Taxes and Market Hours - the Role of Gender and Skill*

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Abstract

Using micro data from 17 OECD countries, this paper documents that cross-country difference in aggregate market hours is mainly due to market hours of women, especially low-skilled women. Based on a multi-sector model with both gender and skill dimensions, the paper shows that taxes and social subsidies on family care can account for a substantial fraction of the observed cross-country differences in market hours by gender and by skill. The model predictions are also largely consistent with cross-country patterns in home hours, leisure, sectoral hours, and gender wage gaps. Both substitution margins across work and leisure and across market and home are important. Taxes operate through both margins while social subsidies operate mainly through the second margin. The first margin affects all population groups while the second margin affects mostly women.

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1 Introduction

Aggregate hours of market work in European countries are typically lower than in the United States. During the early 2000s, weekly market hours per adult in the U.S. were about 28 hours while they ranged from 19 to 25 hours in European countries. 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 each demographic group to different incentives in the labor market across countries.

The objective of this paper is to re-examine the cross-country relationship between taxes and market hours, with a particular focus on the different responses to taxes across gender and skill groups. Using labor force surveys from 17 OECD countries, this paper examines market hours by gender-skill group relative to the U.S., controlling for differences in the demographic composition across countries. Empirically, we document that differences in aggregate market hours are mainly due to differences in women's market hours, especially women without a college degree. We also find that market hours in European countries are particularly lower in the service sector rather than in the goods sector, a finding previously documented by Rogerson (2008). More importantly, we show that higher income and consumption taxes are associated with lower market hours for each of the gender-skill groups, and are also associated with lower market hours for both goods and service sectors. Furthermore, once we control for the presence of social subsidies to family care, the negative association becomes even stronger for women without a college degree and for the part of the service sector that produces close substitutes to home services. These empirical findings suggest that gender, skill, and sector of employment are important dimensions for understanding of how taxes and subsidies affect cross-country differences in aggregate market hours.

Motivated by these empirical findings, we develop a model consisting 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 into market work, home production, and leisure for each gender-skill group.

With this model we show 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 are critical in producing the model results. In particular, the effects of taxes and subsidies occur through two substitution margins: one across work and leisure and another across work in the market and work at home. The first margin affects all population groups, while the second margin affects mostly women, if they have a comparative advantage in producing home services such as cleaning, cooking, and child care.

Income and consumption taxes discourage market hours through both the substitution margin between leisure and total work (market plus home) and the margin between market work and home work. In particular, as taxes increase, households devote more time to leisure and home production and decrease their market hours. Because home services are a good substitute to substitutable market services, households especially substitute away from the latter. If women have a relative comparative advantage in producing home and substitutable services, the shift of hours from market to home is larger for women than for men. This in turn drives up the female wage relative to the male wage. 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 are applicable mainly to sectors that provide close substitutes to home services, thus they operate mainly through the substitution margin between home and the substitutable service sector.

The model is calibrated to match time allocation by gender and by skill in the U.S. economy. High-skilled workers refer to those with a college education or above and low-skilled are those with less than college education. Based on the observed gender intensity across the four sectors, the calibrated parameters imply that women have a relative comparative advantage in producing home and substitutable market services, while men have a relative comparative advantage 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 almost 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 can not explain well their average market hours. Our results indicate that higher social subsidies on family care in Nordic countries go a long way in accounting for differences in market hours, especially female market hours relative to the United States. We also demonstrate that taxes and social subsidies can account well 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 particularly affect market hours of women and hours in the substitutable service market sector.

An additional contribution of the paper is to analyze the differences in the margin of adjustment for hours by different demographic groups. Importantly, we find that the work and leisure margin is important for both men and women, while the market and home margin is more relevant for women. This again is because of women’s comparative advantage in producing home and substitutable market services. We also show that the different adjustments by men and women along the two margins are consistent with the data correlations between time use and taxes and subsidies.

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

This paper contributes to the recent literature analyzing the effect of taxes on the cross-country difference in aggregate market hours. Using a standard macro model with one sector and one representative agent, Prescott (2004) and Ohanian, Raffo and Rogerson (2008) show that higher income and consumption taxes in Europe contribute to its low market hours relative to the United States. Rogerson (2008), Olovsson (2009), McDaniel (2011) and Duernecker and Herrendorf (2016) argue that home production is important in propagating the effect of taxes and Rogerson (2008) also emphasizes the effect of taxes in discouraging the marketization of home services. Finally, Ngai and Pissarides (2011) and Ragan (2013) both find that social subsidies play an important role in accounting for differences in market hours between European countries and the U.S., especially for Nordic countries.¹ However, none of these papers study cross-country differences in market hours by demographic groups.

Recent works by Chakraborty, Holter and Stepanchuk (2015) and Bick and Fuchs-Schündeln (2017) 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 (2017) study the role of the non-linearity of labor income taxes in accounting for cross-country differences in market hours by gender. By contrast, this paper follows previous literature and examines the substitution between market and home production in accounting for differences in market hours by gender and also by skill. Including home production enables us to analyze the adjustment of hours along the margin of total work and leisure, as well as along the margin of market

¹This is in line with the view of Rogerson (2007) that how government spends the tax revenue is important for understanding the effects of taxes on market hours.

work and home work, whereas in Chakraborty et al. (2015) and Bick and Fuchs-Schündeln (2017) hours focus only on the margin across work and leisure. This paper shows that the margin across market and home is essential in generating the pattern of time allocation across market, home and leisure by gender and skill consistent with the data.

In another related paper, Rendall (2015) also separates non-market hours into home hours and leisure. While our paper focuses on the two margins of substitution induced by cross-country differences in taxes and social subsidies, Rendall (2015) focuses on the tax channels in connection with structural transformation and the rise of female and service employment using time-series data from Germany and the United States. Furthermore, while all these three papers assume exogenous gender wage ratio, our paper endogenizes it by allowing male and female labor inputs to be imperfect substitutes as in Ngai and Petrongolo (2017). In a model with manufacturing and service sectors, Ngai and Petrongolo (2017) finds that lower productivity growth in the service sector contributes to a rise in female's wage and market hours relative to male in the U.S. for the last four decades, whereas this paper finds that higher European taxes contribute to higher female's wages but lower female hours in the European countries relative to the U.S.. The substitution margin across market and home plays an important role in the findings of both papers. The substitution margin across work and leisure is not important for the findings of Ngai and Petrongolo (2017), but its interaction with higher taxes is crucial for predicting lower aggregate market hours in European countries.

Finally, this paper also contributes to broaden the empirical literature studying cross-country differences in market hours. Fang and McDaniel (2017) and Chakraborty et al. (2015) both find that differences in cross-country market hours are dominated by the market hours of women. In addition to confirming their findings, this paper emphasizes the role played by the hours of low-skilled women, and the different correlation between social subsidies and the market hours of men and women.

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, while 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 2000–2004.² This section briefly describes the data used in the analysis and

²Of the EU-15 region, only Luxembourg is excluded as there is no comparable tax data.

presents a set of key stylized facts. For a more detailed description on the data sources and variable construction procedures, please refer to the Data Appendix.

2.1 Data

2.1.1 Market Hours

Market hours are constructed using the standardized EU Labor Force Survey for European countries (EU-LFS), 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 years. The annual average hours worked per person over a year is derived as the total annual hours divided by the number of individuals within the specified age range. Bick, Brüggemann and Fuchs-Schündeln (2016) find that it is important to properly adjust vacations and holidays while analyzing the cross-country differences in market hours. Following procedures outlined by Bick et al. (2016), consistent measures of annual hours worked per person across European countries are constructed by including the use of their estimated weeks of effective work over a calendar year. In the US annual hours are estimated by combining the usual weekly hours worked the previous year multiplied the number of weeks worked over the same period. These estimates are then scaled to match the US estimates from Bick et al. (2016).³

Annual market hours worked per person are estimated for four population groups formed by interacting two skill levels with gender. High-skilled individuals are those with a college degree or above. Clearly other demographic dimensions are relevant in determining labor supply decisions. For instance, prime-age individuals work more in the market than young and old individuals, and married women work less in the market than single women. Hence, differences in the demographic composition across countries could lead to differences in market hours. Table A1 in the Data Appendix shows that differences in the age and marital status composition of the population only contributes between 5-33% of the cross-country difference in market hours in our sample. Thus, differences in hours worked by gender-skill groups contribute most of the cross-country difference in aggregate market hours.

To understand the effect of taxes and subsidies, market hours estimates are constructed by 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

³Bick et al. (2016) use instead the CPS ORG samples for the US. Furthermore they do not analyze Finland and Canada, thus for these two countries we scale the weekly hours from the EU-LFS to match OECD statistics on aggregate annual hours.

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.⁴

In order to study the implications of policy through the market and home margins by gender and skill, market hours are estimated for three sectors: goods, non-substitutable service, and substitutable service sectors. This is the simplest classification to capture the idea that men and women may have different comparative advantage in producing goods and services and the fact that only a subset of service sectors produce goods that are substitutable to home production. Broadly speaking, a service industry is classified as “substitutable” if its product can be replaced by activities performed at home.⁵ The detailed classification is included in Table A2 of the Data Appendix. To be consistent, we also control for the demographic composition in the construction of sectoral hours.

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, and the fraction of total work (market plus home) out of total time are constructed using the American Time Use Survey (ATUS) and the Multinational Time Use Survey (MTUS). For the years we study, time use surveys are available for ten of the sample countries.⁶ The construction of market and home hours follows closely the classification of Aguiar and Hurst (2007b) with one key exception that we include child care in home hours. Other differences due to time use information contained in MTUS relative to ATUS are reported in the Data Appendix. Leisure is any time not allocated to market or home hours. These estimates are also adjusted for demographic composition differences following the procedure outlined before.

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

⁴In a supplementary exercise, we included one more partition depending on the presence of small children in the household. The resulting hours are very similar to the ones reported here.

⁵The substitutable service sector includes Retail trade, Hotels and restaurants, Health and social work, Personal and community services, and Domestic services hired by households. The non-substitutable service sector includes Wholesale trade, Transport and communications, Finance, Real estate, Public sector, and Education. Given the industry classification available in most household surveys it is not possible to do a more detailed disaggregation.

⁶The 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). Labor income taxes include Federal and State income taxes, as well as Social Security taxes. Following Ngai and Pissarides (2011), 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), which include Old-Age, Incapacity, and Family benefits.⁷ As in Ngai and Pissarides (2011), the constructed subsidy rates are much higher in Nordic countries than in other European countries and the U.S.

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 average hours of work per person among the studied countries. In European countries hours of work range between 72-92% of the average hours in the United States.⁸ Among the latter, 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 proportional differences in hours worked are similar for men and women of the same skill with the largest differences observed for 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% 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%.

⁷This measure of social subsidies may underestimate the public support to households, as the SOCX database does not include disaggregate estimates of the value of benefits granted through tax credits and exemptions. These tax breaks have become more common over recent years, see for instance Morel (2012).

⁸Similar to Chakraborty et al. (2015) we group Ireland together with Southern European countries based on the similarity between the labor supply of women among these countries.

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 rather than the goods sector. In fact, a few European countries even have higher hours in the goods sector than in 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

This subsection analyzes 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 is $\frac{\text{consumption tax rate} + \text{labor income tax rate}}{1 + \text{consumption tax rate}}$. 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 subsidies to family care.⁹ The straight line is the OLS regression line, b is the regression coefficient, and t is the t-statistic.

It is apparent that higher taxes are associated with lower market hours for all the four demographic groups. More importantly, once 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 those 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 subsidy. This implies that subsidies could be a crucial factor affecting female market hours, especially among low-skilled women.¹⁰

Figure 4 plots sectoral hours against the effect tax rates. The tax rate for goods and non-substitutable service sector is the same as the effective tax rate defined earlier. The tax rate for the substitutable service sector is the effective tax rate net of the subsidy. The

⁹Partial 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, it can be shown that 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 .

¹⁰See 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 to obtain more comparable market hours across countries.

figure demonstrates that market hours in all the three sectors are negatively correlated with taxes, and that the largest negative association occurs in the substitutable service sector. Without subsidies, the size of the negative association in the substitutable service sector will be similar to that in the other two sectors.¹¹ 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 2.1.2, Figure 5 plots the share of market hours in total work hours (market + home) against the effective tax. Without controlling for subsidies, the negative association between the share of market hours and the effective tax is weak and insignificant. After controlling for subsidies, the negative association becomes much stronger and significant for women, especially for low-skilled women. In contrast, the association for men is still small and insignificant.

Figure 6 plots the share of total work hours in total available time (market + home + leisure) against the effective tax. The share of total work is negatively correlated with effective taxes for both genders. Controlling for subsidies makes the negative association between the share of total work and the effective tax stronger for men and weaker for women.

2.2.4 Gender Wage Ratio

Figure 7 plots the cross-country difference in gender wage ratio (female/male) by skill level. Almost all countries have higher gender wage ratios for both skill levels, i.e. they have a lower gender wage gap, than the U.S. does.¹²

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 is stronger for women, especially for low-skilled women who have lower market wages and thus a lower opportunity cost of not working in the market. This substitution margin reduces female market hours and leads to higher gender wage ratios in European countries. 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 direction for market v.s. home substitution relative to the ones induced by taxes.

¹¹Without subsidy, the regression coefficient is -284.7 and the t-statistic is -2.38.

¹²One exception is the high-skilled gender wage ratio in Sweden.

3 The model

This section presents a multi-sector model with three market sectors in an environment with government taxes and subsidies. The three market sectors produce goods, non-substitutable services, and substitutable services, respectively. A representative household supplies four types of labor inputs to the production sectors, indexed by gender and skill level. The household also engages in home production. The production at home delivers a close substitute to the substitutable service produced in the market.

Government taxes the 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, non-substitutable service sector, and substitutable service sector, respectively. 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 are competitive and consist 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:

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

where A_j is labor productivity and L_j is an aggregator of the four labor inputs. L_{ej} is the high-skilled composite and L_{nj} is the low-skilled 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:

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

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 a male and a female, with a joint utility function:

$$U(c_1, c_2, c_3, c_h, L_l) = \ln c + \varphi \ln L_l, \quad (3)$$

where 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 substitutable services. The substitutable services c_s can be either purchased from the market (c_3) or be produced at home (c_h):

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

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

Home services are produced with identical technology as substitutable market services in (1)-(2), except for the level of labor productivity:

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

where

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

and A_h is labor productivity for the home sector.

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

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

where

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

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 $i = n, e$) unit 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:

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

The model abstracts from the complexity of household formation. In our defense, we control for demographic differences across countries and also across gender-skill groups in the construction of the data. Thus, factors that affect household formation, such as differences in marriage rates across education groups and across countries, have been controlled for in the data.

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:

$$c_j = Y_j, \quad j = 1, 2, 3, \quad (10)$$

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

3. Government budget constraint is satisfied:

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

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 time allocation across sectors and genders. The consumption of goods and non-substitutable services is taxed at the same rate, i.e., $t_1 = t_2 = t$, while the consumption of substitutable services could be taxed at a lesser rate and the difference between t_3 and t 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:

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

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

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

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

where π_f is the female skill premium and $I_{ij}(x_i)$ denotes the share of female wage bill in the total income from skill i in sector j :

$$I_{ij}(x_i) \equiv \frac{w_{if} L_{ifj}}{w_{im} L_{imj} + w_{if} L_{ifj}} = \frac{1}{1 + \alpha_{ij}^{-\eta} x_i^{\eta-1}}, \quad j = 1, 2, 3, h; \quad i = n, e. \quad (15)$$

Equation (14) implies that 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 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.

Using the utility function (4), equalizing the marginal rate of substitution between substitutable market services and home hours to their relative prices, together with the production functions (1) and (5) and the market clearing condition (10), the relative time allocation for low-skilled women, across home and substitutable sector, is:

$$\frac{L_{nf3}}{L_{nfh}} = \hat{A}_{3h}^{\sigma-1} \left(\frac{1-\tau}{1+t_3} \right)^\sigma R_{3h}(X), \quad (16)$$

where the effective relative productivity is

$$\hat{A}_{3h} \equiv \left(\frac{A_3}{A_h} \right) \left(\frac{\psi}{1-\psi} \right)^{\frac{\sigma}{\sigma-1}}. \quad (17)$$

Equation (16) states that the relative time allocation depends on relative sector-specific productivity, relative sector-specific taxes and a function $R_{3h}(X)$ that depends on relative wages:

$$R_{3h}(X) \equiv \left(\frac{\xi_{n3}}{\xi_{nh}} \right)^{\frac{\eta(\sigma-1)}{\eta-1}} \left(\frac{1-\lambda_3}{1-\lambda_h} \right)^{\frac{\rho(\sigma-1)}{\rho-1}} \left(\frac{I_{nh}(x_n)}{I_{n3}(x_n)} \right)^{\frac{\sigma-\eta}{\eta-1}} \left(\frac{N_h(X)}{N_3(X)} \right)^{\frac{\sigma-\rho}{\rho-1}}, \quad (18)$$

where $N_j(X)$ is the share of the low-skilled wage bill in the total wage income in sector $j = 1, 2, 3, h$:

$$N_j(X) \equiv \frac{w_{nf}L_{nfj} + w_{nm}L_{nmj}}{\sum_{i,g} w_{ig}L_{igj}} = \left(1 + \left(\frac{\lambda_j}{1-\lambda_j} \right)^\rho \left[\left(\frac{\xi_{ej}}{\xi_{nj}} \right)^\eta \left(\frac{I_{nj}(x_n)}{I_{ej}(x_e)} \right) \right]^{\frac{\rho-1}{\eta-1}} \pi_f^{1-\rho} \right)^{-1}. \quad (19)$$

Both functions of wage bill shares, $I_{ij}(X)$ and $N_j(X)$, are independent of taxes and depend only on the degree of substitutability across different labor inputs (ρ, η) and factor intensities in the production functions $\{\lambda_j, \xi_{ij}\}$. Taken together, the function $R_{3h}(X)$ depends on the sector-specific production functions across 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 into the home sector. Intuitively, as substitutable market services and home services are, by construction, substitutable ($\sigma > 1$), a fall in the opportunity cost of home services (due to higher taxes) reduces the incentive to “marketize” home services. This effect is also present for the other three demographic groups as can be seen from (13) and (14).

We now turn to time allocation across the three market sectors. Using utility function (4), equalizing the marginal rate of substitution across different market goods to their relative

prices, together with the production functions (1) and (5) and the market clearing condition (10), the relative time allocation across different market sectors is derived similarly as for equation (16).

The relative time allocation across non-substitutable and substitutable services is given by:

$$\frac{L_{nf2}}{L_{nf3}} = \hat{A}_{23}^{\varepsilon-1} \left(\frac{1+t_3}{1+t} \right)^{\varepsilon} R_{23} \left(X; \frac{1-\tau}{1+t_3} \right), \quad (20)$$

where the effective relative productivity and the function $R_{23} \left(X; \frac{1-\tau}{1+t_3} \right)$ are:

$$\hat{A}_{23} \equiv \frac{A_2}{A_3} \left(\frac{\omega_s}{\omega_2} \right)^{\frac{\varepsilon}{1-\varepsilon}} \psi^{\frac{\sigma}{1-\sigma}}, \quad (21)$$

$$R_{23} \left(X; \frac{1-\tau}{1+t_3} \right) \quad (22)$$

$$\equiv \left(\frac{\xi_{n2}}{\xi_{n3}} \right)^{\frac{\eta(\varepsilon-1)}{\eta-1}} \left(\frac{1-\lambda_2}{1-\lambda_3} \right)^{\frac{\rho(\varepsilon-1)}{\rho-1}} \left(\frac{I_{n3}(x_n)}{I_{n2}(x_n)} \right)^{\frac{\varepsilon-\eta}{\eta-1}} \left(\frac{N_3(X)}{N_2(X)} \right)^{\frac{\varepsilon-\rho}{\rho-1}} \left(1 + \frac{1}{E_{3h}(X)} \right)^{\frac{\sigma-\varepsilon}{\sigma-1}}. \quad (23)$$

The expression $E_{3h}(x)$ satisfies:

$$E_{3h}(X) = \hat{A}_{3h}^{\sigma-1} \left(\frac{1-\tau}{1+t_3} \right)^{\sigma-1} \left[\left(\frac{\xi_{n3}}{\xi_{nh}} \right)^{\eta} \left(\frac{I_{nh}(x_n)}{I_{n3}(x_n)} \right) \right]^{\frac{\sigma-1}{\eta-1}} \left[\left(\frac{1-\lambda_3}{1-\lambda_h} \right)^{\rho} \left(\frac{N_h(X)}{N_3(X)} \right) \right]^{\frac{\sigma-1}{\rho-1}}. \quad (24)$$

According to equation (20) taxes and subsidies affect time allocation across non-substitutable and substitutable services through two mechanisms. The first is due to the substitution margin across substitutable and home services, namely the decision to marketize home services, which is related to the discussion on equation (16). As home services are a better substitute to substitutable services than to non-substitutable services, i.e. $\sigma > 1 > \varepsilon$, a higher tax implies less home services are marketized resulting in a fall in market hours in substitutable service relative to the non-substitutable services sector: lower $\frac{1-\tau}{1+t_3}$ leads to lower E_{3h} thus higher $R_{23} \left(X; \frac{1-\tau}{1+t_3} \right)$. The second is the substitution margin across non-substitutable and substitutable services as relative sector-specific taxes $\left(\frac{1+t_3}{1+t} \right)$ affect their relative prices. Suppose substitutable services are subsidized which lowers t_3 relative to t , this implies a shift of hours from non-substitutable services into substitutable services, as services from the two sectors are substitutable (with $\varepsilon \geq 0$).

Across goods and non-substitutable services, the relative time allocation is:

$$\frac{L_{nf1}}{L_{nf2}} = \hat{A}_{12}^{\varepsilon-1} \left(\frac{1+t_2}{1+t_1} \right)^{\varepsilon} R_{12}(X), \quad (25)$$

where the effective relative productivity is:

$$\hat{A}_{12} \equiv \frac{A_1}{A_2} \left(\frac{\omega_2}{\omega_1} \right)^{\frac{\varepsilon}{1-\varepsilon}}. \quad (26)$$

As in (16), equation (25) implies that the relative time allocation across goods and non-substitutable services depends on relative productivity, relative consumption taxes and the function $R_{12}(X)$ which is a function of relative wages:

$$R_{12}(X) \equiv \left(\frac{\xi_{n1}}{\xi_{n2}} \right)^{\frac{\eta(\varepsilon-1)}{\eta-1}} \left(\frac{1-\lambda_1}{1-\lambda_2} \right)^{\frac{\rho(\varepsilon-1)}{\rho-1}} \left(\frac{I_{n2}(x_n)}{I_{n1}(x_n)} \right)^{\frac{\varepsilon-\eta}{\eta-1}} \left(\frac{N_2(X)}{N_1(X)} \right)^{\frac{\varepsilon-\rho}{\rho-1}} \quad (27)$$

Given taxes are the same 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 $X \equiv (x_e, x_n, \pi_f)$.

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 $i = n, e, g = m, f$. On the other hand, 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 and consumption taxes tend to reduce market hours in the substitutable service sector, while the presence of subsidies increases market hours in the substitutable service 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. As women have a comparative advantage in producing substitutable services, a larger fraction of female market hours are 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 services from both the home sector and the other two market sectors. 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 a higher income tax reduces female market hours more than male ones, whereas a subsidy has 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 2000 (the average of 2000-2004). Predictions for other countries are obtained by simulating the model with country-specific taxes and subsidies reported in Table A3 of the Data Appendix. 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 $\{\sigma, \epsilon, \rho, \eta, \rho_l, \eta_l\}$; the relative time endowment $\left\{\frac{L_{em}}{L_{ef}}, \frac{L_{nm}}{L_{nf}}, \frac{L_{ef}}{L_{nf}}\right\}$; 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 $\{\hat{A}_{3h}, \hat{A}_{23}, \hat{A}_{12}\}$ as defined in (17), (21) and (26). Excluding the six elasticity parameters, the remaining twenty-two parameters are chosen to match data targets on time allocation and relative wage across the four types of labor in the U.S. economy around 2000.

The six elasticity parameters $\{\sigma, \epsilon, \rho, \eta, \rho_l, \eta_l\}$ for preferences and production functions are directly set to values used 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 ranged from 1.5 to 2.3.¹³ The elasticity of substitution across goods and services, ϵ , is set to 0 given both Herrendorf, Rogerson and Valentinyi (2013) and Moro, Moslehi and Tanaka (forthcoming) 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 (2017) 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 U.S. 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 sector, home sector, and leisure), their relative wages and sectoral shares documented in the Data Section 2. There are a total of twenty-two independent data targets used to match to 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 $\left\{ \frac{L_{ijg}}{L_{ig}} \right\}$. Given the time allocation, the share of substitutable service as a fraction of total high-skilled hours, low-skilled 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.¹⁴ The baseline parameter values are summarized in Table 2. The data targets are reported in the Online Appendix following the discussion of the calibration procedures.

¹³See 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).

¹⁴Note that as shown in equation (16), (20) and (25), separate information on preference parameters $\{\psi, \omega_j\}$ are not needed for the prediction of relative time allocations.

5.2 The Role of Taxes

This subsection reports the quantitative results using only the country-specific income and consumption taxes from McDaniel (2007), i.e. setting $t_3 = t_1 = t_2$. The next subsection discuss the effect of social subsidies. Tables 3 and 4 report the percentage differences from the U.S. for market hours by gender, skill and sector along with the data.

We first compare the prediction of the model on market hours for the four demographic groups with the data. Table 3 shows that the model predicts uniformly lower market hours for each gender-skill group in all European countries and Canada. More importantly, the model predicts larger differences in female market hours, especially low-skilled female market hours, from the U.S. for European countries, which is consistent with the data facts presented in Section 2.2. The model's predictions on sectoral market hours, as reported in Table 4, are also broadly consistent with the data. Predicted market hours in the two service sectors are uniformly lower than in the U.S. Predicted market hours in the goods sector are also uniformly lower, while the data 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 are 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 home services. 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 wages 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 4, on average the model closely predicts the differences in aggregate market hours between Central European countries, Canada, and the U.S., 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 3 reveals that the model particularly over-predicts the difference in female market hours between Nordic Countries and the U.S. This is because Nordic countries have similar or higher effective tax rates than in Central and Southern European countries, but have the smallest difference in female market hours from the United States. Thus, tax alone can not account well for market hours in Nordic countries. The next subsection shows that higher

social subsidies in Nordic countries are the key to reconcile the deviation of model predictions from the data.

We next turn to the model prediction on 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 3 and 4 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 developed by statisticians to measure 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 fitness with the data. Nonetheless, we also report the correlation coefficient and the coefficient of determination for comparison purposes with other papers in the literature.¹⁵

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.¹⁶ 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 5 and 6 report the results when we allow social subsidies on the consumption of substitutable services. The inclusion of subsidies greatly reduces the over-prediction of the model on market hours, especially for women, in Nordic countries and has minimal effects on market hours in Central and Southern European countries. This is because the subsidy rate, as reported in Table A3 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 0.28. The prediction on total market

¹⁵The Data Appendix defines and compares these statistics.

¹⁶All the reported goodness-of-fit measures exclude the United States data point, as the model was calibrated to the US values.

hours also improves with subsidies, with the concordance correlation increasing from 0.35 to 0.42 and the coefficient of determination increasing from 0.78 to 0.85. The improvement is also evident in Figure 8, as the model predictions with subsidy move closer to the 45-degree line. As expected, the largest improvements occur for Nordic countries.

The goodness-of-fit measures indicate that social subsidies mainly affect female market hours and market hours in the substitutable service sector. This is because social subsidies work in the opposite direction as the effective tax. 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 to substitutable services, the substitution away from home services are 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 comparison to the predictive ability of the model, note that Chakraborty et al. (2015) report a coefficient of determination of 0.45 for aggregate market hours while we obtain a coefficient of 0.85.¹⁷ Our improvement in this statistic mainly comes from the model's predictability for 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.

5.4 Two margins of substitutions

The model makes predictions on the effect of taxes and subsidies through two substitution margins: market work versus home work (marketization), and total work versus leisure. These predictions are reported in Tables 7-8. The tables only contain nine countries where Time Use surveys are available. Consistent with the data, the model predicts lower shares of female market work in total work and lower shares of total work in total time for each of the four gender-skill groups in the nine countries. More importantly, the tables reveal the two margins of adjustment made by men and women in response to changes in taxes and subsidies.

Table 7 shows that with higher taxes both men and women in Central and Southern European countries shift their market hours to home, but the magnitude is much larger for women than for men of the same skill level, which is consistent with the negative conditional correlation between shares of female market hours and effective taxes as reported in Figure 5. In Nordic countries, the model again over-predicts the shift in female market hours and social subsidies reduce the over-prediction. The effect of subsidy on female market hours is also

¹⁷See Table 4 in Chakraborty et al. (2015) for details.

evident in Figure 9: When social subsidies are included, the model predictions on the share of female market hours in total work move towards the 45-degree line and the concordance correlation increases from close to zero to 0.28 for low-skilled women and 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 in total work.

Figure 10 and Table 8 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. and there is no significant difference between men and women. The model with higher taxes can deliver these results because the substitution along the work-leisure margin is important for both men and women, which is consistent with the data 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 subsidy mainly affects time allocation between market hours and home hours, it almost has no effect on the share of total work.

To summarize, the model predicts reasonably well the allocation of time for each gender-skill group among the three uses of time: market, home and leisure. In the model higher taxes cause the adjustment of hours across market and home and across work and leisure, and therefore reduce market hours through both margins, while social subsidies reduce market hours mainly through the first margin. Consistent with the data correlations between time use and taxes and subsidies, the work and leisure margin is important for both men and women, while the market and home margin is more important for women. This is due to women’s comparative advantage in producing home and substitutable market services.

5.5 Gender Wage Ratio

Table 9 reports the gender wage ratio (women/men). The model predicts higher gender wage ratios for both skill groups in all European countries and Canada, which is consistent with the data. The intuition is that higher taxes lead to larger decreases in market hours for women, to clear the market, female wages have to increase 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. Turning to specific group of countries, the model performs well for Nordic countries and less so for Southern European countries.

Table 9 reveals that the concordance correlation and the coefficient of determination 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 indication that other complementary factors such as labor market institutions, culture, and discrimination are important for cross-country differences in gender wage ratios (see Blau and Kahn (2000) and Blau and Kahn (2003)). Another channel documented by Olivetti and Petrongolo (2008) is the self-selection of higher ability women into the labor market in Southern Europe, leading to higher gender wage ratios in these countries.

5.6 Robustness

This subsection investigates the robustness 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). This elasticity affects the gender-skill groups similarly and does not change the qualitative effects across the gender-skill groups. It also affects countries similarly and thus the concordance correlation hardly changes with alternative values. 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 from the United States.

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.

6 Conclusion

This paper documents that cross-country differences in aggregate market hours is mainly due to women's market hours, especially low-skilled women. Using a multi-sector model that allows for both gender and skill dimensions, it shows that taxes and social subsidies on family care account for a substantial fraction of the observed cross-country pattern in market hours. Both substitution margins across work and leisure and across market and home are important. Higher taxes reduce market hours through both margins, while higher social subsidies increase market hours through the market and home margin. The impact of taxes through the work and leisure margin affects all population groups, while their impact through the market and home margin is more important for women, especially low-skilled women. Thus countries with higher taxes have lower market hours, especially among low-skilled women. Higher social subsidies in contrast, reverse the effect of taxes on the market

and home margin. This again mainly affects low-skilled women, and thus helps reconciling the labor supply patterns observed in the Nordic countries, where both taxes and subsidies are high, and women have a relatively high labor force participation.

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

The effective tax for substitutable services is net of subsidies to social work activities.

Figure 5: Share of Market Work and 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. Low-skilled individuals are those without a college degree. 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.

	Weekly Hours	Fraction of US	Share of Difference in Annual Hours wrt US							
			Population Group				Sector			
			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 US 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.

Table 2: Calibration

Parameters	Values	Targets
<i>Model Free Parameters</i>		
σ	1.9	Aguiar et al. (2012)
ϵ	0	Herrendorf et al. (2013) and Moro et al. (forthcoming)
ρ	1.42	Katz and Murphy (1992)
η	3	Weinberg (2000) and Acemoglu et al. (2004)
η_l	0.2	Baseline
<i>Calibrated Parameters</i>		
$\frac{L_{ef}}{L_{em}}, \frac{L_{nf}}{L_{nm}}, \frac{L_{ef}}{L_{nf}}$	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	0.81	Relative hours between leisure and goods

Table 3: 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
<i>Average Nordic</i>	<i>-0.15</i>	<i>-0.34</i>	<i>-0.15</i>	<i>-0.31</i>	<i>-0.13</i>	<i>-0.24</i>	<i>-0.18</i>	<i>-0.23</i>
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
<i>Average Central</i>	<i>-0.32</i>	<i>-0.29</i>	<i>-0.20</i>	<i>-0.27</i>	<i>-0.15</i>	<i>-0.20</i>	<i>-0.13</i>	<i>-0.19</i>
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
<i>Average Southern</i>	<i>-0.29</i>	<i>-0.19</i>	<i>-0.20</i>	<i>-0.17</i>	<i>-0.08</i>	<i>-0.13</i>	<i>-0.15</i>	<i>-0.12</i>
Corr		0.04		0.26		0.68		0.41
Concord. Corr.		0.03		0.21		0.48		0.35
Coeff. Determ.		0.72		0.68		0.63		0.82

All values are expressed as a percentage difference of the US value.

Table 4: 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
<i>Average Nordic</i>	<i>-0.15</i>	<i>-0.27</i>	<i>-0.17</i>	<i>-0.49</i>	<i>-0.19</i>	<i>-0.19</i>	<i>-0.06</i>	<i>-0.18</i>
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
<i>Average Central</i>	<i>-0.20</i>	<i>-0.23</i>	<i>-0.28</i>	<i>-0.42</i>	<i>-0.19</i>	<i>-0.16</i>	<i>-0.12</i>	<i>-0.15</i>
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
<i>Average Southern</i>	<i>-0.17</i>	<i>-0.15</i>	<i>-0.25</i>	<i>-0.28</i>	<i>-0.25</i>	<i>-0.10</i>	<i>0.06</i>	<i>-0.10</i>
Corr		0.42		0.33		0.08		0.35
Concord. Corr.		0.35		0.15		0.05		0.17
Coeff. Determ.		0.78		0.31		0.76		-0.13

All values are expressed as a percentage difference of the US value.

Table 5: Market Hours by Labor Input. Model with Subsidies.

	Females				Males			
	Low-Skilled Data	Model	High-Skilled Data	Model	Low-Skilled Data	Model	High-Skilled 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
<i>Average Nordic</i>	<i>-0.15</i>	<i>-0.28</i>	<i>-0.15</i>	<i>-0.26</i>	<i>-0.13</i>	<i>-0.21</i>	<i>-0.18</i>	<i>-0.20</i>
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
<i>Average Central</i>	<i>-0.32</i>	<i>-0.27</i>	<i>-0.20</i>	<i>-0.25</i>	<i>-0.15</i>	<i>-0.19</i>	<i>-0.13</i>	<i>-0.19</i>
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
<i>Average Southern</i>	<i>-0.29</i>	<i>-0.19</i>	<i>-0.20</i>	<i>-0.17</i>	<i>-0.08</i>	<i>-0.13</i>	<i>-0.15</i>	<i>-0.12</i>
Corr		0.12		0.32		0.69		0.36
Concord. Corr.		0.11		0.28		0.53		0.34
Coeff. Determ.		0.76		0.77		0.72		0.85

All values are expressed as a percentage difference of the US value.

Table 6: 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
<i>Average Nordic</i>	<i>-0.15</i>	<i>-0.23</i>	<i>-0.17</i>	<i>-0.38</i>	<i>-0.19</i>	<i>-0.17</i>	<i>-0.06</i>	<i>-0.17</i>
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
<i>Average Central</i>	<i>-0.20</i>	<i>-0.22</i>	<i>-0.28</i>	<i>-0.40</i>	<i>-0.19</i>	<i>-0.15</i>	<i>-0.12</i>	<i>-0.15</i>
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
<i>Average Southern</i>	<i>-0.17</i>	<i>-0.15</i>	<i>-0.25</i>	<i>-0.28</i>	<i>-0.25</i>	<i>-0.10</i>	<i>0.06</i>	<i>-0.09</i>
Corr		0.45		0.47		0.10		0.34
Concord. Corr.		0.42		0.27		0.06		0.16
Coeff. Determ.		0.85		0.59		0.75		-0.09

All values are expressed as a percentage difference of the US value.

Table 7: Marketization: Market Work as Share of Total Work.

	Females				Males			
	Low-Skilled Data	Model	High-Skilled Data	Model	Low-Skilled Data	Model	High-Skilled Data	Model
<i>No Subsidies</i>								
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
<i>Average Nordic</i>	<i>0.02</i>	<i>-0.10</i>	<i>0.02</i>	<i>-0.09</i>	<i>-0.02</i>	<i>-0.07</i>	<i>-0.05</i>	<i>-0.06</i>
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
<i>Average Central</i>	<i>-0.08</i>	<i>-0.08</i>	<i>-0.03</i>	<i>-0.08</i>	<i>-0.01</i>	<i>-0.06</i>	<i>-0.01</i>	<i>-0.05</i>
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
<i>Average Southern</i>	<i>-0.12</i>	<i>-0.07</i>	<i>-0.06</i>	<i>-0.07</i>	<i>0.07</i>	<i>-0.05</i>	<i>0.04</i>	<i>-0.05</i>
Corr		-0.04		0.03		0.29		0.15
Concord. Corr.		-0.03		0.01		0.08		0.06
Coeff. Determ.		0.37		-0.98		-2.59		-1.46
<i>With Subsidies</i>								
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
<i>Average Nordic</i>	<i>0.02</i>	<i>-0.06</i>	<i>0.02</i>	<i>-0.05</i>	<i>-0.02</i>	<i>-0.04</i>	<i>-0.05</i>	<i>-0.04</i>
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
<i>Average Central</i>	<i>-0.08</i>	<i>-0.07</i>	<i>-0.03</i>	<i>-0.07</i>	<i>-0.01</i>	<i>-0.05</i>	<i>-0.01</i>	<i>-0.05</i>
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
<i>Average Southern</i>	<i>-0.12</i>	<i>-0.07</i>	<i>-0.06</i>	<i>-0.07</i>	<i>0.07</i>	<i>-0.05</i>	<i>0.04</i>	<i>-0.05</i>
Corr		0.39		0.46		-0.02		-0.20
Concord. Corr.		0.28		0.25		-0.01		-0.09
Coeff. Determ.		0.62		-0.09		-2.03		-1.15

Marketization is measured by the share of market hours out of total work.

All values are expressed as a difference of the US value.

Table 8: Work vs Leisure: Total Work as Share of Total Time

	Females				Males			
	Low-Skilled Data	Model	High-Skilled Data	Model	Low-Skilled Data	Model	High-Skilled Data	Model
<i>No Subsidies</i>								
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
<i>Average Nordic</i>	<i>-0.04</i>	<i>-0.04</i>	<i>-0.04</i>	<i>-0.05</i>	<i>-0.02</i>	<i>-0.04</i>	<i>-0.05</i>	<i>-0.05</i>
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
<i>Average Central</i>	<i>-0.04</i>	<i>-0.03</i>	<i>-0.05</i>	<i>-0.04</i>	<i>-0.04</i>	<i>-0.04</i>	<i>-0.07</i>	<i>-0.04</i>
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
<i>Average Southern</i>	<i>0.00</i>	<i>-0.03</i>	<i>-0.02</i>	<i>-0.03</i>	<i>-0.02</i>	<i>-0.03</i>	<i>-0.05</i>	<i>-0.03</i>
Corr		0.23		0.23		0.51		0.40
Concord. Corr.		0.17		0.22		0.42		0.20
Coeff. Determ.		0.52		0.80		0.71		0.80
<i>With Subsidies</i>								
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
<i>Average Nordic</i>	<i>-0.04</i>	<i>-0.04</i>	<i>-0.04</i>	<i>-0.04</i>	<i>-0.02</i>	<i>-0.04</i>	<i>-0.05</i>	<i>-0.04</i>
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
<i>Average Central</i>	<i>-0.04</i>	<i>-0.03</i>	<i>-0.05</i>	<i>-0.04</i>	<i>-0.04</i>	<i>-0.04</i>	<i>-0.07</i>	<i>-0.04</i>
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
<i>Average Southern</i>	<i>0.00</i>	<i>-0.03</i>	<i>-0.02</i>	<i>-0.03</i>	<i>-0.02</i>	<i>-0.03</i>	<i>-0.05</i>	<i>-0.03</i>
Corr		0.22		0.22		0.52		0.41
Concord. Corr.		0.17		0.21		0.43		0.20
Coeff. Determ.		0.51		0.79		0.71		0.80

Table 9: Gender Wage Ratio by Skill

	No Subsidies				Subsidies Included			
	Low Skilled Data	Low Skilled Model	High Skilled Data	High Skilled Model	Low Skilled Data	Low Skilled Model	High Skilled Data	High Skilled 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
<i>Average Nordic</i>	<i>0.04</i>	<i>0.01</i>	<i>0.01</i>	<i>0.02</i>	<i>0.04</i>	<i>0.01</i>	<i>0.01</i>	<i>0.01</i>
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
<i>Average Central</i>	<i>0.05</i>	<i>0.01</i>	<i>0.06</i>	<i>0.01</i>	<i>0.05</i>	<i>0.01</i>	<i>0.06</i>	<i>0.01</i>
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
<i>Average Southern</i>	<i>0.06</i>	<i>0.01</i>	<i>0.12</i>	<i>0.01</i>	<i>0.06</i>	<i>0.01</i>	<i>0.12</i>	<i>0.01</i>
Corr		0.27		-0.46		0.38		-0.24
Concord. Corr.		0.03		-0.04		0.03		-0.01
Coeff. Determ.		0.23		0.15		0.20		0.15

All values are expressed as a difference of the US value.

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Data Appendix

In this appendix we document in detail how the data used in the analysis was constructed.

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), the March (ASEC) CPS for the United States, and the 2001 Population Census for Canada. Our sample is restricted to individuals between the ages of 20 and 64 years.

The EU-LFS contains information on the 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 OECD aggregate annual hours, since the aforementioned paper does not include these countries in their sample, and we do not have any other measure of effective weeks worked during a year. Finally, in the March CPS we estimate annual hours using information on the number of weeks and of weekly hours worked during 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 scaled by their own estimates of weeks worked over a year.

Our theoretical model has four types of labor inputs, male and female with low or high skill. In the data, we classify individuals as being high-skilled if they completed college. We select this cut-off point based on cross-country evidence showing that high-school dropouts and high-school graduates are equivalent labor inputs based on their average wages (see Olivetti and Petrongolo (2014)).

To the extent that our model does not capture explicitly demographic dimensions other than gender and skill, we need to control our estimates for additional demographic differences between countries. In order to achieve this, 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 these population partitions we calculate average hours, and these detailed averages are in turn aggregated at the gender-skill level using as weights the U.S. population shares.¹⁸

¹⁸Chakraborty et al. (2015) perform a similar exercise when analyzing the effect of different demographic structures across countries on the cross-national difference in average hours. In estimating the detailed cell-specific average hours we use the sampling weights provided by each survey, in order to guarantee the representativeness of our estimates.

Prior to aggregating the 72 cells, 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 $\mathcal{G}$ the partition of the population obtained by crossing the different gender, skill, age, and marital status groups. Similarly, denote by $\mathcal{GS}$ the partition of the population obtained by crossing only the gender and skill groups; while denote by $\mathcal{AM}$ the partition of the population obtained by crossing the age and marital status groups.¹⁹

Let $f(g)$ be the fraction of the population in a given Age/Marital Status/Skill/Gender group $g \in \mathcal{G}$. For $g \in GS_k$ and $g \in AM_l$, we can rewrite $f(g)$ as

$$f(g) = f(GS_k)f(AM_l|GS_k), \quad (\text{A.28})$$

where $f(GS_k)$ is the fraction of the population in gender-skill group GS_k , while $f(AM_l|GS_k)$ is the fraction of gender-skill group GS_k who belongs to the age-marital status group AM_l .

This fraction $f(AM_l|GS_k)$ varies depending on the gender-skill group GS_k . In order to hold constant the distribution of age and marital status across different gender-skill groups, we replace this proportion by the distribution of age-marital status groups at the national level; i.e. we replace $f(AM_l|GS_k)$ by $f(AM_l)$, which is constant across all gender-skill groups. Thus we replace $f(g)$ in the above formula by

$$\tilde{f}(g) = f(GS_k)f(AM_l). \quad (\text{A.29})$$

In other words, we estimate an alternate fraction of the population in a given Age/Marital Status/Skill/Gender group g by imposing independence between the distributions of age-marital status and that of gender-skill. This adjustment is made for the U.S. population, and the corresponding shares, $\tilde{f}(g)$, are then used across all countries to estimate average hours at different levels of aggregation.

In Table A1 we present evidence on the importance of this demographic adjustment to the hours data. In particular, in the first column of this table we report the weekly hours worked in the market per person for each country, previous to any adjustment for demographic differences between countries.²⁰ Next, we estimate the average hours that would occur in the U.S. if the age and marital status composition of the U.S. population was constant across gender-skill groups, and we report in column 2 the difference between this number and the raw hours of column 1.

¹⁹In other words, $\mathcal{G}$ is a refinement of both $\mathcal{GS}$ and $\mathcal{AM}$, and as such, for any $g \in \mathcal{G}$, there exist corresponding groups $GS_k \in \mathcal{GS}$ and $AM_l \in \mathcal{AM}$ such that $g \in GS_k$ and $g \in AM_l$.

²⁰The weekly hours equal the annual hours of market work per person divided by 52.

Part of the differences in hours reported in column 2 is caused by the different demographics across countries.²¹ In column 3 we report the fraction of these cross-country differences accounted for by differences in the composition of the population in terms of gender, skill, age and marital status. To estimate this so-called “composition effect” note first that 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. $\bar{h}_c = f_c(g)'h_c(g)$, where $f_c(g)$ is the vector of population group shares in equation (A.28), and $h_c(g)$ is the vector of group-specific average hours. Similarly, the average hours that would occur in the U.S. if the age and marital status composition of the population was constant across gender-skill groups is $\tilde{h}_{US} = \tilde{f}_{US}(g)'h_{US}(g)$, where $\tilde{f}_{US}(g)$ is the vector of population group shares in equation (A.29). Hence, we can express the difference in average hours relative to the adjusted US value as

$$\tilde{h}_{US} - \bar{h}_c = \tilde{f}_{US}(g)'(h_{US}(g) - h_c(g)) + (\tilde{f}_{US}(g) - f_c(g))'h_c(g). \quad (\text{A.30})$$

The second term in the right-hand side of the equation is the contribution of demographic differences between countries to the total gap in hours, which we report in column 3 in percentage terms. In this column we observe that, depending on the country, demographic differences account between 2 and 33 percent of the cross-country gap in average effective hours. In other words, while the majority of the cross-country differences in hours is due to behavioral factors, it is still important to adjust for demographic differences when performing our analysis.²²

A.1 Sectoral Hours

The detailed sector classification is presented in Table A2. In the EU-LFS, the industrial classification is provided at the 1-digit level. In that case, we split the number of hours from sector G (“Trade and Motor vehicles”) into “Retail Trade” vs other divisions, by using detailed hours information from the EU-KLEMS database (see Timmer, O’Mahony and van Ark (2007)), and in the case of France and the UK, by using the national versions of their labor surveys.

Sectoral hours are estimated by multiplying the average market hours per person times the share of hours in a given sector out of the total hours worked in the economy. To be consistent with the previous estimations, we also adjust the sectoral hours shares by demographic differences between countries. We do so as follows.

²¹The difference reported for the United States arises from holding constant the age and marital status composition of the population across gender-skill groups.

²²Chakraborty et al. (2015) perform a similar exercise and also find a somewhat small composition effect.

Denote by P the total population in a given country, let $p(g)$ be the population size of group g , and denote by $p(s, g)$ the number of persons in group g employed in sector s . 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. With this notation, we can express the sectoral hours shares as

$$\begin{aligned}
\nu_s &= \frac{H_s}{H} \\
&= \frac{\sum_g p(s, g) \bar{h}(s, g)}{\sum_g p(g) \bar{h}(g)} \\
&= \frac{\sum_g \frac{p(s, g)}{p(g)} \frac{p(g)}{P} \bar{h}(s, g)}{\sum_g \frac{p(g)}{P} \bar{h}(g)} \\
&= \frac{\sum_g f(s|g) f(g) \bar{h}(s, g)}{\sum_g f(g) \bar{h}(g)} \tag{A.31}
\end{aligned}$$

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 sector shares holding constant the demographics of the population at the US level we can replace $f(g)$ in the above equation by $\tilde{f}_{US}(g)$ from equation (A.29). That is the demographically-adjusted shares will equal

$$\hat{\nu}_s = \frac{\sum_g f(s|g) \tilde{f}_{US}(g) \bar{h}(s, g)}{\sum_g \tilde{f}_{US}(g) \bar{h}(g)}. \tag{A.32}$$

B Time-Use information

The time-use classification used in this paper follows closely the one of Aguiar and Hurst (2007b) with a few adjustments. In particular, in the time-use surveys we include into hours of market work both the hours spent doing work, as well as the hours commuting to/from work. The number of hours of work at home include time spent preparing food, cleaning, doing maintenance work, shopping, and child care. It is important to note that child care is not always included in home hours in Aguiar and Hurst (2007b). In contrast, they include time spent gardening and caring for pets as housework, while we include these last two categories in leisure.

In the last three columns of Table A1 we include a cross-country comparison in the market-to-home hours of work, and the effect that adjusting for demographics has on this variable.

C Taxes and Subsidies

As mentioned in the paper, our 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 2000-04, except for Ireland and Greece, where, for data availability reasons, we use data from 2002-04, and 2005, respectively.

The expenditures on social subsidies “in-kind”, S , are obtained from the OECD Social Expenditure Database (SOCX). We include Old-Age, Incapacity, and Family benefits. Benefits “in-kind” are all those non-cash public benefits in the above mentioned areas. Hence, among 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).

We convert these expenditures into a rate by dividing by the gross output in the Substitutable Service sector, GO_{SS} , i.e., the subsidy rate in Substitutable Services is

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

The gross output in the Substitutable Service sector 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 A3.

If we denote the labor income tax by τ , and the consumption tax by t , then the effective tax rate is defined as in Prescott (2004), i.e.,

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

In the case of the Substitutable service sector we use the net consumption tax $t_{ss} = t - s$, where s is the subsidy rate defined above.

C.1 Wages

We construct hourly wage rates using the Labor Force Surveys for France and the UK, the Socioeconomic Panel (SOEP) for Germany, the 2001 population Census for Canada, and the March CPS for the United States. For the rest of Europe, we use the European Community Household Panel (ECHP) for the years 2000-1, and the European Union Statistics on Income and Living Conditions (EU-SILC) for the years 2003-4. In all cases, wages are estimated using the earnings of employees only, as the earnings of the self-employed might include returns to capital as well.

In most cases, the previous surveys provide a measure of current monthly earnings, which

is converted to hourly wages by dividing by 4.33 times the weekly hours of work. However, for the U.S. and some countries in SILC, the hourly wage is constructed using yearly earnings from the previous calendar year.²³ For the U.S., we rely on information on the usual number of hours and weeks worked in the previous year. For the SILC countries without monthly earnings, we divide last year’s earnings by the number of months worked during that year, and by the current number of weekly hours worked times 4.33. Since for these SILC countries we are linking last year’s income to current work hours, we exclude individuals who changed jobs between the income reference period and the time of the interview.

Gender wage ratios for low-skilled and high-skilled individuals are estimated controlling for age and marital status through a standard Mincerian regression. More specifically, we estimate log wage regressions on a second-order age polynomial, a marital status dummy, and interacted dichotomous indicators for college and gender.²⁴ The predicted gender wage ratios are obtained by taking the exponent of the corresponding skill-gender interaction parameters.

D Goodness of Fit Measures

In order to evaluate the goodness-of-fit of our model we use three different measures: the correlation coefficient, the coefficient of determination, and the concordance correlation coefficient. To compare these measures denote by y the original data, and by f the model predictions.

The correlation coefficient is by far the most standard measure of association between two variables. It is defined by

$$\rho = \frac{\text{cov}(y, f)}{\sqrt{V(y)}\sqrt{V(f)}}.$$

It ranges from -1 to 1 and it measures the strength of *linear* association between y and f .

The “Coefficient of Determination” is a generic name for a statistic that takes the form:

$$R^2 = 1 - \frac{SSR}{SST},$$

²³In SILC these countries include Belgium, Denmark, Finland, The Netherlands, Norway, and Sweden.

²⁴Each 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, regressions are estimated using the surveys’ sampling weights.

where SSR is the Residual Sum of Squares,

$$SSR = \sum_i (y_i - f_i)^2,$$

and SST is the Total Sum of Squares,

$$SST = \sum_i (y_i - r_i)^2,$$

where r_i is a reference variable against which the model is evaluated. In most applications, this reference point is simply the mean of the data, i.e. $r_i = \bar{y}$. In our case we follow Chakraborty et al. (2015), and use as reference the value taken by the variable for the US, i.e. $r_i = y_{US}$. One disadvantage of this measure is that it can be negative whenever

$$\sum_i (y_i - f_i)^2 > \sum_i (y_i - y_{i,US})^2$$

The intuition behind this measure is that it compares the “loss” associated with the forecast, f_i , versus the “loss” to be incurred with respect to a reference series, in this case $y_{i,US}$. The measure of loss adopted is the Mean Squared Error. If $R_{CHS}^2 < 0$, it means that the forecast loss associated with f_i is worse than the loss associated with our naive guess, $y_{i,US}$.

The concordance correlation is a statistic proposed in the Statistics literature by Lin (1989) and is expressed as

$$\rho_c = 1 - \frac{\sum_i (y_i - f_i)^2}{V(y) + V(f) + (\bar{y} - \bar{f})^2}$$

The numerator in the RHS of the previous equation is the expected squared perpendicular deviation from the 45-degree line, while the denominator is the expected squared perpendicular deviation from the 45-degree line when y and f are uncorrelated.

The concordance correlation has several appealing properties. For instance, it takes values between -1 and 1. More interestingly, it can be expressed as

$$\rho_c = \rho * \kappa$$

where ρ is the standard correlation coefficient and κ is a term measuring how far the best-fit line deviates from the 45-degree line. Hence, the concordance correlation coefficient combines a measure of precision (ρ) together with a measure of accuracy (κ).

Table A1: Contribution of Demographics to Difference in Hours With Respect to US

	Market Hours			Market-to-Home Hours of Work		
	Raw Effective Weekly Hours	Difference wrt adjusted U.S.	Composition Effect (%)	Ratio	Difference wrt adjusted U.S.	Composition Effect (%)
	(1)	(2)	(3)	(4)	(5)	(6)
Canada	25.9	2.5	5.5	1.5	0.1	27.2
Nordic						
Denmark	24.1	4.3	10.2	1.7	-0.1	21.5
Finland	24.2	4.2	21.6			
Norway	22.7	5.7	2.0	1.5	0.1	-88.6
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	1.3	0.3	15.8
Germany	20.6	7.8	21.2	1.1	0.5	19.2
Netherlands	21.6	6.8	8.2	1.4	0.2	22.9
United Kingdom	23.8	4.6	23.0	1.5	0.1	9.7
Southern						
Greece	23.4	5.0	23.1			
Ireland	23.9	4.5	9.7			
Italy	18.8	9.6	18.5	1.2	0.4	40.0
Portugal	25.1	3.3	33.4			
Spain	21.3	7.1	15.1	1.4	0.2	32.7
United States	28.4	0.02	100	1.58	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 the hours in the U.S. obtained after holding constant the age and marital composition across skill-gender groups and column (1). 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.30)). Column (4) reports the ratio between market and home hours of work. Columns (5) and (6) report the corresponding demographically-adjusted difference and the composition effect for the values in column (4). Data cover the years 2000-2004.

Table A2: 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 A3: 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
<i>Average Nordic</i>	<i>0.36</i>	<i>0.28</i>	<i>0.19</i>
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
<i>Average Central</i>	<i>0.36</i>	<i>0.19</i>	<i>0.07</i>
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
<i>Average Southern</i>	<i>0.28</i>	<i>0.18</i>	<i>0.03</i>
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).