor market in Southern Europe, leading to higher gender wage ratios in these countries.

5.6 Robustness

This subsection discusses some robustness checks of the benchmark results. For each case below, we recalibrate the model to the same set of targets as before.

We first explore the effects of alternative values for the elasticity of substitution between substitutable and home services (σ). Alternative values for this elasticity do not change the mechanism of the model and thus do not change the qualitative predictions across the gender-skill groups. The literature finds estimates for σ between 1.5 and 2.3. Setting σ to the upper (lower) bound leads to only one more (less) percentage point difference in the aggregate market hours for the European average relative to the United States. The concordance correlations hardly change.

Also, setting alternative values for $\eta = \{2.5, 4\}$, $\eta_l = \{0, 1\}$, and $\rho_l = \{0, 2\}$ has no effect on the concordance correlation, and at most leads to one-tenth of a percentage point change from the benchmark simulation for the difference in the aggregate market hours between the European average and the United States. Thus, our results are robust to variations in the key elasticity parameters within the entire range of empirical estimates in the recent literature.

6 Conclusion

Using micro data from 17 OECD countries, this paper documents that cross-country differences in aggregate market hours of work are mainly due to women's market hours, especially the hours of low-skilled women. Using a multi-sector model that allows for both gender and skill differences in market work, home work and leisure, we show that taxes and social subsidies on family care can account for a substantial fraction of the observed cross-country differences in market hours. Both substitution margins across work and leisure and across market and home production are important. Higher taxes reduce market hours through both margins, while higher social subsidies increase market hours through the market and home margin. This reversal helps reconcile the labor supply patterns observed in Nordic countries, where both taxes and subsidies are high, and women have relatively high market hours of work.

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. Among these policies, we studied in-kind social subsidies such as family care, and showed that this seemingly gender-neutral policy is effectively gender-biased, given women's comparative advantage in these family-oriented activities.

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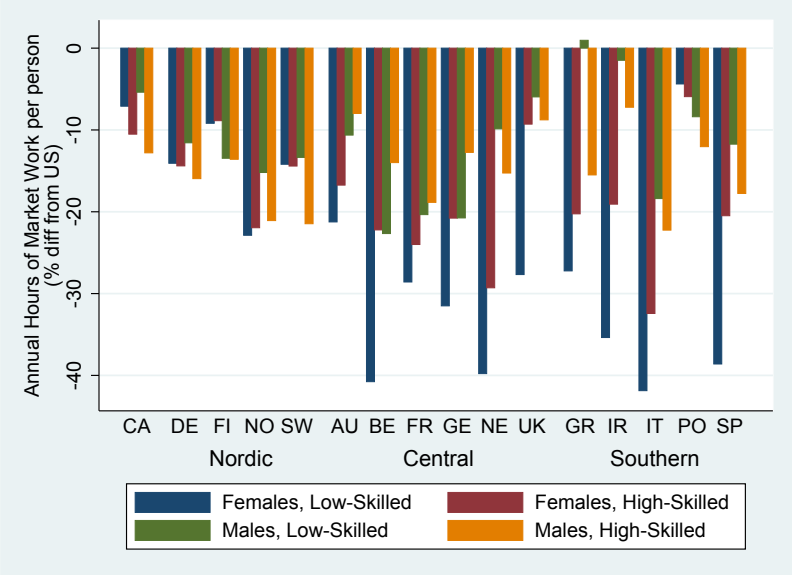
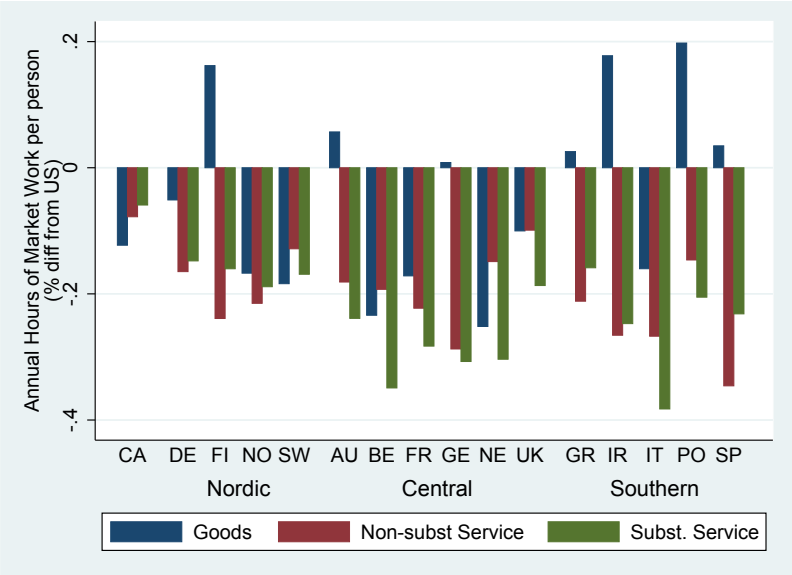
Figures and Tables

Figure 1: Hours Worked in the Market by Population Group Relative to the U.S.



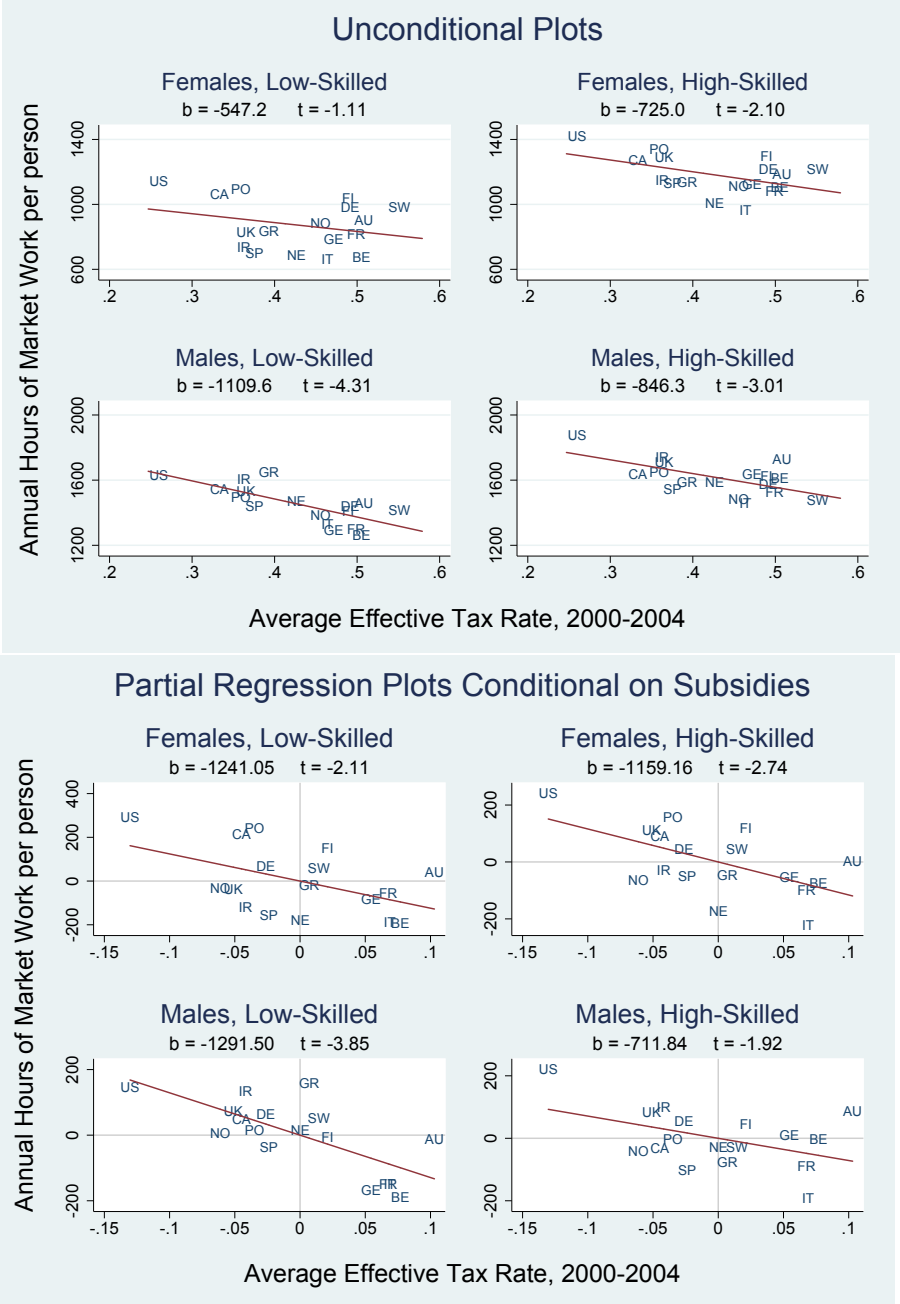
Hours are adjusted for demographic differences across countries. Low-skilled individuals are those without a college degree. Data cover years 2000-2004.

Figure 2: Hours Worked by Sector Relative to the U.S.



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

Figure 3: Hours Worked in the Market and Effective Taxes



The y-axis (x-axis) on the partial regression plots is the residual of a regression of hours (effective taxes) on subsidies.

Figure 4: Hours Worked by Sector and Effective Taxes

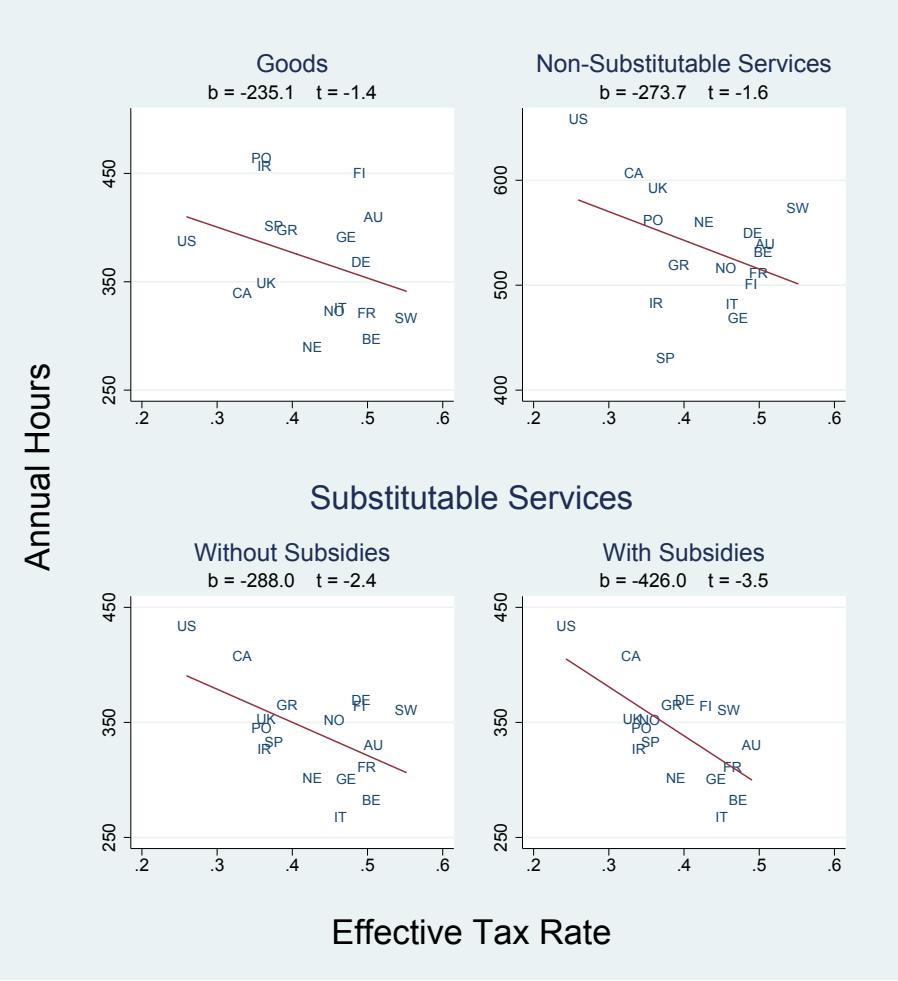
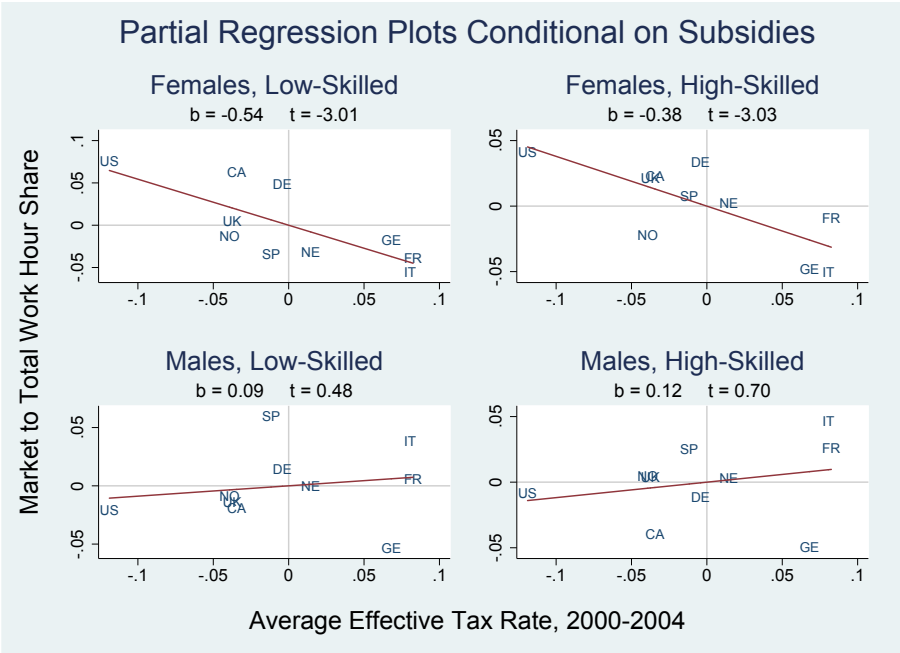
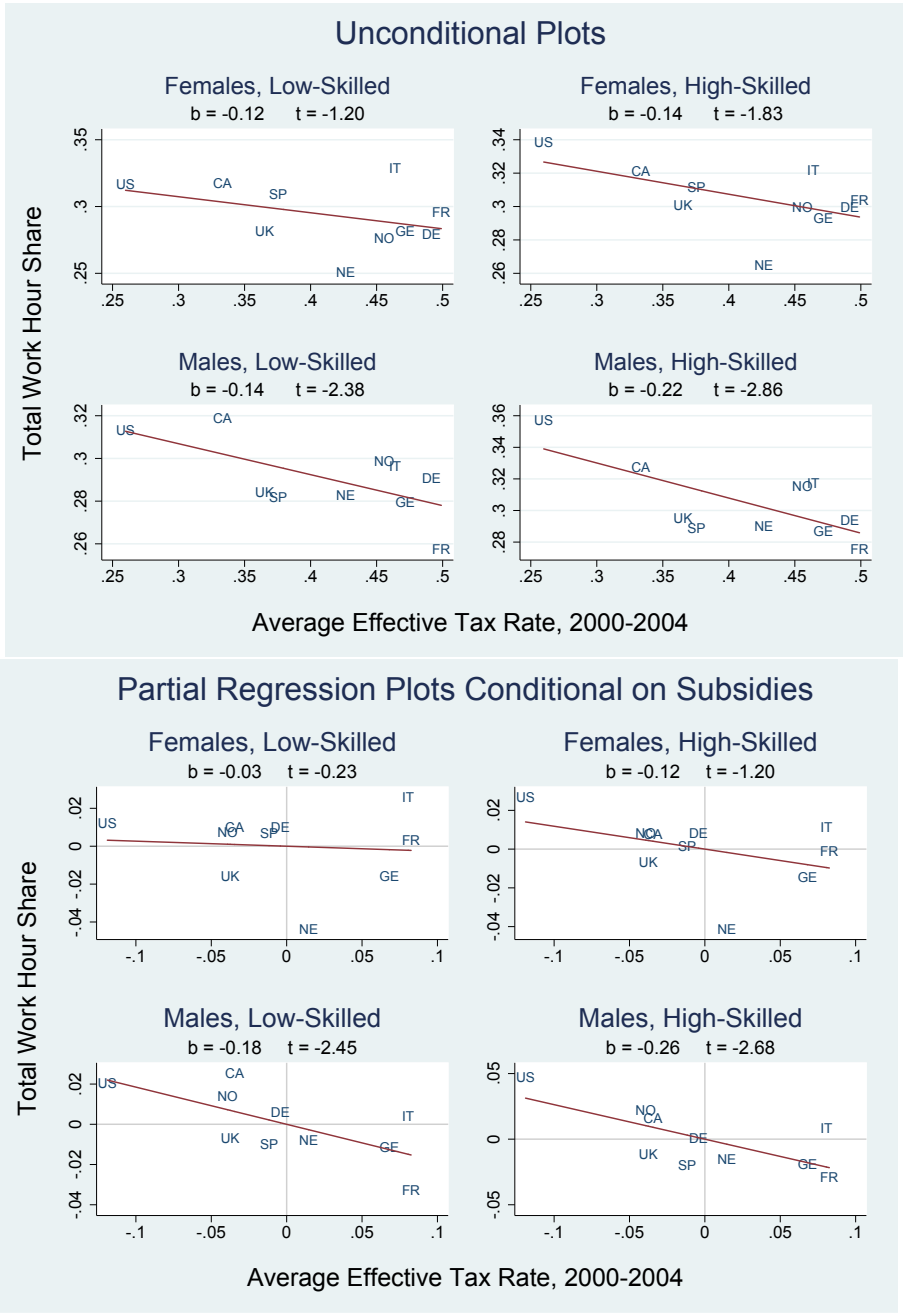


Figure 5: Share of Market Work and Effective Taxes



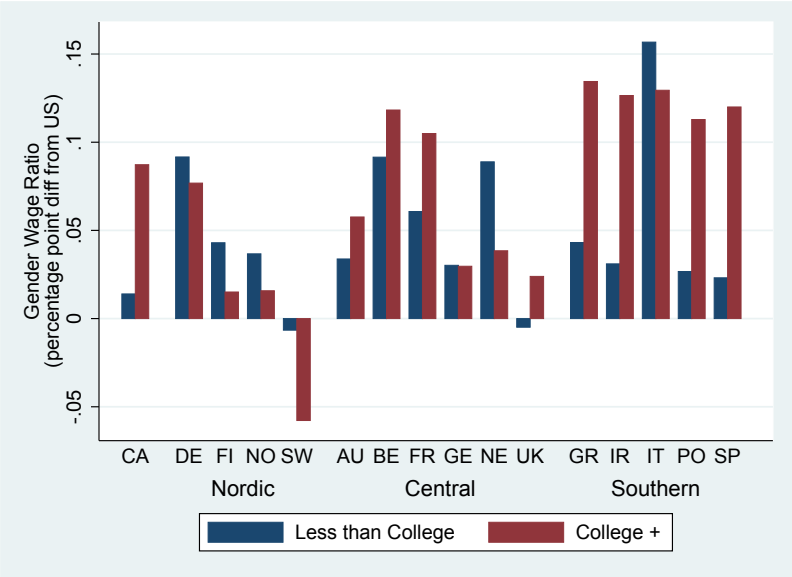
The y-axis (x-axis) on the partial regression plots is the residual of a regression of the market-to-total work share (effective taxes) on subsidies.

Figure 6: Share of Total Work and and Effective Taxes



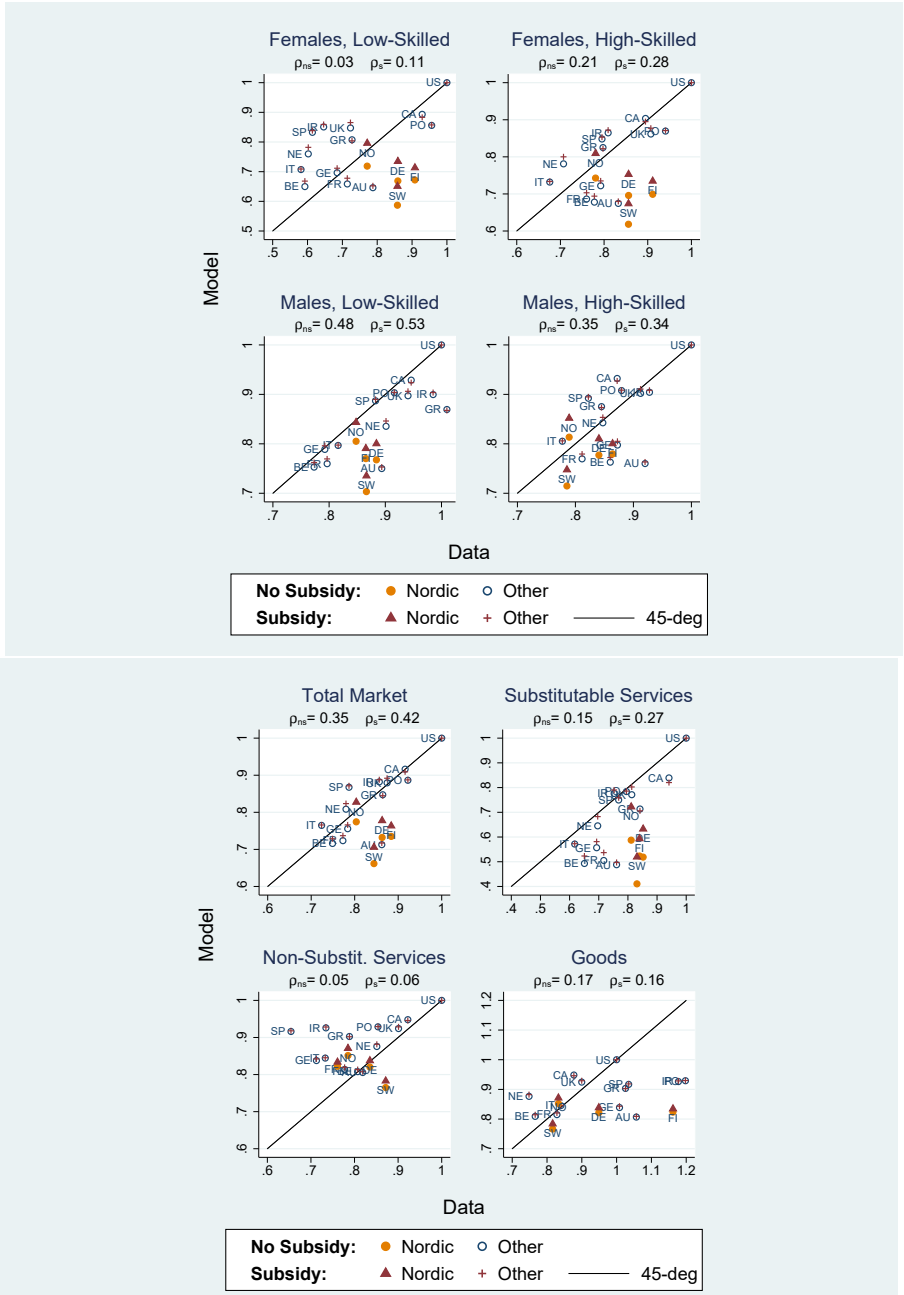
The y-axis (x-axis) on the partial regression plots is the residual of a regression of the total work share (effective taxes) on subsidies.

Figure 7: Gender Wage Ratio Relative to the US



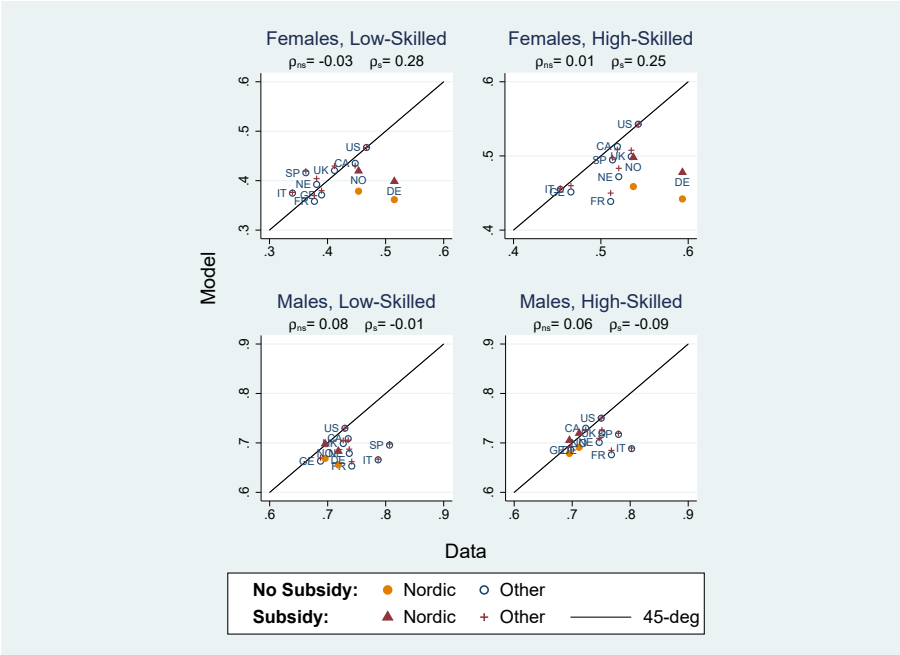
Wage ratios are adjusted for age and marital status. Data cover years 2000-2004.

Figure 8: Model Predictions – Market Hours by Gender, Skill and Sector



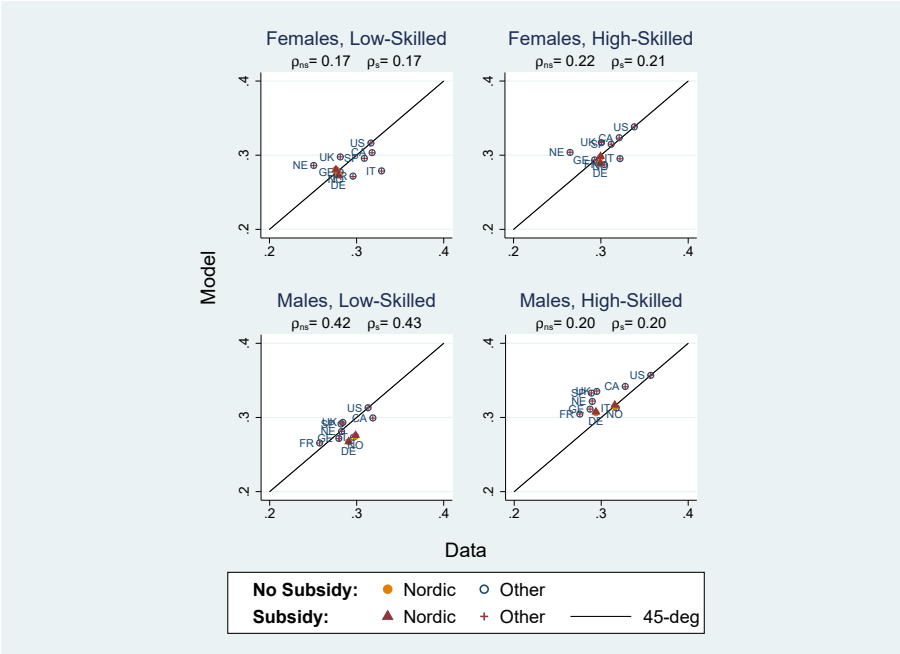
ρ_s and ρ_{ns} - Concordance correlation coefficient in models with and without subsidies, respectively.

Figure 9: Model Predictions – Marketization by Population Group



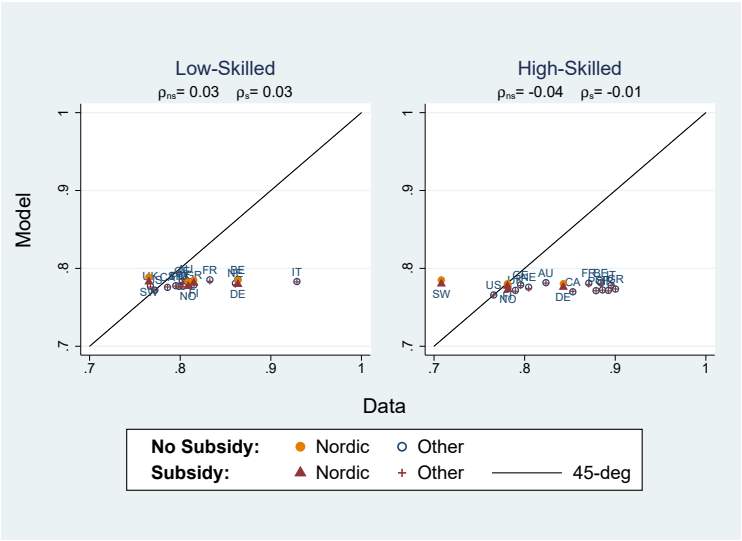
ρ_s and ρ_{ns} - Concordance correlation coefficient in models with and without subsidies, respectively.

Figure 10: Model Predictions – Total Work Share by Population Group



ρ_s and ρ_{ns} - Concordance correlation coefficient in models with and without subsidies, respectively.

Figure 11: Model Predictions – Gender Wage Ratio by Skill Group



ρ_s and ρ_{ns} - Concordance correlation coefficient in models with and without subsidies, respectively.

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

			Share of Difference in Annual Hours wrt US						
			Population Group				Sector		
	Weekly Hours	Fraction of US	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
Central									
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: Linear Regressions of Hours against Taxes and Subsidies

	Females				Males			
	Low-Skilled		High-Skilled		Low-Skilled		High-Skilled	
Market Hours								
Effective Tax Rate	-547.2	-1241.1*	-725.0*	-1159.2**	-1109.6***	-1291.5***	-846.3***	-711.8*
	(492.1)	(589.0)	(344.8)	(422.8)	(257.3)	(335.3)	(281.0)	(371.4)
Subsidy Rate		1267.0*		792.9		332.1		-245.6
		(680.6)		(488.6)		(387.5)		(429.1)
R^2	0.076	0.259	0.228	0.350	0.553	0.576	0.377	0.391
Observations	17	17	17	17	17	17	17	17
Market to Total Work Hour Share								
Effective Tax Rate	-0.14	-0.54**	-0.08	-0.38**	-0.07	0.09	-0.07	0.12
	(0.24)	(0.18)	(0.17)	(0.13)	(0.16)	(0.19)	(0.16)	(0.17)
Subsidy Rate		0.80***		0.59***		-0.32		-0.37*
		(0.21)		(0.14)		(0.22)		(0.19)
R^2	0.043	0.689	0.028	0.711	0.025	0.263	0.023	0.360
Observations	10	10	10	10	10	10	10	10
Total Work Hour Share								
Effective Tax Rate	-0.12	-0.03	-0.14	-0.12	-0.14**	-0.18**	-0.22**	-0.26**
	(0.10)	(0.12)	(0.08)	(0.10)	(0.06)	(0.08)	(0.08)	(0.10)
Subsidy Rate		-0.19		-0.04		0.08		0.08
		(0.13)		(0.11)		(0.09)		(0.11)
R^2	0.152	0.333	0.294	0.306	0.415	0.477	0.505	0.540
Observations	10	10	10	10	10	10	10	10

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: 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 (forthcoming)
	Calibrated Parameters	
$\frac{L_{ef}}{L_{em}}, \frac{L_{nf}}{L_{nm}}, \frac{L_{ef}}{L_{nf}}$	1.19, 1.10, 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, 0.42, 0.47, 0.50, 0.55	Low-skilled gender hour ratios across sectors
ξ_{ej}	0.34, 0.42, 0.46, 0.49, 0.68	High-skilled gender hour ratios across sectors
λ_j	0.45, 0.62, 0.54, 0.52, 0.51	The ratio of high-skilled to low-skilled female hours across sectors
$\hat{A}_{3h}$	0.86	Relative hours between substitutable services and home
$\hat{A}_{23}$	4.43	Relative hours between non-substitutable services and substitutable services
$\hat{A}_{12}$	1.57	Relative hours between goods and non-substitutable services
φ	1.66	Relative hours between leisure and goods

Table 4: Market Hours by Labor Input – Model without Subsidies

	Females				Males			
	Low-Skilled		High-Skilled		Low-Skilled		High-Skilled	
	Data	Model	Data	Model	Data	Model	Data	Model
Canada	-0.07	-0.11	-0.11	-0.10	-0.05	-0.07	-0.13	-0.07
Nordic								
Denmark	-0.14	-0.33	-0.14	-0.30	-0.12	-0.23	-0.16	-0.22
Finland	-0.09	-0.33	-0.09	-0.30	-0.13	-0.23	-0.14	-0.22
Norway	-0.23	-0.28	-0.22	-0.26	-0.15	-0.19	-0.21	-0.19
Sweden	-0.14	-0.41	-0.14	-0.38	-0.13	-0.30	-0.21	-0.29
Average Nordic	*-0.15*	*-0.34*	*-0.15*	*-0.31*	*-0.13*	*-0.24*	*-0.18*	*-0.23*
Central								
Austria	-0.21	-0.35	-0.17	-0.33	-0.11	-0.25	-0.08	-0.24
Belgium	-0.41	-0.35	-0.22	-0.32	-0.23	-0.25	-0.14	-0.24
France	-0.29	-0.34	-0.24	-0.31	-0.20	-0.24	-0.19	-0.23
Germany	-0.32	-0.30	-0.21	-0.28	-0.21	-0.21	-0.13	-0.20
Netherlands	-0.40	-0.24	-0.29	-0.22	-0.10	-0.16	-0.15	-0.16
United Kingdom	-0.28	-0.15	-0.09	-0.14	-0.06	-0.10	-0.09	-0.10
Average Central	*-0.32*	*-0.29*	*-0.20*	*-0.27*	*-0.15*	*-0.20*	*-0.13*	*-0.19*
Southern								
Greece	-0.27	-0.19	-0.20	-0.18	0.01	-0.13	-0.16	-0.12
Ireland	-0.35	-0.15	-0.19	-0.14	-0.01	-0.10	-0.07	-0.10
Italy	-0.42	-0.29	-0.32	-0.27	-0.18	-0.20	-0.22	-0.19
Portugal	-0.04	-0.14	-0.06	-0.13	-0.08	-0.10	-0.12	-0.09
Spain	-0.39	-0.17	-0.20	-0.15	-0.12	-0.11	-0.18	-0.11
Average Southern	*-0.29*	*-0.19*	*-0.20*	*-0.17*	*-0.08*	*-0.13*	*-0.15*	*-0.12*
Concord. Corr.		0.03		0.21		0.48		0.35
Corr		0.04		0.26		0.68		0.41
Coeff. Determ.		0.72		0.68		0.63		0.82

All values are expressed as a percentage difference of the US value. "Concord. Corr" represents the concordance correlation, "Corr" represents the usual correlation coefficient, and "Coeff. Determ." represents the coefficient of determination.

Table 5: Market Hours by Sector – Model without Subsidies

	Total Market		Substitutable Service		Non-Substitutable Service		Goods	
	Data	Model	Data	Model	Data	Model	Data	Model
Canada	-0.08	-0.08	-0.06	-0.16	-0.08	-0.05	-0.12	-0.05
Nordic								
Denmark	-0.14	-0.27	-0.15	-0.48	-0.16	-0.18	-0.05	-0.18
Finland	-0.12	-0.27	-0.16	-0.48	-0.24	-0.18	0.16	-0.18
Norway	-0.20	-0.23	-0.19	-0.41	-0.22	-0.15	-0.17	-0.15
Sweden	-0.16	-0.34	-0.17	-0.59	-0.13	-0.23	-0.18	-0.23
Average Nordic	*-0.15*	*-0.27*	*-0.17*	*-0.49*	*-0.19*	*-0.19*	*-0.06*	*-0.18*
Central								
Austria	-0.14	-0.29	-0.24	-0.51	-0.18	-0.19	0.06	-0.19
Belgium	-0.25	-0.28	-0.35	-0.51	-0.19	-0.19	-0.23	-0.19
France	-0.23	-0.28	-0.28	-0.50	-0.22	-0.19	-0.17	-0.19
Germany	-0.22	-0.24	-0.31	-0.44	-0.29	-0.16	0.01	-0.16
Netherlands	-0.22	-0.19	-0.30	-0.35	-0.15	-0.12	-0.25	-0.12
United Kingdom	-0.13	-0.12	-0.19	-0.23	-0.10	-0.08	-0.10	-0.08
Average Central	*-0.20*	*-0.23*	*-0.28*	*-0.42*	*-0.19*	*-0.16*	*-0.12*	*-0.15*
Southern								
Greece	-0.14	-0.15	-0.16	-0.29	-0.21	-0.10	0.03	-0.10
Ireland	-0.14	-0.12	-0.25	-0.22	-0.27	-0.07	0.18	-0.07
Italy	-0.28	-0.24	-0.38	-0.43	-0.27	-0.16	-0.16	-0.15
Portugal	-0.08	-0.11	-0.21	-0.22	-0.15	-0.07	0.20	-0.07
Spain	-0.21	-0.13	-0.23	-0.25	-0.35	-0.08	0.03	-0.08
Average Southern	*-0.17*	*-0.15*	*-0.25*	*-0.28*	*-0.25*	*-0.10*	*0.06*	*-0.10*
Concord. Corr.		0.35		0.15		0.05		0.17
Corr		0.42		0.33		0.08		0.35
Coeff. Determ.		0.78		0.31		0.76		-0.13

All values are expressed as a percentage difference of the US value. "Concord. Corr" represents the concordance correlation, "Corr" represents the usual correlation coefficient, and "Coeff. Determ." represents the coefficient of determination.

Table 6: Market Hours by Labor Input – Model with Subsidies

	Females				Males			
	Low-Skilled		High-Skilled		Low-Skilled		High-Skilled	
	Data	Model	Data	Model	Data	Model	Data	Model
Canada	-0.07	-0.12	-0.11	-0.11	-0.05	-0.08	-0.13	-0.07
Nordic								
Denmark	-0.14	-0.27	-0.14	-0.25	-0.12	-0.20	-0.16	-0.19
Finland	-0.09	-0.29	-0.09	-0.27	-0.13	-0.21	-0.14	-0.20
Norway	-0.23	-0.20	-0.22	-0.19	-0.15	-0.16	-0.21	-0.15
Sweden	-0.14	-0.35	-0.14	-0.33	-0.13	-0.26	-0.21	-0.25
Average Nordic	*-0.15*	*-0.28*	*-0.15*	*-0.26*	*-0.13*	*-0.21*	*-0.18*	*-0.20*
Central								
Austria	-0.21	-0.35	-0.17	-0.32	-0.11	-0.25	-0.08	-0.24
Belgium	-0.41	-0.33	-0.22	-0.31	-0.23	-0.24	-0.14	-0.23
France	-0.29	-0.32	-0.24	-0.30	-0.20	-0.23	-0.19	-0.22
Germany	-0.32	-0.29	-0.21	-0.26	-0.21	-0.20	-0.13	-0.19
Netherlands	-0.40	-0.22	-0.29	-0.20	-0.10	-0.15	-0.15	-0.15
United Kingdom	-0.28	-0.13	-0.09	-0.12	-0.06	-0.09	-0.09	-0.09
Average Central	*-0.32*	*-0.27*	*-0.20*	*-0.25*	*-0.15*	*-0.19*	*-0.13*	*-0.19*
Southern								
Greece	-0.27	-0.20	-0.20	-0.18	0.01	-0.13	-0.16	-0.13
Ireland	-0.35	-0.14	-0.19	-0.13	-0.01	-0.10	-0.07	-0.09
Italy	-0.42	-0.29	-0.32	-0.27	-0.18	-0.20	-0.22	-0.19
Portugal	-0.04	-0.14	-0.06	-0.13	-0.08	-0.10	-0.12	-0.09
Spain	-0.39	-0.16	-0.20	-0.15	-0.12	-0.11	-0.18	-0.11
Average Southern	*-0.29*	*-0.19*	*-0.20*	*-0.17*	*-0.08*	*-0.13*	*-0.15*	*-0.12*
Concord. Corr.		0.11		0.28		0.53		0.34
Corr		0.12		0.32		0.69		0.36
Coeff. Determ.		0.76		0.77		0.72		0.85

All values are expressed as a percentage difference of the US value. "Concord. Corr" represents the concordance correlation, "Corr" represents the usual correlation coefficient, and "Coeff. Determ." represents the coefficient of determination.

Table 7: Market Hours by Sector – Model with Subsidies

	Total Market		Substitutable Service		Non-Substitutable Service		Goods	
	Data	Model	Data	Model	Data	Model	Data	Model
Canada	-0.08	-0.09	-0.06	-0.18	-0.08	-0.05	-0.12	-0.05
Nordic								
Denmark	-0.14	-0.22	-0.15	-0.37	-0.16	-0.16	-0.05	-0.16
Finland	-0.12	-0.24	-0.16	-0.41	-0.24	-0.17	0.16	-0.17
Norway	-0.20	-0.17	-0.19	-0.28	-0.22	-0.13	-0.17	-0.13
Sweden	-0.16	-0.29	-0.17	-0.48	-0.13	-0.22	-0.18	-0.22
Average Nordic	*-0.15*	*-0.23*	*-0.17*	*-0.38*	*-0.19*	*-0.17*	*-0.06*	*-0.17*
Central								
Austria	-0.14	-0.28	-0.24	-0.50	-0.18	-0.19	0.06	-0.19
Belgium	-0.25	-0.27	-0.35	-0.48	-0.19	-0.19	-0.23	-0.19
France	-0.23	-0.26	-0.28	-0.46	-0.22	-0.18	-0.17	-0.18
Germany	-0.22	-0.23	-0.31	-0.42	-0.29	-0.16	0.01	-0.16
Netherlands	-0.22	-0.18	-0.30	-0.32	-0.15	-0.12	-0.25	-0.12
United Kingdom	-0.13	-0.11	-0.19	-0.20	-0.10	-0.07	-0.10	-0.07
Average Central	*-0.20*	*-0.22*	*-0.28*	*-0.40*	*-0.19*	*-0.15*	*-0.12*	*-0.15*
Southern								
Greece	-0.14	-0.16	-0.16	-0.29	-0.21	-0.10	0.03	-0.10
Ireland	-0.14	-0.11	-0.25	-0.21	-0.27	-0.07	0.18	-0.07
Italy	-0.28	-0.23	-0.38	-0.43	-0.27	-0.15	-0.16	-0.15
Portugal	-0.08	-0.11	-0.21	-0.21	-0.15	-0.07	0.20	-0.07
Spain	-0.21	-0.13	-0.23	-0.24	-0.35	-0.08	0.03	-0.08
Average Southern	*-0.17*	*-0.15*	*-0.25*	*-0.28*	*-0.25*	*-0.10*	*0.06*	*-0.09*
Concord. Corr.		0.42		0.27		0.06		0.16
Corr		0.45		0.47		0.10		0.34
Coeff. Determ.		0.85		0.59		0.75		-0.09

All values are expressed as a percentage difference of the US value. "Concord. Corr" represents the concordance correlation, "Corr" represents the usual correlation coefficient, and "Coeff. Determ." represents the coefficient of determination.

Table 8: Marketization – Market Work as Share of Total Work

	Females				Males			
	Low-Skilled		High-Skilled		Low-Skilled		High-Skilled	
	Data	Model	Data	Model	Data	Model	Data	Model
No Subsidies								
Canada	-0.02	-0.03	-0.02	-0.03	0.01	-0.02	-0.03	-0.02
Nordic								
Denmark	0.05	-0.11	0.05	-0.10	-0.01	-0.07	-0.05	-0.07
Norway	-0.01	-0.09	-0.01	-0.08	-0.03	-0.06	-0.04	-0.06
Average Nordic	*0.02*	*-0.10*	*0.02*	*-0.09*	*-0.02*	*-0.07*	*-0.05*	*-0.06*
Central								
France	-0.09	-0.11	-0.03	-0.10	0.01	-0.08	0.02	-0.07
Germany	-0.08	-0.10	-0.08	-0.09	-0.04	-0.07	-0.05	-0.06
Netherlands	-0.09	-0.07	-0.02	-0.07	0.01	-0.05	0.00	-0.05
United Kingdom	-0.06	-0.05	-0.01	-0.04	0.00	-0.03	0.00	-0.03
Average Central	*-0.08*	*-0.08*	*-0.03*	*-0.08*	*-0.01*	*-0.06*	*-0.01*	*-0.05*
Southern								
Italy	-0.13	-0.09	-0.09	-0.09	0.06	-0.06	0.05	-0.06
Spain	-0.10	-0.05	-0.03	-0.05	0.08	-0.03	0.03	-0.03
Average Southern	*-0.12*	*-0.07*	*-0.06*	*-0.07*	*0.07*	*-0.05*	*0.04*	*-0.05*
Concord. Corr.		-0.03		0.01		0.08		0.06
Corr		-0.04		0.03		0.29		0.15
Coeff. Determ.		0.37		-0.98		-2.59		-1.46
With Subsidies								
Canada	-0.02	-0.04	-0.02	-0.03	0.01	-0.02	-0.03	-0.02
Nordic								
Denmark	0.05	-0.07	0.05	-0.07	-0.01	-0.05	-0.05	-0.04
Norway	-0.01	-0.05	-0.01	-0.04	-0.03	-0.03	-0.04	-0.03
Average Nordic	*0.02*	*-0.06*	*0.02*	*-0.05*	*-0.02*	*-0.04*	*-0.05*	*-0.04*
Central								
France	-0.09	-0.10	-0.03	-0.09	0.01	-0.07	0.02	-0.07
Germany	-0.08	-0.09	-0.08	-0.08	-0.04	-0.06	-0.05	-0.06
Netherlands	-0.09	-0.06	-0.02	-0.06	0.01	-0.04	0.00	-0.04
United Kingdom	-0.06	-0.04	-0.01	-0.04	0.00	-0.02	0.00	-0.02
Average Central	*-0.08*	*-0.07*	*-0.03*	*-0.07*	*-0.01*	*-0.05*	*-0.01*	*-0.05*
Southern								
Italy	-0.13	-0.09	-0.09	-0.09	0.06	-0.06	0.05	-0.06
Spain	-0.10	-0.05	-0.03	-0.05	0.08	-0.03	0.03	-0.03
Average Southern	*-0.12*	*-0.07*	*-0.06*	*-0.07*	*0.07*	*-0.05*	*0.04*	*-0.05*
Concord. Corr.		0.28		0.25		-0.01		-0.09
Corr		0.39		0.46		-0.02		-0.20
Coeff. Determ.		0.62		-0.09		-2.03		-1.15

Marketization is measured by the share of market hours out of total work (market plus home). All values are expressed as a difference of the US value. "Concord. Corr" represents the concordance correlation, "Corr" represents the usual correlation coefficient, and "Coeff. Determ." represents the coefficient of determination.

Table 9: Work vs Leisure – Total Work as Share of Total Time

	Females				Males			
	Low-Skilled		High-Skilled		Low-Skilled		High-Skilled	
	Data	Model	Data	Model	Data	Model	Data	Model
No Subsidies								
Canada	0.001	-0.01	-0.02	-0.01	0.01	-0.01	-0.03	-0.02
Nordic								
Denmark	-0.04	-0.04	-0.04	-0.05	-0.02	-0.05	-0.06	-0.05
Norway	-0.04	-0.04	-0.04	-0.04	-0.01	-0.04	-0.04	-0.04
Average Nordic	*-0.04*	*-0.04*	*-0.04*	*-0.05*	*-0.02*	*-0.04*	*-0.05*	*-0.05*
Central								
France	-0.02	-0.04	-0.03	-0.05	-0.06	-0.05	-0.08	-0.05
Germany	-0.04	-0.04	-0.05	-0.04	-0.03	-0.04	-0.07	-0.05
Netherlands	-0.07	-0.03	-0.07	-0.03	-0.03	-0.03	-0.07	-0.04
United Kingdom	-0.04	-0.02	-0.04	-0.02	-0.03	-0.02	-0.06	-0.02
Average Central	*-0.04*	*-0.03*	*-0.05*	*-0.04*	*-0.04*	*-0.04*	*-0.07*	*-0.04*
Southern								
Italy	0.01	-0.04	-0.02	-0.04	-0.02	-0.04	-0.04	-0.04
Spain	-0.01	-0.02	-0.03	-0.02	-0.03	-0.02	-0.07	-0.02
Average Southern	*0.00*	*-0.03*	*-0.02*	*-0.03*	*-0.02*	*-0.03*	*-0.05*	*-0.03*
Concord. Corr.		0.17		0.22		0.42		0.20
Corr		0.23		0.23		0.51		0.40
Coeff. Determ.		0.52		0.80		0.71		0.80
With Subsidies								
Canada	0.001	-0.01	-0.02	-0.02	0.01	-0.01	-0.03	-0.02
Nordic								
Denmark	-0.04	-0.04	-0.04	-0.05	-0.02	-0.05	-0.06	-0.05
Norway	-0.04	-0.04	-0.04	-0.04	-0.01	-0.04	-0.04	-0.04
Average Nordic	*-0.04*	*-0.04*	*-0.04*	*-0.04*	*-0.02*	*-0.04*	*-0.05*	*-0.04*
Central								
France	-0.02	-0.05	-0.03	-0.05	-0.06	-0.05	-0.08	-0.05
Germany	-0.04	-0.04	-0.05	-0.04	-0.03	-0.04	-0.07	-0.05
Netherlands	-0.07	-0.03	-0.07	-0.03	-0.03	-0.03	-0.07	-0.03
United Kingdom	-0.04	-0.02	-0.04	-0.02	-0.03	-0.02	-0.06	-0.02
Average Central	*-0.04*	*-0.03*	*-0.05*	*-0.04*	*-0.04*	*-0.04*	*-0.07*	*-0.04*
Southern								
Italy	0.01	-0.04	-0.02	-0.04	-0.02	-0.04	-0.04	-0.04
Spain	-0.01	-0.02	-0.03	-0.02	-0.03	-0.02	-0.07	-0.02
Average Southern	*0.00*	*-0.03*	*-0.02*	*-0.03*	*-0.02*	*-0.03*	*-0.05*	*-0.03*
Concord. Corr.		0.17		0.21		0.43		0.20
Corr		0.22		0.22		0.52		0.41
Coeff. Determ.		0.51		0.79		0.71		0.80

All values are expressed as a difference of the US value. "Concord. Corr" represents the concordance correlation, "Corr" represents the usual correlation coefficient, and "Coeff. Determ." represents the coefficient of determination.

Table 10: Gender Wage Ratio by Skill

	No Subsidies				Subsidies Included			
	Low Skilled		High Skilled		Low Skilled		High Skilled	
	Data	Model	Data	Model	Data	Model	Data	Model
Canada	0.01	0.004	0.09	0.004	0.01	0.00	0.09	0.00
Nordic								
Denmark	0.09	0.01	0.08	0.01	0.09	0.01	0.08	0.01
Finland	0.04	0.01	0.02	0.01	0.04	0.01	0.02	0.01
Norway	0.04	0.01	0.02	0.01	0.04	0.01	0.02	0.01
Sweden	-0.01	0.02	-0.06	0.02	-0.01	0.01	-0.06	0.01
Average Nordic	*0.04*	*0.01*	*0.01*	*0.02*	*0.04*	*0.01*	*0.01*	*0.01*
Central								
Austria	0.03	0.01	0.06	0.02	0.03	0.01	0.06	0.02
Belgium	0.09	0.01	0.12	0.02	0.09	0.01	0.12	0.01
France	0.06	0.01	0.10	0.02	0.06	0.01	0.10	0.01
Germany	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01
Netherlands	0.09	0.01	0.04	0.01	0.09	0.01	0.04	0.01
United Kingdom	0.00	0.01	0.02	0.01	0.00	0.00	0.02	0.00
Average Central	*0.05*	*0.01*	*0.06*	*0.01*	*0.05*	*0.01*	*0.06*	*0.01*
Southern								
Greece	0.04	0.01	0.13	0.01	0.04	0.01	0.13	0.01
Ireland	0.03	0.01	0.13	0.01	0.03	0.00	0.13	0.01
Italy	0.16	0.01	0.13	0.01	0.16	0.01	0.13	0.01
Portugal	0.03	0.00	0.11	0.01	0.03	0.00	0.11	0.01
Spain	0.02	0.01	0.12	0.01	0.02	0.01	0.12	0.01
Average Southern	*0.06*	*0.01*	*0.12*	*0.01*	*0.06*	*0.01*	*0.12*	*0.01*
Concord. Corr.		0.03		-0.04		0.03		-0.01
Corr		0.27		-0.46		0.38		-0.24
Coeff. Determ.		0.23		0.15		0.20		0.15

All values are expressed as a difference of the US value. "Concord. Corr" represents the concordance correlation, "Corr" represents the usual correlation coefficient, and "Coeff. Determ." represents the coefficient of determination.

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.[22]

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. (2016), 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. (2016), who constructed their estimates using weekly hours from the CPS ORG samples.

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 the group GS_k who belongs to the age-marital status group AM_l. The fraction $f(AM_l|GS_k)$ varies depending on the gender-skill group. To hold

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

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.[23] 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. The difference between the adjusted values and the raw hours is reported in the second column for the U.S. The small difference, 0.02, implies that the compositional differences in age and marital status across gender-skill groups have almost no effect on the aggregate hours in the U.S. The rest of the second column reports the difference between 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). 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. 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.[24] The table shows that the hours obtained are very similar to the ones when the presence of small children is

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

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

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.[25] 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 different sectors, the above procedure needs to be adjusted to handle this type of information.

[25] 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 U.K., by using the national versions of their labor surveys.

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 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" expenditure S includes all the non-cash public benefits in these three categories, such as expenditures on residential care, home-help services, rehabilitation, and day-care (see Adema et al. (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)). The resulting tax and subsidy rates are reported in Table A4. As in Prescott (2004), the effective tax rate is:

$$\tau_e = \frac{t_1 + \tau}{1 + t_1}.$$

The net consumption tax in the substitutable service sector is $t_3 = t_1 - s$.

D Wages

We construct hourly wage rates using the Labor Force Surveys for France and the U.K. (Insee 2014, ONS 2015), the Socioeconomic Panel (SOEP) for Germany (Socio-Economic

Panel 2015), 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) for 2000-2001, and the European Union Statistics on Income and Living Conditions (EU-SILC) for 2003-2004.[26] 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.[27] 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 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.[28] The predicted gender wage ratios are obtained by taking the exponent of the corresponding skill-gender interaction parameters.

E Jointness of Taxation

This appendix explores the relation of market hours with taxes and subsidies while controlling for the jointness of the taxation system. Table A5 reports the cross-country regression of market hours on effective taxes, subsidy rates, and a measure of the jointness of the taxation system, which is borrowed from Chakraborty et al. (2015). Conditioning on jointness only alters slightly the regression coefficients of market hours on effective taxes and subsidies. Figure A1 is similar to Figure 3, but controls the jointness of the taxation system.

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

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

[28] 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
Central			
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 age and marital composition across skill-gender groups. 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)
Central								
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 reported hours and the ones without 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
	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		Subsidy
	Income	Consumption	Rate
Canada	0.22	0.17	0.01
Nordic			
Denmark	0.33	0.31	0.20
Finland	0.37	0.23	0.13
Norway	0.32	0.25	0.20
Sweden	0.41	0.32	0.22
Average Nordic	*0.36*	*0.28*	*0.19*
Central			
Austria	0.40	0.21	0.04
Belgium	0.41	0.20	0.08
France	0.38	0.23	0.08
Germany	0.39	0.15	0.06
Netherlands	0.32	0.18	0.07
United Kingdom	0.26	0.17	0.06
Average Central	*0.36*	*0.19*	*0.07*
Southern			
Greece	0.30	0.15	0.02
Ireland	0.22	0.23	0.04
Italy	0.35	0.20	0.03
Portugal	0.24	0.18	0.03
Spain	0.28	0.15	0.04
Average Southern	*0.28*	*0.18*	*0.03*
United States	0.21	0.07	0.02

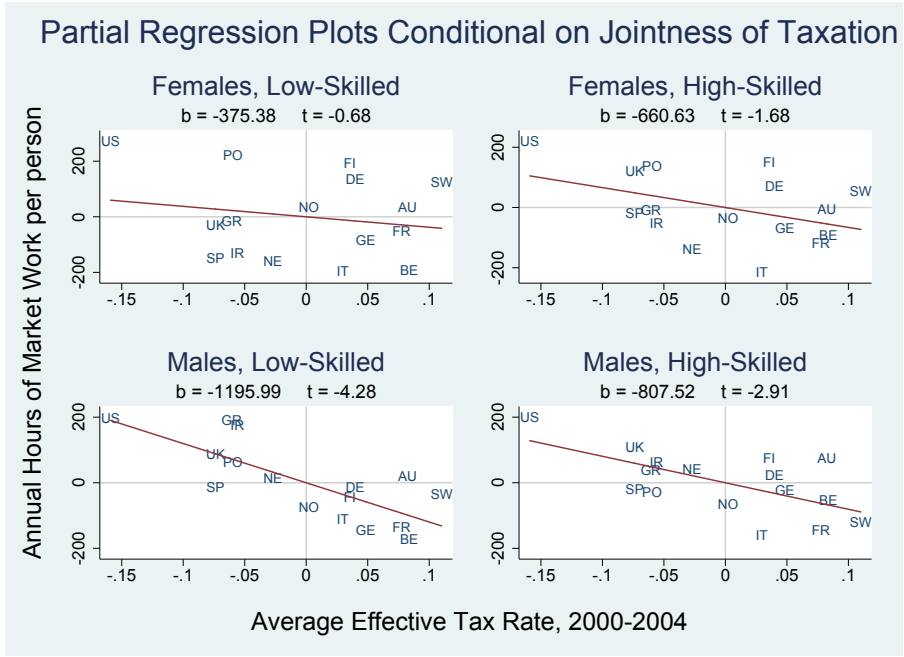
Note: Labor income tax and consumption tax are obtained from McDaniel (2007). Subsidy is constructed following Ngai and Pissarides (2011).

Table A5: Linear Regressions of Market Hours against Effective Taxes, Jointness of Taxation, and Subsidies

	Females				Males			
	Low-Skilled		High-Skilled		Low-Skilled		High-Skilled	
Effective Tax Rate	-375.4	-1176.6*	-660.6	-1199.8**	-1196.0***	-1256.6***	-807.5**	-849.6**
	(549.7)	(586.2)	(393.6)	(430.7)	(279.3)	(357.7)	(277.1)	(355.5)
Jointness of Taxation	10.99	109.9	34.91	101.5	-65.33	-57.84	102.3*	107.5*
	(99.42)	(95.78)	(71.19)	(70.38)	(50.51)	(58.44)	(50.11)	(58.09)
Subsidy Rate		1721.1**		1158.2*		130.2		90.32
		(738.7)		(542.7)		(450.7)		(447.9)
R^2	0.039	0.338	0.212	0.429	0.588	0.591	0.544	0.546
Observations	16	16	16	16	16	16	16	16

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
The measure of jointness of taxation is obtained from Chakraborty et al. (2015), Table D.8.

Figure A1: Hours Worked in the Market and Effective Taxes, Conditional On Jointness



The y-axis (x-axis) on the top panel is the residual of a regression of hours (effective taxes) on the jointness measure. The y-axis (x-axis) on the bottom panel is the residual of a regression of hours (effective taxes) on the jointness measure and subsidies.