Marriage Stability, Taxation and Aggregate Labor Supply in the U.S. vs. Europe

Indraneel Chakraborty   Hans A. Holter   Serhiy Stepanchuk

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Abstract

Americans work more than Europeans. Using micro data from the U.S. and 17 European countries, we document that women are typically the largest contributors to the cross-country differences in work hours. We also show that there is a negative relation between taxes and annual hours worked, driven by men, and a positive relation between divorce rates and annual hours worked, driven by women. In a calibrated life-cycle model with heterogeneous agents, marriage and divorce we find that the divorce and tax mechanisms together can explain 45% of the variation in labor supply between the U.S. and the European countries.

Keywords: Aggregate Labor Supply, Taxation, Marriage, Divorce, Heterogeneous Households.

JEL: E24, E62, H24, H31, J21, J22.

1. Introduction

It is a well-known empirical finding that aggregate hours worked are higher in the United States than in Europe and that there is also substantial variation among European countries; see for instance Prescott (2004) and Rogerson (2006). These differences deserve attention: Rogerson (2006) notes that they are an order of magnitude larger than the fluctuations at business cycle frequencies in post-WWII U.S. data. Are the differences in hours worked due to public policies or are they due to other fundamental differences between societies?

This paper has two contributions: first, it documents, using cross-country data, that there is a negative relation between taxes and annual hours worked and a positive relation between divorce rate and annual hours worked. While the first relation is well-known, the second one is new, at least from a cross-country perspective. Furthermore, this paper shows that the negative relation between taxes and hours is driven by the behavior of men (i.e. for women the correlation between taxes and hours is close to zero) and the positive relation between divorce and hours is driven by the behavior of women (i.e. for men the correlation between divorce and hours is close to zero).

Second, motivated by these two facts, this paper builds a life cycle model economy populated by heterogenous agents in which both taxes and marital instability affect hours of work. In the model economy, the marital transitions are exogenous, but given these exogenous transitions agents adjust their labor supply and savings behavior. An important assumption is that the labor force participation is associated with higher future earnings, as agents accumulate experience. The model is then calibrated to the U.S. and is used to evaluate how much cross-country differences in taxes and marriage and divorce rates can account for cross-country differences in hours worked. To this end, we use the calibrated economy and change taxes and/or marriage and divorce rates. The results show that taxes play an important role for differences for male hours, while differences in marriage and divorce explain differences in female hours.

We begin by using micro level data to document the contribution of various demographic groups to the aggregate differences in hours worked between the U.S. and 17 European coun-

tries (Western Europe, except Iceland and Lichtenstein).[1] We divide the populations into 12 demographic groups, by age, gender and marital status, and find that the largest contribution comes from prime-aged women. In most European countries, women work substantially less than in the United States while the difference in hours worked between European and American men is smaller.[2] This is especially true for married women, but also holds for single women, and for women with and without children. Next, we document the main motivation for this paper: a negative cross-country correlation between tax levels and hours worked, and a positive correlation between divorce rates and hours worked across countries. However, taxes are in particular correlated with male work hours, while divorce rates are in particular correlated with female work hours.

Why should divorce rates affect labor supply? The value of marriage as consumption insurance has been pointed out in the literature.[3] This paper argues that a higher probability of divorce affects labor supply by reducing the expected value of insurance provided by marriage. In response, individuals self-insure by investing in experience accumulation in the labor market. The argument also applies to individuals who have not yet married. Thus, differences in divorce rates can help explain cross-country differences in labor supply.

To quantitatively assess the impact of taxes and marriage stability on labor supply, we develop a life-cycle, overlapping-generations model with heterogeneous agents, marriage and divorce. There are three types of households: single men, single women and married couples. Divorces and marriages occur stochastically.[4] We calibrate our model to U.S. data and study how labor supply in the U.S. changes as we introduce divorce and marriage probabilities and tax systems from other countries. We find that making marriages more stable results in a reduction of labor supply, par-

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[1]The selection of countries is due to data availability.

[2]The Nordic countries are an exception.

[3]See for instance Kotlikoff and Spivak (1981) who study the gains from marriage due to risk sharing. Johnson and Skinner (1986) and Stevenson (2008) have shown that divorce rates have significant effects on female labor supply.

[4]Two recent papers also making the assumption of exogenous divorce and marriage rates are Cubeddu and Rios-Rull (2003) and Fernández and Wong (2013). This is reasonable because literature has shown that cultural, legal and birth control factors play an important role for cross-country differences in divorce and marriage rates (See Johnson and Skinner (1986), Goldin and Katz (2002), Crouch and Beaulieu (2006), Stevenson (2008), McDermott, Fowler, and Christakis (2009), Gonzalez and Viitanen (2009) and Furtado, Marcen, and Sevilla-Sanz (2010), Kennes and Knowles (2012) among others.

ticularly for women. This is because women are usually the second earners in a married couple. The insurance effect of marriage is therefore stronger for women, and female labor supply is more sensitive to divorce and marriage rates.

When treated with both divorce and marriage probabilities and tax systems from the European countries at the same time, the model can explain 45% of the variation in aggregate labor supply between the U.S. and the European countries. Changing only the probabilities of marriage and divorce in the U.S. to their European equivalents accounts for 17% of the cross-country differences in aggregate hours worked. When we only introduce European taxes, we can account for 32% of the variation in aggregate hours worked between the U.S. and the European countries. For female labor supply, marriage stability explains 22% of the variation in work hours. However, taxes are unable to explain any variation in female labor supply. Taxes are on the other hand very good predictors of male labor supply. For men, taxes explain 71% of the variation between the U.S. and the 17 European countries compared to 9% explained by divorce and marriage rates. In Section 6 we relate the differential impact of taxation on male and female labor supply to the fact that countries with high tax average levels also tend to have progressive taxes and separate taxation of married couples.

There is a substantial literature devoted to the rise in female work hours in the US over time. The same explanations may be important from a cross country perspective. Divorce rates have been shown to have a significant effect on female labor supply (see Johnson and Skinner (1986) and Stevenson (2008)). In a contemporary paper which is closely related to ours, Fernández and Wong (2013) find that divorce rates can help explain the rise in female labor force participation over time in the U.S. Building a life-cycle model and treating it with exogenous divorce and marriage rates the authors can explain a significant fraction of the increase in labor force participation of married women in the 1955 cohort compared to the 1935 cohort. The rest is explained by changes in wage structure. Kaygusuz (2010) finds that 20-24 percent of the 13 percentage points rise in labor force participation of U.S. married women between 1980 to 1990 can be explained by changes in taxes. In another related contemporary paper by Guvenen and Rendall (2013), women

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can achieve insurance against a bad marriage through education. Guvenen and Rendall (2013) are able to explain the rise in divorce and decline in marriage rates in U.S. using their framework. Attanasio, Low, and Sanchez-Marcos (2008) look at the life-cycle labor supply of American women born in the 30s, 40s and 50s and find that a combination of a reduction in the cost of children alongside a reduction in the wage-gender gap is needed to explain the increase in participation of the youngest cohort. Jones, Manuelli, and McGrattan (2003) study the increase in labor supply of married women in U.S. between 1950-1990 and find that the gender wage gap plays an important role, while technological improvements in the household have limited impact on the increase in labor supply by married women. On the other hand, Greenwood, Seshadri, and Yorukoglu (2005) find that new household technologies can help explain the rise in married female labor force participation. Fernaǹdez, Fogli, and Olivetti (2004) argues that changes in characteristics of men - whose mothers have worked themselves - helps explain the labor participation decisions of their wives.

A contemporary paper which is related to ours, and which also investigates the relationship between taxes and labor supply across countries, is Bick and Fuchs-Schundeln (2014). Using a static model with two-person households, they concentrate on the labor supply of married couples. The authors find that the introduction of European tax systems in the U.S. does a good job of explaining differences in married male work hours and for countries, which like the U.S. practice joint taxation[5], it also helps to explain differences in female work hours. For countries who practice a higher degree of separate taxation of married couples, taxes explain less of the differences in female labor supply. The reason is that some of the countries with relatively high average tax rate practice separate taxation and in addition have very progressive tax schedules. The tax rate on the secondary earner (usually the female) is therefore not necessarily that different from in the U.S. This is similar to what we find in Section 6.3.

Other mechanisms that may affect differences in work hours across countries have also been investigated in the literature. In particular, Rendall (2011) investigates differential productivity

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[5]Germany and Belgium would be examples of such countries.

across sectors, Alesina, Glaeser, and Sacerdote (2005) suggests regulations and unionization, Wallenius (2012) considers social security systems and resulting redistributive effects and Olivetti (2006) looks at the role of returns to experience. We partially capture the redistributive effects in our model, but due to data limitations are unable to capture country specific gender wage gaps, returns to labor market experience, and unionization effects. These mechanisms could also contribute to explaining cross-country differences in work hours. While we do not expect that our two mechanisms can explain all of the cross-country variation in hours, in Section 6 we find that they explain a substantial fraction (45%).

The remainder of the paper is organized as follows: In Section 2, we study the contributions of different demographic groups to aggregate differences in labor supply between the U.S. and 17 Western European countries. In Section 3, we document a correlation between aggregate labor supply and taxation across countries and a correlation between aggregate labor supply and divorce rates across geographic regions. Section 4 develops the quantitative model. Section 5 discusses data and calibration. Section 6 studies the quantitative implications of changing the U.S. divorce and marriage probabilities to their European counterparts, and quantitative implications of introducing European tax schemes in the U.S. Section 7 concludes.

2. Labor Supply in the U.S. and Europe

2.1. Data Description

To obtain information about annual hours worked, we use two sources of micro data – the European Union Labor Force Survey database (E.U. LFS), which contains data from the 17 European countries in our sample, and the Current Population Survey (CPS), which contains the corresponding data from the U.S. Both of these datasets are used by the OECD to construct their macro-level labor market statistics. We use data from 2000 for all countries except Germany, for which E.U. LFS data is only available from 2002.

Similar to Prescott (2004), we consider individuals between 15 and 64 years of age. We construct the data on annual hours worked as the product of hours worked per week and the number

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of weeks worked per year.[6] We provide further details and discuss some existing issues with the data in Appendix A.[7]

2.2. Labor Supply Across Countries

Column (2) in Table 1 shows that when taking a simple average across all European countries in our sample, in the year 2000 European hours worked were 81.70% of (or about 249 hours less than) those in the U.S. At the same time, there is a substantial variation within Europe. The annual hours worked in Switzerland were quite close to those in the U.S., while in Belgium they were only 69.18% of (or more than 400 hours lower than) those in the U.S.

Columns (3) and (4) in Table 1 show cross-country differences in hours worked for men and women separately. On average, the difference for women is about 45 percent larger than for men. However, the average masks a large variation within Europe. We divide the European countries in our sample in three subgroups: Nordic countries, Central Europe and Southern Europe.[8] In the Nordic countries, the difference from the U.S. is in fact larger for men, while in a typical Southern European country (with the only exception of Portugal), the difference for women is about two to three times larger than the corresponding difference for men.

Columns (5-8) in Table 1 compare the average annual hours worked by marital status. Among the four gender/marital status groups shown in the table (married men, single men, married women and single women), married women in Europe display the largest difference from their U.S. counterparts. However, this is largely due to the behavior of married women in Central and Southern European countries. In Nordic countries, married women work almost as many hours as those in the U.S. Single women in Europe also work substantially less compared to their U.S. counterparts, and the difference is again particularly large in Southern Europe.

We use legal marital status in our analysis. Cohabitation is an important issue. However, data

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[6] Hours worked per week correspond to the hours worked in all jobs in the reference week of the interview.

[7] Internet supplement is available at `https://dl.dropboxusercontent.com/u/19751944/ms/ia.pdf`.

[8] We put Ireland in the "Southern" European group, since it resembles those countries along two important dimensions: marriage stability and labor supply of women. It might be more appropriate to call this group of countries "Catholic".

is mostly unavailable regarding cohabiting couples. Eurostat database that we use to compute the marriage and divorce probabilities provides data on persons in registered partnership for only four countries in our sample: the Netherlands, Denmark, Finland and Sweden, starting from 2007. In Appendix B, we discuss the impact of cohabitation on these four countries in some detail. The impact of cohabitation for the four countries seems limited. However, more research using more data is necessary before a conclusion can be reached. At the same time, we believe that people that are legally married and those that only cohabit differ along the dimensions (such as separation costs, tax schedule) that are mainly relevant for this paper. The existing research on this matter appears to support this view. (See, for example, Gemici and Laufer (2010)).[9]

Columns (9-14) in Table 1 contrasts the cross-country differences in hours worked by gender and three age groups: (i) "young" (16-24 years of age), (ii) "prime-aged" (25-54 years of age) and (iii) "old" (55-64 years of age). As before, for each age group, the difference is larger for women. Among the three age groups, the largest difference from the corresponding reference group in the U.S. on average is displayed by the "old" European men and women. However, as we will discuss later, because of the relative sizes of the age groups, prime-aged persons (and in particular prime-aged women) are typically the largest contributors to the aggregate difference with the U.S.

Given that we find that the difference in hours worked between the U.S. and Europe is larger for women than for men, it is natural to ask whether this is related to women reducing their labor supply as a result of having children.

Panel A of Table H.14 in the Appendix shows that when we concentrate on a narrower age group (20-30 years of age), we find that these younger women without small children in Europe typically have annual hours of work that are closer to their American counterparts.[10] This is in comparison to the same group of young women with small children, where we find a larger gap in work hours. This pattern is especially true for countries like Austria and Germany. Comparing columns (2) and (4) for those two nations shows that numbers drop from 100.3% and 82.9% of

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[9]In a few European countries, cohabitation is quite similar to marriage (see Perelli-Harris and Gassen (2012)).

[10]We thank the anonymous referee for this suggestion.

U.S. hours to 57.1% and 37.2% of the U.S. hours for Austria and Germany respectively.[11]

Next, we investigate the contribution of women with small children to the overall difference in annual hours worked, with respect to U.S. Panel B of Table H.14 in the Appendix shows that the contribution of women with small children to the overall difference in annual hours worked, with respect to the U.S., is typically substantially smaller than the contribution of women without small children. This is intuitive because the annual hours worked by women with small children is generally lower than other groups in both U.S. and Europe, and this group is not very large. Hence, the explanatory power of the difference in annual hours worked by women with small children is itself low. This is the reason why while children may play an important role in labor supply of young women, the presence of children does not play such a significant role in the difference of labor supply between U.S. and Europe. Bick and Fuchs-Schundeln (2014) also do not find that women with small children are a major contributor to the difference in labor supply between U.S. and European countries. However, more research needs to be done on this important sub-group of population.

2.3. Group Contribution Decomposition

To analyze the contributions of various demographic groups to the difference between aggregate labor supply in the U.S. and the European countries in our sample, we perform the following decomposition. Suppose we divide each country's sample into n different groups. Then the difference between the aggregate average annual hours worked in the U.S., $\bar{h}^{us}$, and in country j, $\bar{h}^j$, can be written as:

$$\bar{h}^{us} - \bar{h}^j = \sum_{i=1}^{n} \omega_i^{us} h_i^{us} - \sum_{i=1}^{n} \omega_i^j h_i^j = \underbrace{\sum_{i=1}^{n} (h_i^{us} - h_i^j)\omega_i^{us}}_{\text{``behavioral effect''}} + \underbrace{\sum_{i=1}^{n} (\omega_i^{us} - \omega_i^j)h_i^j}_{\text{``compositional effect''}} \tag{1}$$

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[11]Table H.14 contains only a subset of countries for which E.U. LFS provide information on children.

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where ω_i^j is the share of observations that come from group i in country j's sample, while h_i^j is the average annual hours worked by individuals in this group.[12] The last term in Equation 1, which we call the "compositional" effect, reflects the differences in hours worked due to the differences in the composition of the population in the two countries. For instance, a positive compositional effect would mean that in the U.S., the demographic groups that typically work more (such as prime-aged men) have relatively larger size, and the demographic groups that typically work less (such as older women) have smaller size compared to the corresponding European country j. We are more interested in the first term which we call the "behavioral effect". It captures the differences in hours worked by various demographic groups in the two countries, assuming that the composition of the population in these two countries is the same.

We divide the data into 12 demographic groups, according to gender, marital status and age (using three age groups). Table 2 reports the contribution of various demographic groups to the difference in aggregate labor supply. Columns (2) and (3) divide the population by gender, and add up to one. Columns (4) - (6) divide the population by age, i.e. Young, Prime-aged and Old, and add up to one as well. As can be seen from Column (7) in Table 2, the compositional effect is typically small. On average, it accounts for 6.6% of the difference between the U.S. and the European countries in our dataset. The rest of the difference is due to the behavioral effect. Columns (8) and (9) report the intensive and extensive margins, and add up to one.

Columns (2-6) in Table 2 shows the contribution of several demographic groups of interest to the behavioral effect (while Table H.11 in the Appendix provides more details). To compute the weighted means for the three subgroups, and for all European countries in our sample, we weight them according to the size of the difference from the U.S.[13] The table shows that in Central and especially in Southern Europe, women are the main contributors to the differences in hours worked

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[12]This is similar to the decomposition performed in Blundell, Bozio, and Laroque (2011). They analyze the changes in hours worked over time, while we look at the differences in hours worked between countries at a given point in time.

[13]We use the weights $\omega_i = \frac{\Delta_{U.S.,i}}{\sum_i \Delta_{U.S.,i}}$. One feature of such a weighting scheme is that it puts lower weight on Switzerland, which appears to be a special case. The difference between the U.S. and Switzerland is very small to begin with and therefore a relatively small absolute difference for one demographic group can be a large percentage difference.

between the U.S. and the European countries. In particular, the biggest contribution in these two groups of countries are coming from married prime-aged women. In contrast to this, in the Nordic countries, the biggest contribution comes from married prime-aged men.

As we mentioned earlier, the largest difference in terms of hours worked per person is displayed by older persons. However, because of the small size of that demographic group, their contribution to the overall difference is much smaller than the contribution of the prime-aged individuals.

2.4. Intensive vs. Extensive Margin

In this subsection we investigate whether the discrepancies in work hours between the U.S. and Europe are due to Americans working longer hours (intensive margin) or whether they are due to more Americans working (extensive margin). We find that the two margins are about equally important.

The two last columns of Table 2 show the contribution of the intensive and extensive margins to the difference in labor supply between the U.S. and country i, using the following decomposition formula:

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\begin{aligned}
\bar{h}^{U.S.} - \bar{h}^i &= H^{U.S.}_{\text{empl}} \cdot \text{Share}^{U.S.}_{\text{empl}} - H^i_{\text{empl}} \cdot \text{Share}^i_{\text{empl}} \\
&= \underbrace{\left(H^{U.S.}_{\text{empl}} - H^i_{\text{empl}}\right)\text{Share}^{U.S.}_{\text{empl}}}_{\text{Intensive Margin}} + \underbrace{\left(\text{Share}^{U.S.}_{\text{empl}} - \text{Share}^i_{\text{empl}}\right)H^i_{\text{empl}}}_{\text{Extensive Margin}}
\end{aligned}
\tag{2}
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From the OECD data, one can compute the total average hours worked in country i, H^i, as the product of the hours worked by employed persons, H^i_{empl}, and the share of the population which is employed, $\text{Share}^i_{\text{empl}}$. Table 2 reports the contributions of intensive and extensive margins as a percentage of the total difference in hours worked between the U.S. and country i, $\bar{h}^{U.S.} - \bar{h}^i$. As can be seen from the table, both margins appear to be important. The contribution of the extensive margin is particularly large in Southern Europe, while the intensive margin is more important in the Nordic countries, Netherlands and Germany (with Switzerland being a special case).

3. Possible Determinants of Labor Supply: Taxes and Marriage Stability

Taxes have been suggested as a major contributor to cross country differences in labor supply in the literature (see Prescott (2004) and Rogerson (2006)). Marriage stability is a new explanation in this context, motivated by our finding in Section 2 that women are the biggest contributor to the cross-country differences in labor supply. Our hypothesis is that more stable marriages provide consumption insurance, thereby reducing the incentives to accumulate labor market experience, in particular for women who often are secondary earners. Conversely, a higher probability of divorce can increase the value of market experience for the woman who has a higher probability of ending up as a single earner.

It is well-known that the level of labor income taxes are higher in Europe (see Prescott (2004)). However, there are many issues to consider when comparing labor income taxes across countries. Both the cross-country differences in tax levels and tax progressivity may be of interest. We use 2 measures that capture some elements of the cross-country differences in tax progressivity: (1) top marginal tax rates, (2) progressivity wedge (PW) measure from Guvenen, Kuruscu, and Ozkan (2013):[14]

$$PW(y_1, y_2) = 1 - \frac{1 - \tau(y_2)}{1 - \tau(y_1)} \tag{3}$$

This intuitive measure, where a higher value indicates a more progressive tax schedule, takes values between 0 and 1 but will naturally be sensitive to the choice of y_1 and y_2, except with flat taxes. If there is a flat tax, then the progressivity wedge would be zero for all levels of y_1 and y_2. Table H.10 in the Appendix shows that according to this measure, among the 18 countries in the table, Denmark has the most progressive taxes and Switzerland the least progressive. The U.S. is among the countries with the least progressive taxes, while Germany is among the countries with the most progressive taxes.

Consumption taxes may also have an impact on labor supply decisions, since it affects the purchasing power of the after-tax income the worker receives. The consumption tax varies from

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[14] An analogous measure is used in Caucutt, Imrohoroglu, and Kumar (2003).

a low 7.6% in Switzerland, to a high 25% in Denmark and Sweden. The U.S. has the second lowest consumption tax among the countries in our dataset. To capture the joint effect of labor and consumption taxes, we consider the effective tax rate on labor income, τ, as defined in Prescott (2004) is $\tau = 1 - \frac{1-\tau_l}{1+\tau_c}$, which is the fraction of labor income that is taken by the government in the form of labor and consumption taxes.

Table 3 shows the results of regressing (the log of) average annual hours of work on the number of divorces per 1000 married people and each of our tax measures.[15] In columns (3) and (4), we find that both the divorce rate and the average tax rate/average effective tax rate are highly statistically significant, and have the expected sign – higher taxes tend to reduce average hours worked, while higher number of divorces tend to increase them.

Figure 1 shows that the taxes and divorces affect men and women differently. While there is a strong positive correlation between the divorce rates and hours worked for women, the corresponding correlation for men is positive but close to zero. On the other hand, while there is a strong negative correlation between the hours worked and the average effective tax rate for men, the corresponding correlation for women is also negative but close to zero.

This is further confirmed in Panel B of Table 3 where we regress (the logarithm of) hours worked on divorce rate and average effective tax rate for men and women separately.

4. Model

The stationary economy is populated by three types of households: single males, single females, and married couples. Individuals start their work life at age 20. They live for at least 65 years and at most 95 years, but enter retirement at age 65. A model period is 1 year, so there are a total of 45 model periods of active work life. In addition to demographics, households are heterogeneous with respect to asset holdings, years of labor market experience, and idiosyncratic productivity shocks (market luck). Single households face an age-dependent probability of becoming married, while married couples face an age-dependent probability of divorce. One is more

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[15]We provide the details of how we construct these divorce rates in the calibration section below.

likely to be married to someone with a similar level of education. We assume that marriage will always happen to a partner of the same age, and that married couples die together. Households decide whether or not to participate in the labor market, how many hours to work conditional on participation, how much to consume, and how much to save. If they participate in the labor market, they accumulate one year of labor market experience.

4.1. Labor Income

Individuals choose work hours, $n \in [0, 1]$. The wage per time unit, w, of an individual depends on his level of education, $j \in \{hs, c\}$ (where "hs" stands for high school and "c" stands for college), gender, $g \in \{m, f\}$, years of labor market experience, x, and idiosyncratic productivity shock, u:

$$w(j, g, x, u) = e^{\gamma_{0jg} + \gamma_{1jg}x + \gamma_{2jg}x^2 + \gamma_{3jg}x^3 + u} \tag{4}$$

$$u' = \rho_{jg}u + \epsilon, \quad \epsilon \sim N(0, \sigma_{jg}^2) \tag{5}$$

Given this wage function, the beginning wage level as well as the returns to experience and idiosyncratic shock process are allowed to differ by level of education and gender. The productivity shock is assumed to follow the AR(1)-process in Equation 5.

4.2. Preferences

The momentary utility function of single individuals, U^S, depends on work hours, $n \in [0, 1]$, consumption, c, and gender, g:

$$U^S(g, c, n) = \log(c) - \chi_g \frac{n^{1+\eta_g}}{1 + \eta_g} - F_g \mathbb{1}_{[n>0]} \tag{6}$$

F_g is a fixed, gender specific, disutility from working positive hours. The indicator function, $\mathbb{1}_{[n>0]}$, is equal to 0 when $n = 0$ and equal to 1 when $n > 0$. χ_g here captures the taste for work while $1/\eta_g$ is the Frisch elasticity of labor supply conditional on employment. Married couples have a joint

utility function, U^M, with shared consumption, measured in adult equivalents:

$$U^M(c, n_m, n_f) = \log(c/e) - \chi_m \frac{n_m^{1+\eta_m}}{1 + \eta_m} - \chi_f \frac{n_f^{1+\eta_f}}{1 + \eta_f} - F_m \mathbb{1}_{[n_m>0]} - F_f \mathbb{1}_{[n_f>0]} \qquad (7)$$

4.3. Marriage and Divorce

Marriages and divorces occur exogenously in the model. Single households face an age-dependent probability, $\bar{\omega}(t)$, of marriage whereas married households face an age-dependent probability , $\pi(t)$, of divorce. We assume that one is always married to someone of the same age and that married couples die together. Except for age, the only form of assortative mating in the model is by education. There is a higher probability, $\bar{\omega}_{intra\_ed.}$, of marrying someone with the same level of education. Conditional on age, education and gender, a draw of partner is made from the distribution of singles generated by the model, $Q^{jgt}(j, x, k, u)$. This means that the agents in the model have rational expectations about their partner's education level, j, experience, x, asset holdings, k and productivity shock, u.

4.4. Government

The government taxes consumption and labor income and runs a balanced budget. We assume that a fraction $(1 - \vartheta)$ of the government revenues are wasted, i.e. spent on things that are not in the model.[16] The remainder of the government's revenues are spent on social security payments, Ψ_g, transfers to unemployed people, T, and lump sum transfers to households, G. G captures a wide range of government expenditure, from education and healthcare to social aid and disability insurance. It is beyond the scope of the paper to model these programs in great detail. It is, however, reasonable to assume that these programs are progressive in the idiosyncratic shock, u. We let $G(u) = \alpha_u(u_{\max} - u)$, where $u_{\max}$ is the highest realized value of u.[17] Similar assumptions about the progressivity of G are made by Oh and Reis (2012) and McKay and Reis (2013), who study government transfer programs in greater detail. Let $\Upsilon^S(g, j, k, x, u, t)$ be the measure of single households over gender, g, education, j, assets, k, experience, x, productivity shock, u, and age, t, and $\Upsilon^M(j_m, j_f, k, x_m, x_f, u_m, u_f, t)$ be the measure of married households. The government budget

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[16]Examples would be interest payments, national defense etc.
[17]We discretize the process for u using the method developed by Tauchen (1986). α_u is adjusted to balance the budget.

can thus be written:

$$\int G d\Upsilon^S + \int \left(G_m + G_f\right) d\Upsilon^M = \vartheta \int (nw\tau_S(wn) + c\tau_c)d\Upsilon^S + \vartheta \int ((n_m w_m + n_f w_f)\tau_M(n_m w_m + n_f w_f) + c\tau_c)d\Upsilon^M$$

$$- \int (T\mathbb{1}_{[t\le44,n=0]} + \Psi_g\mathbb{1}_{[t>44]})d\Upsilon_g^S - \int (T(\mathbb{1}_{[t\le64,n_m=0]} + \mathbb{1}_{[t\le64,n_f=0]}))d\Upsilon^M - \int ((\Psi_m + \Psi_f)\mathbb{1}_{[t>44]})d\Upsilon^M$$

(8)

Equation 8 says that the sum of lump sum payments to households is equal to the fraction of tax revenues that is not wasted minus expenses on social security and transfers to non-working households.

4.5. Household's Problem

Let r be the risk-free interest rate, and β the time discount factor. τ_c and τ_k represent flat taxes on consumption and capital, whereas τ_S and τ_M are nonlinear labor income taxes for singles and married couples, respectively. In most OECD countries, at least some part of the tax schedule is dependent on whether a person is single or married. There is, however, significant cross country variation. Written recursively, a single household's problem can be formalized as follows:

$$V^S(g, j, k, x, u, t) = \max_{c,n,k'} U^S(g, c, n) + \beta\big((1 - \bar{\omega}(t))E_{u'}[V^S(g, j, k', x', u', t + 1)]$$

$$+ \bar{\omega}(t)E_{j_p,k'_p,x'_p,u',u'_p}[V^M(j, j_p, k' + k'_p, x', x'_p, u', u'_p, t + 1)]\big)$$

$$\text{s.t.:} \quad c(1 + \tau_c) + k' = k(1 + r(1 - \tau_k)) + nw(j, g, x, u)(1 - \tau_S(w(j, g, x, u)n))$$

$$+ G(u) + (1 - \mathbb{1}_{[n>0]})T$$

$$x' = x + \mathbb{1}_{[n>0]}, \quad n \in [0, 1], \quad k' \ge 0, \quad c > 0, \quad (9)$$

The subscript, p, stands for partner. In the case that an individual becomes married in the next period, the expectation of next period's utility must be taken with respect to the distribution over potential partners' education, experience, asset holdings, and idiosyncratic productivity shock, $Q^{jgt}(j_p, x'_p, k'_p, u_p)$[18]. Married couples maximize their joint utility and face an age-dependent prob-

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[18] Q^{jgt} and Υ^S are related as follows. Let the single person i have gender g_i, age t_i and education level j_i. Then:

$$Q^{j_i q_i t_i}(j, x, k, u) = \bar{\omega}_{\text{intra\_ed}}\Upsilon^S(-g_i, j_i, k, x, u, t_i) + (1 - \bar{\omega}_{\text{intra\_ed}})\Upsilon^S(-g_i, -j_i, k, x, u, t_i),$$

ability, $\pi(t)$, of becoming divorced. When couples divorce, they split their assets evenly. Their problem can be written as:

$$V^M(j_m, j_f, k, x_m, x_f, u_m, u_f, t) =$$

$$\max_{c,k',n_m,n_f} U^M(c, n_m, n_f) + \beta(1 - \pi(t))E_{u'_m, u'_f}[V^M(j_m, j_f, k', x'_m, x'_f, u'_m, u'_f, t+1)]$$

$$+ \beta\pi(t)E_{u'_m}[V^S(m, k'/2, x'_m, u'_m, t+1)]$$

$$+ \beta\pi(t)E_{u'_f}[V^S(f, k'/2, x'_f, u'_f, t+1)]$$

$$\text{s.t.:} \quad c(1 + \tau_c) + k' = k(1 + r(1 - \tau_k)) + (n_m w_m + n_f w_f)(1 - \tau_M(n_m w_m, n_f w_f))$$

$$+ G(u_m) + G(u_f) + (2 - (\mathbb{1}_{[n_m>0]} + \mathbb{1}_{[n_f>0]}))T$$

$$x'_m = x_m + \mathbb{1}_{[n_m>0]}, \quad x'_f = x_f + \mathbb{1}_{[n_f>0]}, \quad n_f, n_m \in [0, 1], \quad k' \geq 0, \quad c > 0 \qquad (10)$$

Retired households make no labor supply decisions but receive an amount of social security, Ψ_g, depending on their gender. We assume that retirees receive a lump sum redistribution equal to a working individual with a 0 shock. We also assume that retired households do not marry or get divorced, and that husband and wife die at the same time. Their problem, if single, is simply:

$$V^S(g, k, t) = \max_{c>0, k'\geq 0} U^S(g, c) + \Omega(t)\beta V^S(g, k', t+1)$$

$$\text{s.t.:} \quad c(1 + \tau_c) = k(1 + r(1 - \tau_k)) + \Psi_g + G(u = 0) \qquad (11)$$

where $\Omega(t)$ is the probability of survival until the next period. Married retirees solve:

$$V^M(k, t) = \max_{c>0, k'\geq 0} U^M(c) + \Omega(t)\beta V^M(g, k', t+1),$$

$$\text{s.t.:} \quad c(1 + \tau_c) = k(1 + r(1 - \tau_k)) + \Psi_m + \Psi_f + 2G(u = 0) \qquad (12)$$

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where $-g_i$ denotes the gender opposite to g_i, and $-j_i$ denotes the education level different from j_i.

5. Calibration

We try to use data from 2000 or the year closest to 2000 that we can obtain. The reason for this is that for the year 2000, we have data that can be used to construct divorce and marriage probabilities for all the countries in Western Europe. We also have tax data for all the countries starting in 2001.

5.1. Preferences

The momentary utility functions for single and married persons are given in Equations 6 and 7, with consumption measured in adult equivalents, $\frac{c}{e}$. We use the OECD adult equivalence scale and set $e = 1.7$ for married couples, and $e = 1.0$ for singles. The discount factor, β, the fixed costs of working, F_m and F_f, as well as χ_m and χ_f are among the estimated parameters. The corresponding data moments are the mean asset holdings of individuals in households with head aged $20 - 64$, taken from the PSID (99-05), male and female employment rates from the CPS (2000) and work hours, taken from OECD 2000.

There is considerable debate in the economic literature about the inter-temporal elasticity of labor supply, see Keane (2011) for a thorough survey. However, there seems to be a consensus that the elasticity of labor supply for women is larger than that for men. In our model, the inter-temporal elasticity will be related to both the fixed costs of working, F_m and F_f, and the parameters η_m and η_f. We chose to fix the latter two and calibrate the first two within the model. This ensures that the model matches both the intensive and extensive margin of labor supply for men and women. Another reason is that η parameters have direct empirical counterparts in the intensive margin inter-temporal elasticity of labor supply. Kimmel and Kniesner (1998) separately estimate the intensive margin elasticities, corresponding to $\frac{1}{\eta_m}$ and $\frac{1}{\eta_f}$ in the model by controlling for selection and includes a fixed cost of participation. They obtain 0.39 for men and 0.66 for women. We choose to be slightly more conservative and set $\frac{1}{\eta_m} = 0.3$, $\frac{1}{\eta_f} = 0.6$.[19]

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[19] A calibration where we set the elasticity of labor supply of both genders equal to each other, $\frac{1}{\eta_m} = \frac{1}{\eta_f} = 0.4$, yields similar results.

5.2. Risk Free Interest Rate

Given the partial equilibrium nature of the model, we take the risk free rate as fixed and calibrate it using the data. We set the risk free rate equal to the average of 3-month t-bill rates minus inflation over the period from 1947-2008 based on data from the Federal Reserve Bank of St. Louis.[20]

5.3. Wages

We estimate the experience profile of wages and the processes for the idiosyncratic shocks exogenously, using the PSID from 1968-1997. After 1997, it is not possible to get years of actual labor market experience from the PSID. Appendix C describes the estimation procedure in more detail. We use a maximum likelihood approach to control for selection into the labor market, as described in Heckman (1976) and Heckman (1979). We estimate different returns to experience for each gender/education group. We then obtain the residuals from these estimations and use the panel data structure of the PSID to estimate the parameters for productivity shock process ρ_{jg} and σ_{jg} by OLS. Our results for the shock processes are in line with Chang and Kim (2006) who use a similar approach on PSID data. To get levels of earnings that are in line with the asset holdings, we include a parameter controlling the average earnings of each gender/education group in the simulated moments estimation. The corresponding data moments are the average wage of each group in the PSID 99-05.

5.4. Taxes

For single households we use the labor income tax schedule proposed by Benabou (2002) and recently used in Heathcote, Storesletten, and Violante (2014). For married couples, we modify the tax function to distinguish between joint and separate taxation of their income. The tax schedule is then a function of an individual's (or each of the spouses') earnings relative to the average earnings (AE) (see Equations D.1 and D.2 in Appendix D). As described in more detail in the Appendix, we fit this function to labor income tax data from the OECD tax database (2001). This data is constructed by the OECD based on tax laws from different countries. It is well suited for cross

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[20]Series TB3MS and GDPDEF.

country comparisons, see also Guvenen et al. (2013). We fit a different tax schedule for married and single individuals.

Coming up with an accurate estimate of consumption taxes in the U.S. is complicated by the fact that there are local county-level taxes in addition to state taxes. Vertex Inc. (a consulting company) estimated that the average consumption tax in the U.S. was 8.4% in 2002. We use that number. We follow Trabandt and Uhlig (2011) and set τ_k=36%.

5.5. *Death Probabilities and Social Security*

We obtain the probability that a retiree will survive to the next period from the National Center for Health Statistics (1991-2001). We assume that all retirees receive the same constant Social Security benefit, which only depends on gender. We obtain the average benefit for males and females from the Annual Statistical Supplement to the Social Security Bulletin (2000).

5.6. *Marriage and Divorce Probabilities*

To compute the age-specific probabilities for marriage and divorce for the U.S., we use the data from the CPS March supplement from 1999-2001. For most European countries, we use the data from Eurostat on-line database.[21] For some European countries, we supplement it with the data from the IPUMS International.

We assume a stationary environment, where the probabilities of getting married and divorced do not change over time (we allow them to depend on the age of the person, but not on his/her cohort). We also assume that the probability of getting married is the same for those who get married for the first time, and those who were previously divorced. This allows us to compute the probabilities using the following approach. Let M_t and D_t be the share of the married and divorced persons respectively at age t.[22] Then the probability of getting married at age t, $\bar{\omega}(t)$, and the probability of getting divorced at age t, $\pi(t)$, is pinned down by:

$$M_{t+1} = (1 - M_t)\bar{\omega}(t) + M_t(1 - \pi(t)) \tag{13}$$

$$D_{t+1} = D_t(1 - \bar{\omega}(t)) + M_t\pi(t) \tag{14}$$

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[21] Available at `http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database`.

[22] Figure H.8 shows the fraction of married and divorced women by age in the U.S., Italy and Germany.

We smooth the resulting age-profiles for $\bar{\omega}(t)$ and $\pi(t)$ by fitting a polynomial. We find that the probability of getting divorced is noticeably higher in the U.S. compared to Italy, and somewhat higher compared to Germany. At the same time, the probability of getting married reaches its peak in the U.S. somewhat earlier compared to the two European countries.[23]

5.7. Transfers to Unemployed, Fixed Cost of Working and Lump Sum Redistribution

People who do not work have other source of income such as unemployment benefits, gifts from relatives and charities, black market work etc. They also have more time for home production (not included in the model). Pinning down the money equivalent value of not working is a difficult task. The number we choose will also affect the size of the fixed cost of working, which we calibrate endogenously to hit the employment rates for men and women, see Panel B of Table H.13 in the Appendix. As an approximation for income when not working, we take the average value of non-housing consumption of households with income less than $5000 per year from the 2000-2001 Consumer Expenditure Survey. As pointed out by Oh and Reis (2012) transfers to households makes up a majority of the government's expenditure. To determine ϑ, the fraction of the government's income, which can be spent on households in the model, we take the U.S. government budget from 2000 and remove expenditures on defense, interest payments and protection. This leaves us with 76% of the year 2000 government budget. The corresponding average value of G in the model is then $2200. As described in the model section, G is, however, decreasing in the idiosyncratic shock, $G = \alpha_u (u_{\max} - u)$.[24]

We also consider an alternative, country-specific calibration of the government transfers, where we use the idea from Piketty and Saez (2012), and collect the data on: (1) total public spending; (2) social public spending that consists of 5 major categories - (a) education, (b) health, (c) pensions, (d) income support to working age, (e) other social public spending for all countries in our sample for the year 2000. We use the data from Adema, Fron, and Ladaique (2011) and OECD (2011),

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[23]The computed probabilities use the data for women. We get a qualitatively similar picture when using the data for both men and women (with the exception that men in all countries tend to get married somewhat later than women).

[24]The value of α_u is determined by the level of lumpsum redistribution. In the benchmark model its value is 0.043.

which we summarize in the Appendix in Table G.9. We assume that all public spending that does not fall in one of the "social public spending" subcategories is wasteful from the point of view of the model agents. We assume that "income support to the working age" and "other social public spending" (which according to Piketty and Saez (2012) includes social services to the elderly and the disabled, family services, housing and other social policy areas) are lump-sum transfers to the poor, while education and health spending are lump-sum transfers to all agents.[25]

5.8. Calibration Method

The nine parameters which must be calibrated inside the model are found by minimizing the distance between simulated model moments and data moments. Panel B of Table H.13 in the Appendix summarizes the nine calibrated parameter values and the data moments. We are able to match all the moments exactly.

5.9. Model Fit

It is natural to ask how the model performs along some dimensions, which has not been explicitly targeted. The model does quite well along a number of dimensions. The standard deviation of log earnings is for instance 0.650 compared to 0.661 in the data. In Figure 2, we plot the life-cycle profiles of asset holdings and earnings by gender in the model and data. The model does quite well in matching the life-cycle profiles of earnings and asset holdings in the data. The reason that average earnings for women is a bit lower in the model than in the data is that the earnings data is from the PSID, whereas the model was calibrated using wages from the PSID and hours worked from the CPS (female labor supply is a bit lower in the CPS). The model cannot replicate the hump shape in work hours over the life-cycle observed in the data.

The simulated Hicksian labor supply elasticity for our model is about 0.41. This is in line with a survey of empirical studies in Keane (2011), where the average Hicksian elasticity estimate for 22 studies on males is equal to 0.31. Our economy is, however, also inhabited by women who are

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[25]Piketty and Saez (2012) argue that education and health care government spending are approximately a transfer of equal value for all individuals in expectation over a lifetime.

known to have more elastic labor supply. The elasticity of female work hours with respect to the probability of divorce is somewhat smaller than the results in Johnson and Skinner (1986). They estimate that a 1% increase in divorce probability over a 6-year period leads to a 1.3% increase in female labor supply. The corresponding number in our model is 0.71%.

6. The Impact of Marriage Stability and Taxation on Labor Supply

We consider three different counterfactual experiments: **(i)** We replace both the U.S. marriage and divorce probabilities, and the tax system in the model with the ones we compute for each European country in our sample; **(ii)** We replace only the marriage and divorce probabilities, and leave the tax system unchanged, at the U.S. level; **(iii)** We replace only the tax system, and leave the marriage and divorce probabilities unchanged, at their U.S. values.

During these experiments, we keep taxes, old age social security, and income when not working proportional to the average earnings in the economy.[26] In this way, if the society becomes richer or poorer because of a counterfactual experiment, taxes and social security payments will adjust accordingly.

6.1. The Effect of Marriage Stability and Taxation

Figure 3 shows the results when simultaneously replacing both the U.S. marriage and divorce probabilities and the tax system in the model with those obtained for each European country. On the horizontal axis, we put hours worked in each country relative to the U.S. (in percent) in the data, while on the vertical axis, we put hours worked relative to the U.S. (also in percent) in the model.

Ideally, if the model were able to match the hours worked in the European countries exactly, using just the two mechanisms that we study in this paper, all the observations would fall on the diagonal line (the black line). If the observation for a particular European country falls to the left of the diagonal line in the picture, it means that the two mechanisms that we study do not lead to

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[26]In the case of taxes, we have specified them as polynomials in y/AE, where y is individual labor income, and AE is the average earnings in the economy.

enough reduction of hours worked in that country compared to the U.S. to match the data perfectly (agents "work too much" in the model compared to the data), and vice versa if the observation falls to the right of the diagonal. Hours worked in the U.S. fall on the diagonal line by construction, since our model is calibrated to match the U.S. in terms of annual hours worked.

Figure 3 shows that we obtain a positive correlation between the hours worked generated by the model and hours worked that we find in the data, equal to 0.327. We explain 45% of the variation between the U.S. and the European countries in the data as measured by the coefficient of determination:

$$R^2 = 1 - \frac{SS_{err}}{SS_{tot}} \tag{15}$$

where $SS_{err} = \sum_{i=1}^{n} (h_{i,model} - h_{i,data})^2$, $SS_{tot} = \sum_{i=1}^{n} (h_{i,data} - h_{us})^2$, $h_{i,model}$ is the hours worked in country i generated by the model, $h_{i,data}$ is the hours worked in country i in the data, and h_{us} is the hours worked in the U.S. (both in the model and in the data).[27] This means that the two mechanisms that we study work in the right direction. However, since all our European countries but Denmark fall to the left of the diagonal, this means that the two mechanisms that we study generally do not reduce the hours worked in the model enough to match the data perfectly.

Column (3) of Table 4 lists the results for each country in the model, as percent of hours worked in the U.S., next to the observed value in the data in Column 2. As can be seen from the table, we are relatively more successful in explaining hours worked in the Nordic countries and Central Europe than in Southern Europe.

Panels (b) and (c) of Figure 3 illustrates the impact of one mechanism at a time – we either change the U.S. marriage and divorce probabilities in the model to those found in the European countries while keeping the tax system unchanged (i.e., set to the U.S. level), or change the U.S. tax system while keeping the marriage and divorce probabilities unchanged. In both cases, we get positive correlations between the hours worked generated in the model and those that we find

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[27]In the literature our R^2 is also referred to as the "forecast skill" measure. It evaluates by how much the model in question improves the forecast compared to some reference model. In our case, the hours worked in the U.S. are used as the "reference model".

in the data – higher taxes and higher marriage stability reduce hours worked in the model. The correlations with the data in both separate experiments are of about equal strength, and smaller than those from the combined experiment, suggesting that both mechanisms play an important role in accounting for the difference in hours worked between the U.S. and Europe (which is similar to what we found in Section 3). As measured by R^2, divorce and marriage probabilities explain 17% of the variation in labor supply between the U.S. and the European countries, whereas taxes explain 32%.

As can be seen from Columns 4 and 5 in Table 4, taxes generally work in the wrong direction for the Southern European countries, which have low taxes, and hours increase relative to the United States. However, Southern European countries have very low divorce rates, which work in the right direction for these countries. In the Nordic countries divorce and marriage probabilities work in the wrong direction. These countries have very low marriage rates, and also high divorce rates. Taxes, however, do a good job of predicting labor supply in the Nordic countries. In Central Europe both the divorce and tax mechanisms reduce hours relative to the U.S.

Table 5 shows the results from the alternative, country-specific calibration of the government transfers. In this alternative calibration, when we replace both the marriage and divorce probabilities and the tax system from the European countries, we explain 47.5% of the variation in hours worked between the U.S. and the European countries, as measured by R^2.

6.2. The Effect on Men and Women Separately

Figure 4 and Columns (6-13) of Table 4 present the results. The figure shows that there is a very pronounced difference in how these two mechanisms affect men and women in our model. Female labor supply is mostly correlated with the marriage stability mechanism. Female hours worked fall in countries with more stable marriages. At the same time, in the model where we only change the tax system, leaving the marriage and divorce probabilities at their U.S. levels, the correlation between the actual hours worked by women in the data and those generated by our model is small and negative. As measured by R^2, divorce and marriage probabilities explain 22% of the variation in female labor supply between the U.S. and the European countries, while taxes do not help to

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explain the differences in hours worked in our model.

The results for men are directly opposite to those for women. In our model, men appear to react mostly to the changes in the tax system. When we change the marriage and divorce probabilities and leave the taxes at their U.S. levels, the correlation between the actual hours worked by men in the data and those generated by our model is small and negative. This is in line with our findings in Section 2 that there is no correlation between male labor supply and divorce rates in the data. The R^2 for men is 9% when we introduce European marriage and divorce probabilities and 71% when we introduce European tax systems into the model. We conclude that taxes are a very powerful explanation for male labor supply, while divorce and marriage rates help significantly in explaining female labor supply.

6.3. The Impact of Tax Progressivity and Separate Taxation on Male and Female Labor Supply

Why do the higher European taxes affect men much more than women in our model? The effect is related to the structure of the tax systems. The European countries with high average labor income taxes are also more likely to have higher tax progressivity (the correlation between the average effective labor income tax rate and the tax progressivity measure that we used in Section 3 is for instance 0.389 is our sample), meaning that the higher tax rates in these countries will disproportionately affect high earners. It is even possible that because of the tax progressivity, low earners face lower tax rates in Europe compared to the U.S. Another important feature of tax systems is joint versus separate taxation. Guner, Kaygusuz, and Ventura (2012) point out how separate taxation of married couples encourages female labor supply through lowering the tax rate on the secondary earner in a married couple (usually the female)[28]. Because of the gender wage gap, men are more likely to be among the high earners. Because countries with high average tax rates typically also have very progressive taxes and practice separate taxation of married couples, men bear most of the burden from the higher European tax rates.

To study the impact of tax structure versus tax level, we conduct the following experiment. We

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[28]Figure H.7 in the Appendix shows negative correlation between s_1 (our measure of joint taxation of married couples) and hours worked by married women.

start with our benchmark model, which we calibrated using the U.S. labor income taxes. Then we first change the labor income taxes so that the average labor income tax rate would be equal to that in Norway, but tax progressivity would remain the same as in the U.S.[29] The degree to which couples are taxed jointly is also kept like in the US in this experiment. Next, we change to a Norwegian tax system. We choose Norway because it is both among the countries in our sample for which the impact of the tax change on labor supply was much larger for men than for women. Norway has a highly progressive tax system and practices separate taxation of married couples.

Figure 5 shows what happens to hours worked for men and women at different wage-quintiles as we change the tax system. The results confirm our intuition. As we change the U.S. taxes to the Norwegian tax level, keeping tax progressivity unchanged, the work hours schedule shifts downward – individuals at all wage-quintiles reduce their labor supply. As we change to a Norwegian tax system, the work hours schedule also changes its shape – because of the higher tax progressivity and separate taxation of married couples, the lowest earners actually increase their work hours, while higher earners reduce their work hours further.

6.4. Intensive vs. Extensive Margin

In Section 2 we documented that the intensive and extensive margin are about equally important in accounting for differences in labor supply between the U.S. and Europe but that the importance of the two margins varies greatly with region. Table H.12 in the Appendix displays our model's performance in accounting for the intensive and extensive margin of labor supply across countries. We find that divorce and marriage probabilities explain 33% of the variation in employment rates between the U.S. and our European countries and do not help to explain the variation in the intensive margin. However, for taxes it is the other way around. Taxes explain 47% of the variation in intensive margin hours between the U.S. and the European countries but do not help in explaining the variation in the employment rates. This is similar to what we find in the data.[30]

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[29]See Appendix F for the details.

[30]In unreported regressions, we find that when extensive and intensive margin labor supply is regressed on divorce rates and tax measures, taxes only help explain the variation in intensive margin labor supply and divorce rates only help explain the variation in extensive margin labor supply.

6.5. Discussion

The correlation between female labor supply in the data and in our model when we introduce European divorce and marriage rates is quite strong, 0.61. However as measured by R^2 we only explain 22% of the variation in female labor supply between the U.S. and our European countries. The effect of marriage and divorce rates pull in the right direction but the size of the effects is not that large.

A concern may be whether divorces are costly enough in the model. More costly divorces are likely to increase the impact of marriage and divorce probabilities on labor supply. For instance, we do not have children in the model. Children usually follow their mother in case of divorce, making divorce more costly for women (See Fernández and Wong (2013) for a model that incorporates this effect). Cubeddu and Rios-Rull (2003) assume that 20% of a couple's assets are lost when there is a divorce. This may be a reasonable assumption. Divorces carry large administrative costs, potential losses related to liquidation of home equity, reduced labor market mobility if there are children in the marriage etc. We leave alternative specifications of the cost of divorce for future research but believe that the real cost of divorce is larger than in the current model.

7. Conclusion

In this paper we show that prime aged women are the largest contributor to differences in aggregate labor supply between the U.S. and Europe. We document a negative cross-country correlation between tax levels and labor supply and a positive correlation between divorce rates and labor supply across countries. However, the first correlation is driven by a strong correlation between male labor supply and taxes, whereas the latter correlation is driven by a strong correlation between female labor supply and divorce rates.

To quantify the impact of differences in tax schemes and divorce/marriage rates on labor supply, we develop a life-cycle, overlapping-generations model with heterogeneous agents, marriage, and divorce. We calibrate our model to U.S. data and study how labor supply in the U.S. changes as we introduce European tax systems, and as we replace the U.S. divorce and marriage rates with their

European equivalents. Combining these two mechanisms can account for 45% of the variation in hours worked between the U.S. and the European countries. Taxes are a good predictor of male labor supply but do not help explaining the variation in female labor supply. Divorce and marriage rates can explain some of the variation in female labor supply across countries but is a worse predictor of male labor supply.

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Table 1: Annual Hours Worked, all Persons 15-64 Years of Age. Hours worked per year for the U.S., percent of the U.S. for other countries.

Country:	All	Men	Women	Men, married	Women, married	Men, single	Women, single	Men, 15-24 yr	Women, 15-24 yr	Men, 25-54 yr	Women, 25-54 yr	Men, 55-64 yr	Women, 55-64 yr
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
						Nordic countries:							
Denmark	88.80	87.95	91.98	81.10	92.90	107.00	88.30	136.10	121.80	82.40	88.60	77.80	72.20
Finland	86.92	83.33	91.45	80.90	98.50	97.40	83.40	108.40	98.20	85.10	95.50	56.40	70.10
Norway	83.32	84.86	79.96	81.90	81.90	98.80	76.50	108.70	93.50	79.70	77.00	90.70	82.90
Sweden	89.72	86.18	93.99	83.40	99.50	104.20	88.40	89.30	87.80	84.40	92.80	87.20	100.70
Group Mean:	87.19	85.58	89.34	81.83	93.20	101.85	84.15	110.62	100.33	82.90	88.48	78.02	81.48
						Central Europe:							
Austria	83.24	88.76	75.38	80.00	66.40	107.30	86.50	136.30	129.60	90.20	78.00	56.00	30.80
Belgium	69.18	74.89	60.96	71.80	59.00	81.10	61.80	69.80	62.20	80.20	68.30	42.80	20.70
France	72.18	74.98	68.22	74.10	69.40	81.60	65.50	68.10	57.60	81.10	74.50	42.70	39.40
Germany	71.00	74.68	64.93	69.50	55.70	86.40	76.90	96.90	104.40	75.10	66.30	57.60	38.80
Luxembourg	76.60	85.96	62.07	82.50	55.60	86.40	72.50	76.40	66.00	92.30	66.20	50.60	27.30
Netherlands	76.01	88.19	57.81	81.80	47.80	99.60	72.90	105.90	102.50	87.40	55.70	63.60	27.10
Switzerland	97.24	107.68	84.89	98.00	60.10	130.50	113.20	141.40	161.40	98.70	79.30	109.20	66.90
UK	90.17	97.47	80.85	92.60	76.30	110.10	84.80	126.10	122.30	95.50	79.70	85.50	55.60
Group Mean:	79.45	86.58	69.39	81.29	61.29	97.88	79.26	102.61	100.75	87.56	71.00	63.50	38.33
						South Europe:							
Greece	87.09	98.35	71.73	95.70	72.10	100.60	67.20	99.10	76.20	100.80	76.60	92.40	55.00
Ireland	82.17	92.35	66.55	92.10	55.80	101.80	77.70	121.70	105.70	92.40	66.40	94.40	39.90
Italy	73.70	84.54	58.37	82.50	54.70	87.60	62.20	78.70	63.10	89.30	63.50	60.10	29.70
Portugal	88.57	90.62	85.60	87.70	89.10	91.80	74.70	123.50	98.60	90.80	91.20	88.50	69.30
Spain	73.04	83.45	58.00	83.60	52.60	85.30	64.10	95.30	72.40	85.30	61.40	78.50	36.50
Group Mean:	80.91	89.86	68.05	88.32	64.86	93.42	69.18	103.66	83.20	91.72	71.82	82.78	46.08
Overall Mean:	81.70	87.31	73.69	83.48	69.85	97.50	77.45	104.81	95.49	87.69	75.35	72.59	50.76
United States	1360.40	1613.00	1121.30	1931.70	1171.90	1191.30	1087.50	714.30	574.30	1951.90	1332.00	1354.80	894.80

Note: This table reports the annual hours works by each group as a fraction of the respective U.S. group in the year 2000. Column (2) shows the average annual hours worked per European country in our sample. Columns (3) and (4) show cross-country differences in hours worked for men and women separately. We divide the European countries in our sample in 3 subgroups: Nordic countries, Central Europe and Southern Europe. Columns (5-8) compare the average annual hours worked by marital status. Columns (9-14) compares the cross-country differences in hours worked by gender and 3 age groups: (i) "young" (16-24 years of age), (ii) "prime-aged" (25-54 years of age) and (iii) "old" (55-64 years of age). Column (2) shows that the average work hours in Europe are 81.70% of (or about 249 hours less than) those in the U.S. Columns (3) and (4) show that the difference in work hours for women is about 45 percent larger than for men. There is large variation within Europe. The difference in work hours is driven by Southern European women, where the difference for women is about two to three times larger than the corresponding difference for men. Columns (5-8) show that married women in Central and Southern Europe display the largest difference from their U.S. counterparts. Columns (9-14) show that among the three age groups, the largest difference is displayed by the "old" European men and women. However, due to the relative sizes of the age groups, prime-aged persons (and in particular prime-aged women) are typically the largest contributors to the aggregate difference with the U.S.

Table 2: Contribution of Demographic Groups to Overall Difference in Annual Hours Worked, with respect to the U.S.

Country	Men	Women	Young	Prime-aged	Old	Compo-sition	Intensive Margin	Extensive Margin
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Nordic countries								
Denmark	62.3	37.7	-31.4	105.9	25.5	8.9	124.0	-24.0
Finland	73.6	26.4	-6.7	69.5	37.2	18.8	35.4	64.6
Norway	49.1	50.9	-2.1	94.8	7.3	-3.9	124.4	-24.4
Sweden	73.0	27.0	7.9	85.2	6.9	6.9	102.7	-2.7
Central Europe								
Austria	36.6	63.4	-24.7	82.6	42.1	17.0	57.8	42.2
Belgium	47.7	52.3	9.4	66.5	24.1	4.4	51.4	48.6
Netherlands	30.9	69.1	-3.0	80.6	22.4	-4.0	91.0	9.0
Germany	50.3	49.7	-0.7	81.1	19.6	5.4	68.2	31.8
Switzerland	-74.8	174.8	-138.6	211.4	27.3	-40.2	34.4	65.6
France	50.8	49.2	11.5	64.7	23.8	5.3	48.0	52.0
Luxembourg	36.4	63.6	10.0	61.3	28.7	8.0	40.5	59.5
UK	12.1	87.9	-30.6	98.0	32.5	9.1	75.3	24.7
Southern Europe								
Greece	0.4	99.6	5.0	67.6	27.4	22.5	-120.2	220.2
Ireland	15.0	85.0	-10.8	91.9	19.0	11.8	35.7	64.3
Italy	33.9	66.1	9.9	67.2	22.9	6.0	-5.2	105.2
Portugal	52.7	47.3	-17.7	90.5	27.2	26.3	33.8	66.2
Spain	33.6	66.4	3.8	79.0	17.2	9.8	21.2	78.8
R^2	–	–	–	–	–	–	0.138	0.423
Mean :	34.3	65.7	-12.3	88.1	24.2	6.6	63.3	36.7
Mean (weighted):	39.7	60.3	-2.3	78.8	23.5	7.6	49.6	50.4
Mean (*Nordic*):	63.0	37.0	-7.7	88.9	18.8	6.9	97.3	2.7
Mean (*Central*):	39.3	60.7	-2.1	76.0	26.1	4.8	64.1	35.9
Mean (*South*):	28.0	72.0	0.3	78.0	21.7	12.8	-5.7	105.7

Note: This table reports the contributions of various demographic groups to the difference between aggregate labor supply in the U.S. and the European countries in our sample. Each column captures the differences in hours worked by various demographic groups in the two countries, assuming that the composition of the population in these two countries is the same. The data is divided into 12 demographic groups, according to gender, marital status and age (using three age groups). Columns (2) and (3) divide the population by gender, and add up to one. Columns (4) - (6) divide the population by age, i.e. Young, Prime-aged and Old, and add up to one as well. Column (7) reports the compositional effect, i.e. the differences in hours worked due to the differences in the composition of the population in the two countries. This is typically small, and on average, accounts for 6.6% of the difference between the U.S. and the European countries in our dataset. Columns (8) and (9) report the intensive and extensive margins, and add up to one. The table shows that in Central and Southern Europe, women – specifically married prime-aged women – are the main contributors to the differences in hours worked between the U.S. and the European countries. Older persons' contribution to the overall difference is much smaller than the contribution of the prime-aged individuals due to the smaller size of group.

Table 3: Relation between Average Hours Worked, Divorce Rates and Tax Measures

Panel A: Hours for both genders				
	(1)	(2)	(3)	(4)
Divorce rate	0.026*	0.023*	0.039***	.038***
	(0.013)	(0.012)	(0.011)	(0.011)
Top marginal tax rate	−0.004	–	–	–
	(0.004)			
Progressivity wedge	–	−0.622	–	–
		(0.432)		
Average labor income tax	–	–	−0.869***	–
			(0.287)	
Average effective tax rate	–	–	–	−0.913***
				(0.264)
Const	7.117***	7.057***	7.113***	7.223***
	(0.189)	(0.113)	(0.081)	(0.099)
Adjusted R^2	0.142	0.184	0.423	0.484

Panel B: Average hours by gender		
	Men	Women
Divorce rate	0.019*	0.070***
	(0.009)	(0.019)
Average effective tax rate	−1.055***	−0.710
	(0.229)	(0.474)
Const	7.595***	6.705***
	(0.086)	(0.179)
Adjusted R^2	0.533	0.403

Standard errors are in parentheses, $^*-p<0.10$, $^{**}-p<0.05$, $^{***}-p<0.01$

Note: Panel A reports the results of regressing logarithm of average hours worked in each country in the dataset on number of divorces per 1000 married persons and each tax measure for both genders together. Panel B reports the results of regressing logarithm of average hours worked on divorce rates and average effective tax rate by gender. Panel A Columns (3) and (4) show that both the divorce rate and the average tax rate/average effective tax rate are highly statistically significant, and have the expected sign – higher taxes tend to reduce average hours worked, while higher number of divorces tend to increase them. Panel B shows that for women, the divorce rates are statistically significant and have three times larger magnitude than for men. The average effective tax rates are highly statistically significant for men, but not for women.

Table 4: Hours Worked in the Model and in the Data, in Percent of the U.S. hours

	All				Men				Women			
	Data	Tax. & Div.	Divorces	Taxes	Data	Tax. & Div.	Divorces	Taxes	Data	Tax. & Div.	Divorces	Taxes
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Nordic countries:												
Denmark	83.5	74.4	100.5	73.9	82.3	70.9	100.5	70.3	86.9	79.7	100.6	79.1
Finnland	85.5	94.4	102.4	92.9	81.3	87.3	100.6	86.4	90.6	104.6	105.0	102.2
Norway	80.6	92.2	100.1	92.3	81.7	87.1	99.9	87.3	77.7	99.7	100.5	99.7
Sweden	87.4	90.9	104.8	88.3	83.7	85.5	102.7	84.1	91.9	98.7	107.9	94.2
Mean:	84.3	88.0	102.0	86.8	82.3	82.7	100.9	82.0	86.8	95.7	103.5	93.8
Central Europe:												
Austria	79.4	96.4	101.1	95.4	84.6	92.0	100.9	91.2	71.8	102.8	101.5	101.6
Belgium	68.4	78.0	96.3	80.4	73.9	73.8	97.8	75.6	60.5	84.0	94.3	87.3
Netherlands	73.5	94.1	97.6	95.8	85.4	89.6	98.4	90.8	55.5	100.8	96.6	102.9
Germany	67.9	82.1	97.0	83.8	71.3	86.2	98.0	87.3	62.1	76.2	95.5	78.8
Switzerland	91.3	98.7	98.6	100.0	101.3	99.3	99.1	100.1	79.4	97.9	97.8	99.8
France	72.4	94.8	99.4	94.8	75.0	94.0	99.2	94.2	68.8	96.0	99.8	95.8
Luxembourg	75.9	93.8	96.3	97.2	85.1	95.5	98.0	96.9	61.4	91.5	93.8	97.5
UK	87.3	101.3	98.7	102.4	94.5	97.5	98.9	98.5	77.9	106.9	98.3	108.1
Mean:	77.0	92.4	98.1	93.7	83.9	91.0	98.8	91.8	67.2	94.5	97.2	96.5
Southern Europe:												
Greece	86.5	99.6	92.9	104.8	97.3	96.0	95.9	100.2	71.6	104.9	88.6	111.5
Ireland	82.9	96.4	98.1	97.9	93.0	96.3	98.5	97.8	67.2	96.4	97.5	98.1
Italy	72.0	94.1	93.1	98.7	82.3	89.6	95.8	93.2	57.3	100.7	89.1	106.8
Portugal	87.3	96.8	94.6	101.2	88.9	97.7	97.0	100.3	84.9	95.4	91.0	102.6
Spain	72.0	104.2	95.6	107.2	99.8	99.7	97.2	102.3	57.4	110.8	93.5	114.4
Mean:	80.1	98.2	94.9	102.0	92.3	95.9	96.9	98.8	67.7	101.7	91.9	106.7
U.S.A	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
R^2		0.452	0.170	0.321		0.757	0.090	0.708		0.098	0.217	-0.066
Corr(data,model)		0.327	0.326	0.239		0.671	-0.219	0.680		0.040	0.614	-0.140

Note: This table displays hours worked as % of U.S. hours in the data and in the model, after introducing taxes and divorce and marriage rates from other countries. Columns 2 reports data and column 3 reports the results when we simultaneously replace both the U.S. marriage and divorce probabilities and the tax system in the calibrated model with those obtained for each European country. Columns 4 and 5 respectively report results when we replace only the marriage and divorce probabilities, and leave the tax system unchanged, at the U.S. level; and when we replace only the tax system, and leave the marriage and divorce probabilities unchanged, at their U.S. values. Columns 6-13 repeat the exercise by gender. Overall the model explains 45% of the variation in labor supply between the U.S. and the European countries, as measured by R^2.

Table 5: Hours Worked in the Model and in the Data, in Percent of the U.S. Hours: Alternative Calibration of Government Transfers

	All		Men		Women	
	Data	Model	Data	Model	Data	Model
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Nordic countries:						
Denmark	83.5	75.1	82.3	71.7	86.9	80.1
Finnland	85.5	94.0	81.3	86.9	90.6	104.4
Norway	80.6	90.1	81.7	84.9	77.7	97.6
Sweden	87.4	89.8	83.7	84.6	91.9	97.5
Mean:	87.3	82.0	94.9	84.2	82.2	86.8
Southern Europe:						
Greece	86.5	101.8	97.3	98.2	71.6	107.0
Ireland	82.9	96.7	93.0	96.6	67.2	97.0
Italy	72.0	94.4	82.3	89.9	57.3	100.8
Portugal	87.3	96.6	88.9	97.5	84.9	95.2
Spain	72.0	102.7	99.8	98.2	57.4	109.3
Mean:	98.4	96.1	101.9	80.1	92.3	67.7
Central Europe:						
Austria	79.4	96.1	84.6	91.9	71.8	102.2
Belgium	68.4	78.3	73.9	74.4	60.5	83.9
Netherlands	73.5	95.6	85.4	91.2	55.5	102.1
Germany	67.9	80.6	71.3	83.9	62.1	75.9
Switzerland	91.3	97.2	101.3	97.8	79.4	96.2
France	72.4	93.5	75.0	92.5	68.8	94.8
Luxembourg	75.9	94.2	85.1	96.2	61.4	91.1
UK	87.3	99.3	94.5	95.4	77.9	104.9
Mean:	91.8	90.4	93.9	77.0	83.9	67.2
U.S.A.	100.0	100.0	100.0	100.0	100.0	100.0
R^2		0.475		0.784		0.115
Corr(data,model)		0.326		0.697		0.011

Note: This table displays hours worked as % of U.S. hours in the data and in the model with alternative calibration of government transfers, after introducing taxes and divorce and marriage rates from other countries. Column 2 reports data and column 3 reports the results when we simultaneously replace both the U.S. marriage and divorce probabilities and the tax system in the calibrated model with those obtained for each European country. Columns 4-7 repeat the exercise by gender. Overall the model explains 48% of the variation in labor supply between the U.S. and the European countries, as measured by R^2, which is similar that from the main calibration.

Figure 1: Correlation between Hours Worked, Divorce Rates and Tax Rates for Men and Women
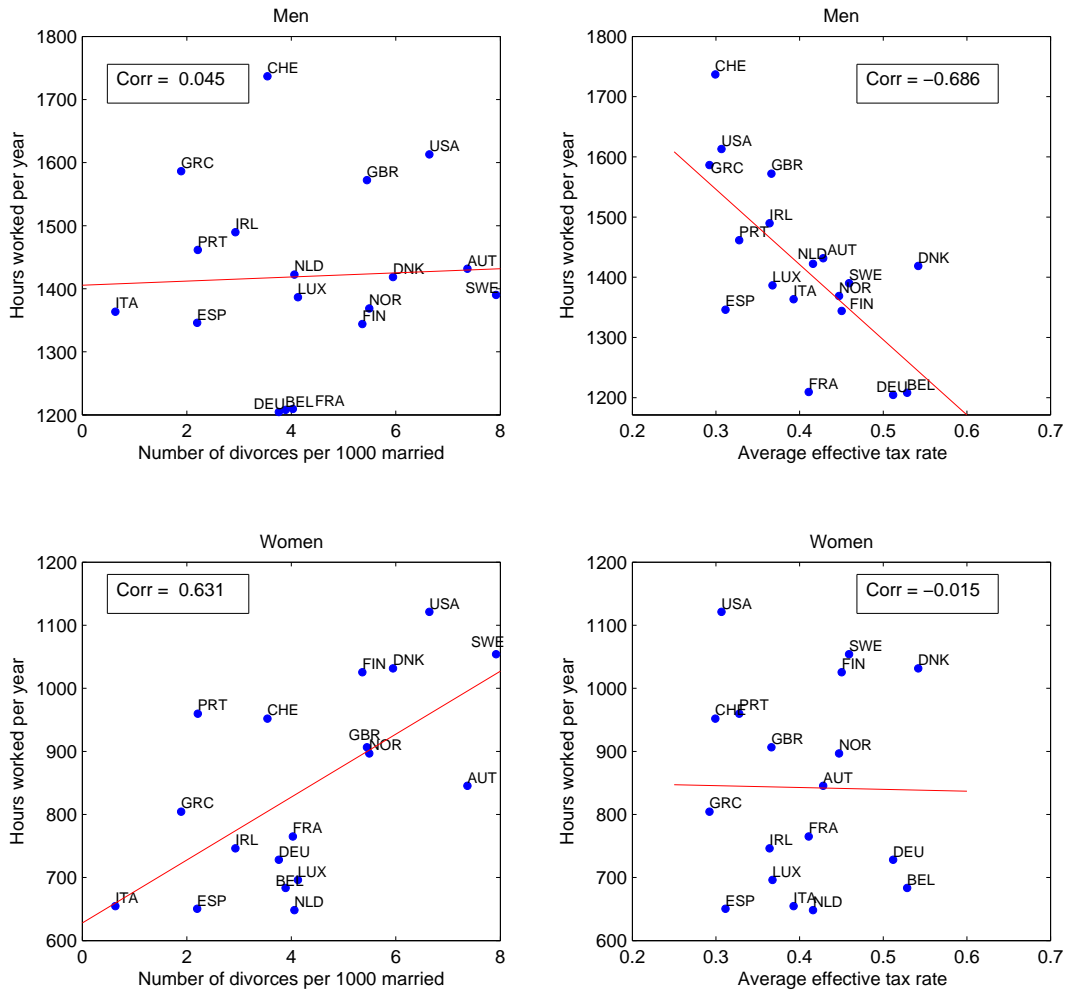
Note: This figure reports the correlation between hours worked per year, with divorce and tax rates by gender. There is a strong positive correlation between the divorce rates and hours worked for women. For men it is positive but close to zero. There is a strong negative correlation between the hours worked and the average effective tax rate for men. The corresponding correlation for women is also negative but close to zero.

Figure 2: Model Fit: Assets and Income over the life-cycle

(a) Assets over the life cycle
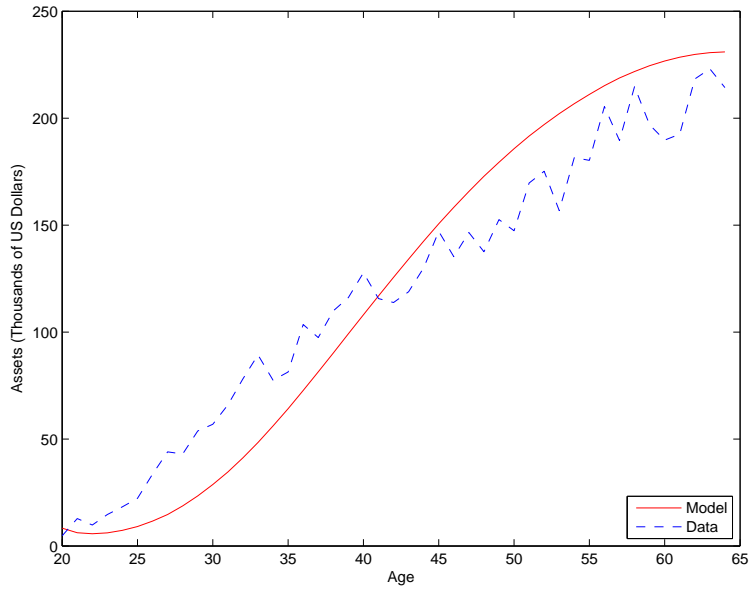
(b) Male Income over the life cycle
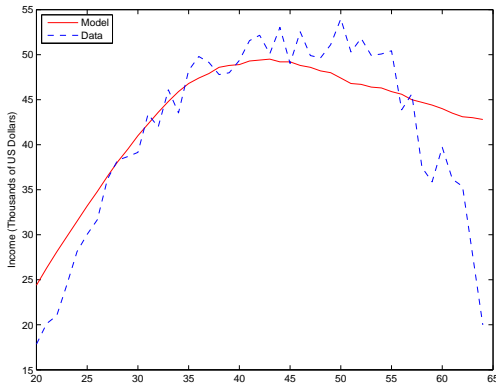
(c) Female Income over life cycle
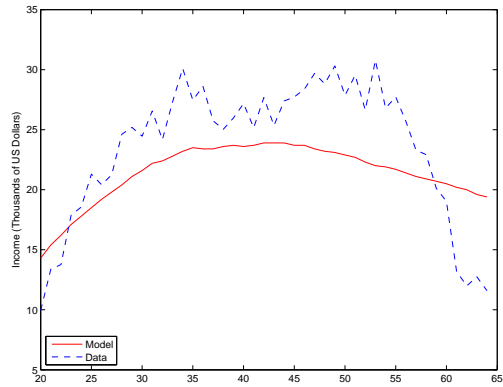
Note: The figure plots the life-cycle profiles of asset holdings and earnings by gender in the model and data.

Figure 3: Combined and Separate Effect of Marriage Stability and Taxes

(a) Combined Effect of Marriage Stability and Taxes
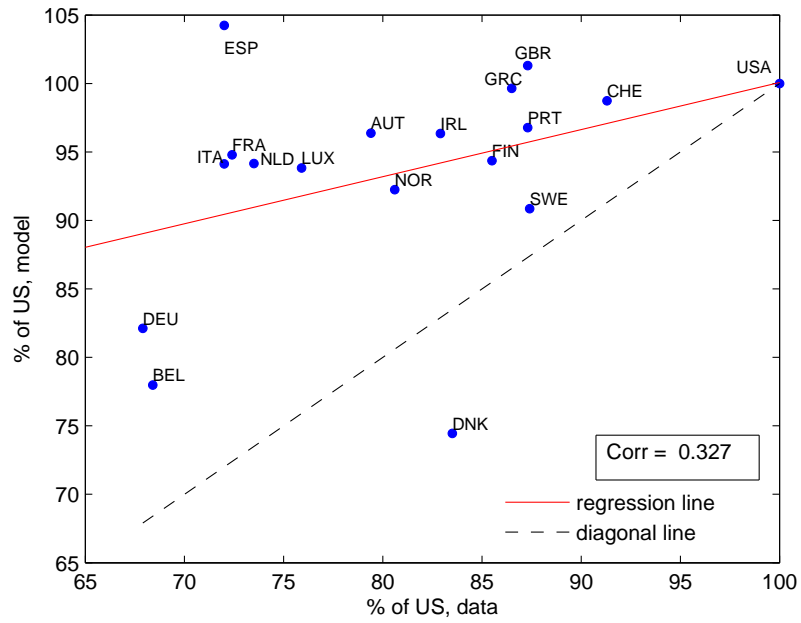
(b) Effect of Marriage Stability
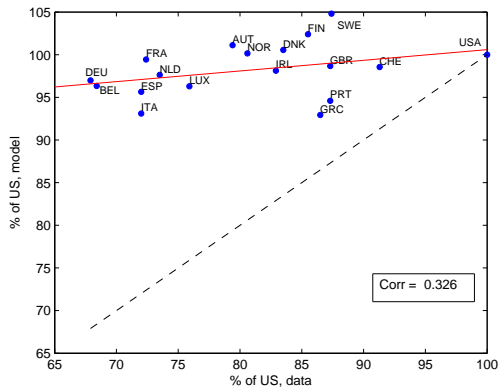
(c) Effect of Taxes
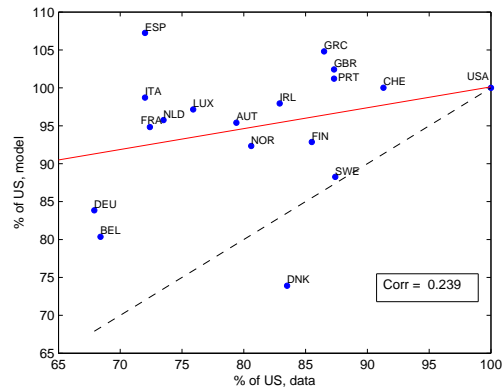
Note: This figure reports the results when simultaneously replacing both the U.S. marriage and divorce probabilities and the tax system in the model with those obtained for each European country. The horizontal axis represents hours worked in each country relative to the U.S. (in percent) in the data. The vertical axis represents hours worked relative to the U.S. (in percent) in the model.

Figure 4: Effects of Marriage Stability and Taxes by Gender
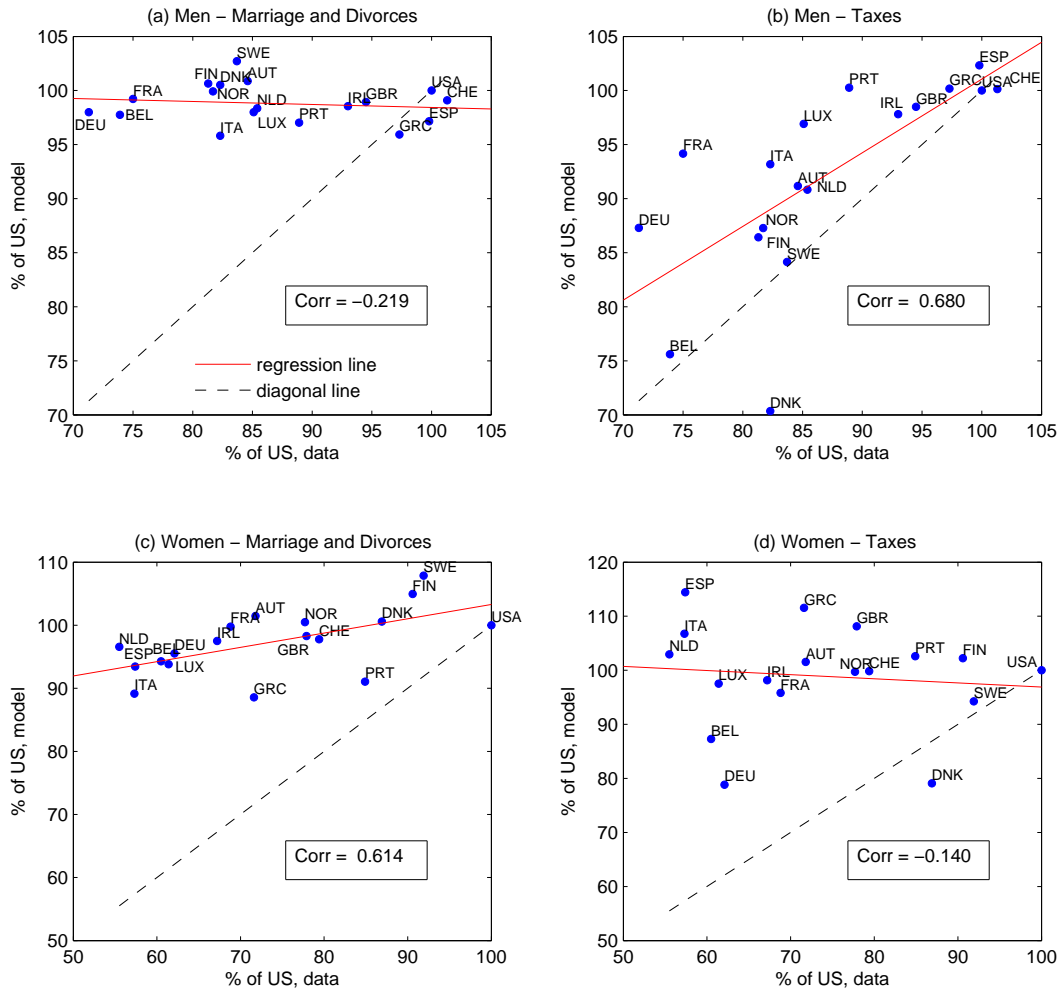
Note: This figure compares by gender, hours worked as % of U.S. hours in the data and in the model, after introducing taxes and divorce and marriage rates from other countries. The horizontal axis represents hours worked in each country relative to the U.S. (in percent) in the data. The vertical axis represents hours worked relative to the U.S. (in percent) in the model.

Figure 5: Changing Tax Level vs. Changing Tax Progressivity
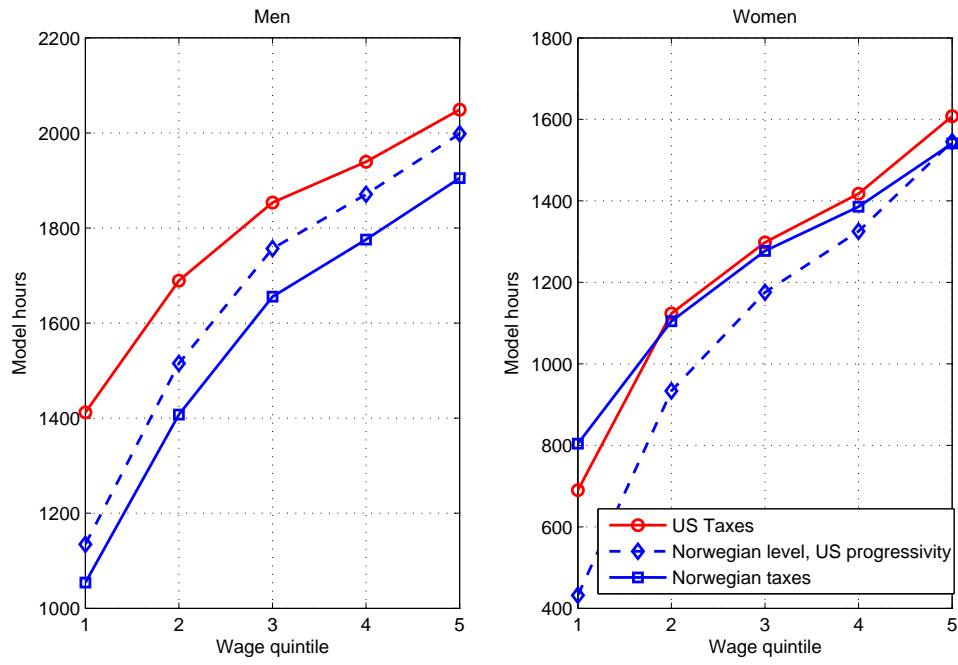
Note: This figure reports how average hours worked over the life-cycle vary for men and women at different wage-quintiles (measure by life-time income) as the tax system changes.

Marriage Stability, Taxation and Aggregate Labor Supply in the U.S. vs. Europe (Internet Appendix)

Appendix A. LFS vs OECD data

Unlike the CPS, the E.U. LFS does not provide information on the number of weeks worked per year. However, it reports the labor force status during the reference week, which we use to reconstruct information about weeks worked as follows: we set the number of weeks worked to 52 for people who reported having a job, and to 0 otherwise.[31]

Table A.6: Annual Hours Worked in OECD vs LFS/CPS micro data

Country	LFS/CPS data	OECD data	LFS/CPS − OECD	$\frac{\Delta_{U.S.}(\text{LFS/CPS})}{\Delta_{U.S.}\text{OECD}}$
Austria	1280.5	1132.3	148.2	48.91
Belgium	1073.7	941.1	132.5	75.94
Denmark	1337.7	1208.0	129.6	35.69
Finland	1313.1	1182.5	130.6	44.37
France	1165.7	982.0	183.7	59.81
Germany	1213.8	965.9	247.9	45.19
Greece	1257.1	1184.7	72.3	76.84
Ireland	1265.5	1117.8	147.6	52.18
Italy	1036.4	1002.7	33.7	99.41
Luxembourg	1165.4	1042.1	123.2	71.22
Netherlands	1162.9	1034.0	128.9	70.21
Norway	1359.7	1133.5	226.3	14.24
Portugal	1338.5	1204.8	133.7	34.42
Spain	1119.0	993.6	125.4	74.45
Sweden	1336.6	1220.5	116.1	39.61
UK	1340.9	1226.6	114.2	38.27
Mean:	1235.4	1098.3	137.1	55.05
United States	1392.1	1360.4	31.7	n.a.

It is worth mentioning that the differences in the annual hours worked between the U.S. and Europe that we find in the micro level data are smaller than the ones reported by the OECD.[32] There is some evidence that most of the discrepancy between the micro-level estimates and the macro-level statistics reported by the OECD comes from the cross-country differences in the duration of

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[31]We also set the number of weeks worked to 0 for people on maternity or paternity leave, and we set it to 48 for people who had a job but did not work during the reference week due to labor dispute, and to 40 where it was due to school education and training, illness or temporary disability.

[32]Table A.6 provides the details.

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vacations and public holidays. According to the OECD's online documenation, they use external sources to adjust for hours not worked due to public holidays and annual leave.

To maintain consistency with the majority of studies of the differences in hours worked between the U.S. and Europe, which have used the OECD aggregate-level data, we uniformly adjust the hours worked for all observations in our micro data sets so that the country-level average corresponds to the one reported by the OECD. One downside of doing this is that we cannot capture the differences in days off between different demographic groups within a given country. However, if anything, we expect that this should provide us with a conservative estimate of the differences in the contributions of various demographic groups to the cross-country differences in hours worked.[33]

Appendix B. Cohabitation

The Eurostat database that we use to compute the marriage and divorce probabilities in the paper provides the data on persons in registered partnership for only four countries in our sample: the Netherlands, Denmark, Finland and Sweden starting from 2007. Figure B.6 compares the marriage and divorce probabilities that we use in the paper (dotted red lines labeled "old") with the ones we obtain when we combine the married persons with those in a registered partnership (the solid blue lines labeled "new") when using the 2007 data for the Netherlands: The two sets of probabilities are not very different from one another. One caveat is that it is likely that persons in registered partnerships most probably do not include all cohabitors. Another caveat is that 2007 was the first year of the recent financial crisis which might have had an impact on the marriage and divorce behavior. At the same time, we believe that there are many dimensions relevant for this paper along which people that are legally married and those that only cohabit differ. The existing research on this matter appears to support this view. Gemici and Laufer (2010) state that "cohabitation constitutes a separate state of union to marriage, either in terms of the different characteristics of couples who choose to cohabit, or as a different institutional framework that changes the way in which partners interact. For example, it is legally more difficult for married partners to separate than cohabiting partners. Moreover, married couples face a different tax schedule than single and cohabiting individuals do".

Additionally, the rules for dividing the assets after the separation are also quite different for the married and the cohabiting couple. When looking at the hours worked (the key variable for our analysis) of cohabiting women, Gemici and Laufer (2010) conclude that "the difference between cohabiting women and single women's labor supply is statistically insignificant".

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[33]Using a multiplicative factor adjustment, we essentially assume that workers that report longer hours of work in our data had proportionally longer vacations/days off compared to those who reported less hours of work. We also attempted to make the adjustment where all observations are adjusted by the same number of days off, which made practically no difference to the result.
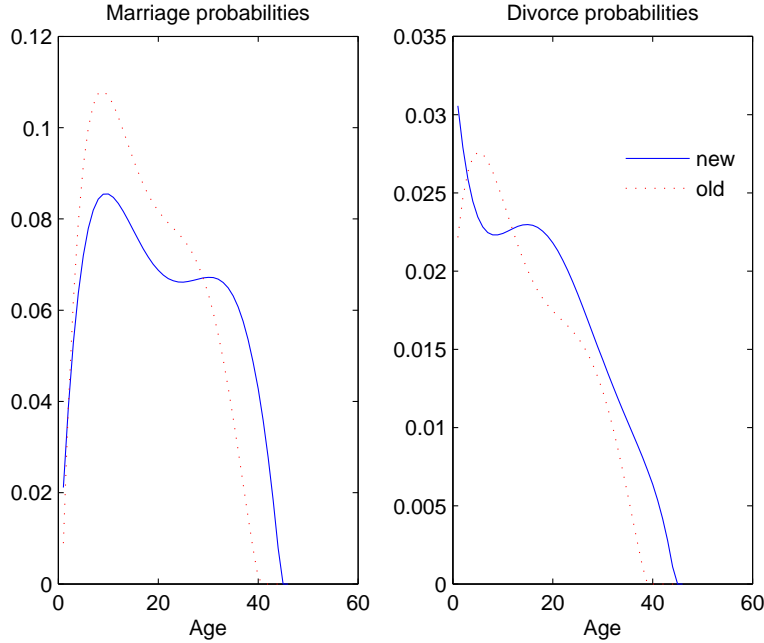
Figure B.6: Incorporating persons in registered partnerships

Appendix C. Estimation of Returns to Experience and Shock Processes From the PSID

We take the log of Equation 4 and estimate a logarithm(wage) equation using data from the non-poverty sample of the PSID 1968-1997. We inflation adjust the nominal wages using the GDP deflator series from the Bureau of Economic Analysis with 2005 as the base year. Equation 5 is estimated using the residuals from 4. To control for selection bias we use Heckman's selection model and estimate it by a maximum likelihood approach. For people that are working and for which we observe wages, the likelihood density function (or population equation) depends on a 3rd order polynomial in years of labor market experience, x, as well as dummies for the year of observation, D:

$$\phi_i(log(w_{jgi})) = \phi_i(constant_{jg} + D_i'\zeta_{jg} + \gamma_{1jg}x_i + \gamma_{2jg}x_i^2 + \gamma_{3jg}x_i^3 + u_i) \quad (C.1)$$

Labor market experience is the only observable determinant of wages in the model apart from gender and education. The probability of participation (or selection equation) depends on various demographic characteristics, Z:

$$\Phi(participation) = \Phi(Z_i'\xi_{jg} + \upsilon_i) \quad (C.2)$$

The variables included in Z are marital status, age, the number of children, years of schooling, time dummies, and an interaction term between years of schooling and age. We obtain the residuals u_i

and use them to estimate Equation 5 by OLS. The coefficients γ_{1jg}, γ_{2jg}, γ_{3jg}, ρ_{jg}, and σ_{jg} can be found in Table H.13.

Appendix D. Fitting Tax Functions Based on Data from the OECD

For single individuals, we use the tax function proposed by Benabou (2002) and recently used in Heathcote et al. (2014):

$$y_a/AE = \theta_0(y/AE)^{1-\theta_1} \tag{D.1}$$

where y_a is the after-tax (net) income, y is the before-tax (gross) income, AE is equal to the average earnings in the economy. In this function, θ_1 controls the tax progressivity, while θ_0 controls the tax level.

For married couples, we modify the above function, and assume that the after-tax income depends on the incomes of spouse 1 (y_1) and spouse 2 (y_2) as follows:

$$y_a/AE = s_1\left(\theta_0^{jnt}[y_1/AE + y_2/AE]^{1-\theta_1^{jnt}}\right) + (1 - s_1)\left(\theta_0^{sep}[(y_1/AE)^{1-\theta_1^{sep}} + (y_2/AE)^{1-\theta_1^{sep}}]\right) \tag{D.2}$$

We restrict s_1 to lie between 0 and 1, and interpret it as a measure of tax "jointness". Intuitively, the above function is a weighted average of 2 versions of the Benabou/HSV tax polynomials, where in the first version, one assumes that the taxation if fully joint, and the second one assumes that its fully separate.

We use labor income tax data from the OECD Tax Database.[34] This data is constructed by the OECD based on tax laws from different countries. The OECD Tax-Benefit Calculator gives the net (after taxes and benefits) income for various values of gross labor income of individuals and married couples, by family type. We use the data for 2001.

For single individuals, we collect the data at 301 equally spaced points with gross labor incomes between 25% and 500% of the average country earnings. For married couples, we collect the data for all combinations of the two spouses' earnings, where the labor earnings of each spouse ranges from 25% to 300% of the average country earnings (301 grid points for each spouse, with 90601 data points overall).

Tables D.7 and D.8 show tax rates for several values of individual's and married couple's earnings, and some of the tax function parameter values that we find.[35] The values of θ_1 in Table D.7 give us some idea about the tax progressivity of the labor income taxes (based only on single individuals' taxes), with higher values meaning more progressive taxes.[36] Judging from the values

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[34]Available at: http://www.oecd.org/els/benefitsandwagesmodels.htm.

[35]For married couple, we compute the tax rate here as $1 - y_a/(y_1 + y_2)$.

[36]We apply progressive taxes on labor income. In certain countries in certain periods, such as the U.S. presently,

of θ_1 in this table, we see that the U.S. has one of the least progressive tax systems in our sample (with only Switzerland and Austria having even less progressive taxes). The values of θ_0 give us a measure of the tax level, with higher values meaning lower taxes.[37] Judging by the values of θ_0, the U.S. is also among the countries with the lowest tax rates. However, Greece, Ireland, Spain and UK all have higher values of θ_0 (and thus lower taxes for singles with $y = AE$).

Table D.7: Country Tax Functions for Single Individuals

Country	θ_0	θ_1	Tax rates, for different values of y/AE			
			$y/AE = 0.5$	$y/AE = 1.0$	$y/AE = 1.5$	$y/AE = 2.0$
Austria	0.696	0.109	0.218	0.314	0.371	0.370
Belgium	0.597	0.184	0.301	0.429	0.473	0.494
Denmark	0.556	0.218	0.347	0.427	0.502	0.536
Finland	0.700	0.258	0.195	0.329	0.387	0.423
France	0.725	0.148	0.221	0.295	0.323	0.349
Germany	0.608	0.160	0.307	0.420	0.473	0.483
Greece	0.805	0.161	0.048	0.209	0.268	0.290
Ireland	0.807	0.191	0.043	0.170	0.265	0.310
Italy	0.729	0.168	0.171	0.274	0.323	0.360
Luxembourg	0.719	0.159	0.162	0.272	0.347	0.386
Netherlands	0.716	0.214	0.240	0.306	0.354	0.396
Norway	0.674	0.174	0.247	0.314	0.374	0.404
Portugal	0.774	0.144	0.136	0.213	0.259	0.305
Spain	0.802	0.139	0.108	0.201	0.241	0.262
Sweden	0.641	0.163	0.286	0.324	0.386	0.429
Switzerland	0.730	0.104	0.222	0.277	0.289	0.308
UK	0.798	0.177	0.170	0.255	0.288	0.316
U.S.A	0.734	0.112	0.203	0.248	0.304	0.333

As described above, s_1 in Table D.8 is a measure of tax "jointness". We get some intuitive results that labor taxes in the U.S. are fully joint. In Scandinavian countries, they are either fully or mostly separate. In Germany, they are mostly joint, while in Spain they are mostly separate.

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progressive taxes are applied to the sum of labor and capital income, depending on whether capital gains are taxed at short or long term rates.

[37] $1 - \theta_0$ is the tax rate at $y = AE$.

Table D.8: Country Tax Functions for Married Couples

| Country | s_1 | Tax rates, for different values of $(y_1/AE, y_2/AE)$ |
		(0.500, 0.500)	(0.500, 1.000)	(0.500, 1.500)	(1.000, 1.000)	(1.000, 1.500)	(1.500, 1.500)
Austria	0.804	0.216	0.281	0.332	0.314	0.348	0.371
Belgium	0.917	0.327	0.405	0.442	0.442	0.464	0.477
Denmark	0.054	0.375	0.423	0.473	0.443	0.479	0.503
Finland	0.000	0.224	0.294	0.347	0.329	0.364	0.388
France	0.928	0.233	0.270	0.287	0.295	0.309	0.323
Germany	0.872	0.306	0.375	0.406	0.420	0.447	0.473
Greece	0.000	0.159	0.193	0.241	0.209	0.244	0.268
Ireland	1.000	0.042	0.127	0.160	0.170	0.222	0.265
Italy	0.556	0.203	0.261	0.296	0.285	0.308	0.323
Luxembourg	0.945	0.139	0.197	0.249	0.249	0.296	0.331
Netherlands	0.000	0.238	0.284	0.325	0.306	0.335	0.354
Norway	0.000	0.247	0.292	0.342	0.314	0.350	0.374
Portugal	1.000	0.141	0.175	0.216	0.216	0.243	0.261
Spain	0.125	0.106	0.170	0.207	0.201	0.225	0.241
Sweden	0.355	0.285	0.311	0.361	0.324	0.361	0.386
Switzerland	1.000	0.237	0.269	0.276	0.296	0.309	0.323
U.K.	0.423	0.191	0.234	0.264	0.255	0.275	0.288
U.S.A	1.000	0.227	0.249	0.278	0.278	0.306	0.325

Appendix E. Computational Details

Appendix E.1. Computation of Optimal Policies

We put boundaries on the capital space and pick a 16 point grid in $K = [0, k^{max}]$. Capital is the only continuous state variable, which is also a choice variable. Following the method outlined by Tauchen (1986), we approximate the processes for the idiosyncratic productivity shocks, u, as finite state Markov processes. We use 5 equally spaced states for u in $U = [-\sqrt{\frac{\sigma^2}{1-\rho^2}}, \sqrt{\frac{\sigma^2}{1-\rho^2}}]$. Let $J = \{hs, c\}$ be the state space for whether an individual is high school or college educated, $X = \{0, ..., 44\}$ be the state space for the number of years of labor market experience, and $T = \{20, ..., 95\}$ be the state space for age. The state space for working age married individuals is then: $J \times J \times K \times X \times X \times U \times U \times T$. Letting $G = \{m, f\}$ be the state space for gender, the state space for working age single individuals is: $G \times J \times K \times X \times U \times T$. For retired individuals, it is: $G \times T \times K$ for singles and $T \times K$ for married. We compute the household's optimal policies for each state by iterating backwards. We start from age 95, the last possible period of life. In that period, the next period's value function is 0, and the optimal policy is to consume as much as possible. Knowing the value function at age 95, we can compute optimal policies and value functions for age 94, and so on. The labor market participation decisions are discrete, and so we compare the different options. For each choice of labor market participation, we must solve for the optimal level of capital in the next period as well as optimal work hours in the cases where the individual(s) are participating in the labor market. We find the optimal choice of capital by "golden search". To interpolate next period's value function outside of the grid, we use cubic splines. In the cases when the individuals are working, each choice of capital in the next period imply an optimal number of work hours. We solve for optimal work hours using the routine called LCONF from the IMSL Fortran library. It is based on M. Powell's method for solving linearly constrained optimization problems; see IMSL documentation for details. To speed up the computation when the number of experience levels grow large, we solve the household's problem for every 4 levels of experience and linearly interpolate the value- and policy functions at the remaining experience levels. We follow this approach for households aged 33-64. For households aged 20-32 we solve the problem for all experience levels.

Appendix E.2. Simulation

We simulate an overlapping generations economy with 100,000 men and 100,000 women in each identical generation. Knowing today's state, the policy functions, and next period's marital status, we can find the next period's state. To determine next period's marital status, we draw a random number, $v \in (0, 1)$, for every single individual and every married couple in each time period. We use the age dependent probabilities for divorce and marriage to determine whether a single individual is going to marry or a couple is going to split. We only let the random number drawn

by the single men determine if they are going to get married. Then to find them a partner, we sort single men and women by their random number and find a partner for each man that is going to change status. We also make sure that the right number of men marry women with the same level of education.

Appendix E.3. Partial Equilibrium

When we calibrate the model we must have equilibrium in the marriage market, in the sense that single individuals must have rational expectations about their potential partners in the next period. This expectation must be taken with respect to education, experience, asset holdings, and idiosyncratic productivity shock, $Q^{jgt}(j_p, x'_p, k'_p, u_p)$.. Given his own education, an individual knows the likelihood of marrying someone with high school and college education in the next period. We keep track of the distribution of single individuals in each education group with respect to capital and experience for each value of the productivity shock at every age. We start out with an educated guess for the distribution and then solve the model iteratively until we reach a fixed point. In addition to the distribution of partners, we must also solve for a fixed point in the government lump sum distribution of excess tax revenues.

When we perform the policy experiments we also solve for a fixed point in terms of the average earnings in the economy because the tax functions, the social security payments, and the value of not working are kept as functions of average earnings.

Appendix F. Introducing a Tax System with Norwegian Level and U.S. Progressivity

Here we follow Guvenen et al. (2013). We want to introduce a new tax function, $\tilde{\tau}(y)$, which has the same average tax rate as in Norway but where progressivity, as defined in 3, is the same as in the U.S. tax system, $\tau_{U.S.}(y)$. We must have:

$$1 - \frac{1 - \tilde{\tau}(y_2)}{1 - \tilde{\tau}(y_1)} = 1 - \frac{1 - \tau_{U.S.}(y_2)}{1 - \tau_{U.S.}(y_1)} \Rightarrow \frac{1 - \tilde{\tau}(y_2)}{1 - \tau_{U.S.}(y_2)} = \frac{1 - \tilde{\tau}(y_1)}{1 - \tau_{U.S.}(y_1)} \tag{F.1}$$

for all levels of y_1 and y_2. Letting the fraction $\frac{1-\tilde{\tau}(y)}{1-\tau_{U.S.}(y)}$ be equal to a constant, Λ, for all levels of y, we can obtain a new tax system with the desired properties as follows:

$$1 - \tilde{\tau}(y) = \Lambda(1 - \tau_{U.S.}(y)) \Rightarrow \tilde{\tau}(y) = 1 - \Lambda + \Lambda\tau_{U.S.}(y) \tag{F.2}$$

We must solve for Λ in the context of the model to obtain the same average tax level as in Norway.

Appendix G. Data for Alternative Calibration of Government Transfers

Table G.9: Structure of Public Spending by Country

Country	Total Public Spending	Education	Health	Pensions	Income Support to Working Age	Other Social Public Spending	Total Social Public Spending	"Waste"	Transfers to the Poor	Transfers to All
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Austria	51.8	5.6	6.6	12.3	6.1	1.8	62.5	37.5	15.2	23.5
Belgium	49.1	5.9	6.6	8.9	6.7	3.3	64.0	36.0	20.4	25.5
Denmark	53.7	8.3	5.1	5.3	7.8	7.4	63.2	36.8	28.3	25.0
Finland	48.4	6	5.1	7.7	7.3	4.2	62.6	37.4	23.8	22.9
France	51.6	6	7.1	11.8	4.8	4	65.3	34.7	17.0	25.4
Germany	45.1	4.5	8.1	11.2	4.4	2.8	68.8	31.2	16.0	27.9
Greece	46.7	3.4	4.7	10.7	1.9	1.8	48.1	51.9	7.9	17.3
Ireland	31.2	4.3	4.6	3.1	3.9	1.7	56.5	43.5	18.0	28.6
Italy	45.8	4.5	5.8	13.6	2.5	1.4	60.7	39.3	8.5	22.5
Luxembourg	37.6	5.4	5.2	7.5	5.7	1.4	67.2	32.8	18.9	28.3
Netherlands	44.1	5	5	5	6.2	3.6	56.2	43.8	22.2	22.7
Norway	42.3	7.8	4.9	4.8	6.4	5.2	68.8	31.2	27.4	30.0
Portugal	41.6	5.2	6.2	7.9	3.7	1.1	57.9	42.1	11.5	27.4
Spain	39.2	4.3	5.2	8.6	4.6	2.1	63.3	36.7	17.1	24.2
Sweden	55.1	7.2	6.3	7.2	6.9	8.1	64.8	35.2	27.2	24.5
Switzerland	35.6	5.4	5	6.6	4.2	2	65.2	34.8	17.4	29.2
United Kingdom	34.1	4.3	5.5	5.3	4.3	3.4	66.8	33.2	22.6	28.7
United States1	33.4	4.9	5.9	5.9	1.7	1	58.1	41.9	8.1	32.3

Note: Data is from Adema et al. (2011) and OECD (2011). Columns 2-7 are in percent of the GDP. Columns 8-11 are in percent of Total Public Spending (Column 2). Column (8) equals $\frac{(3)+(4)+(5)+(6)+(7)}{(2)} \cdot 100$. Column (9) equals 100 - (8). Column (10) = $\frac{(6)+(7)}{(2)} \cdot 100$. Column (11) = $\frac{(3)+(4)}{(2)} \cdot 100$.

Appendix H. Additional Tables and Figures

Figure H.7: Relationship Between Female Hours Worked and s_1
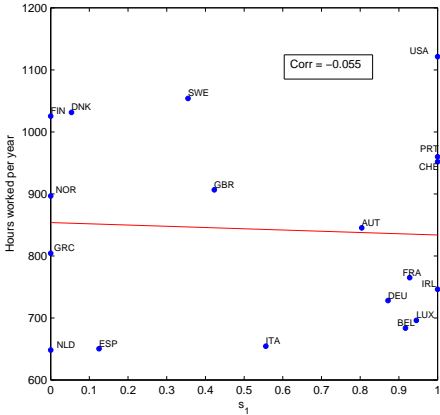
(a) All Women   (b) Married Women
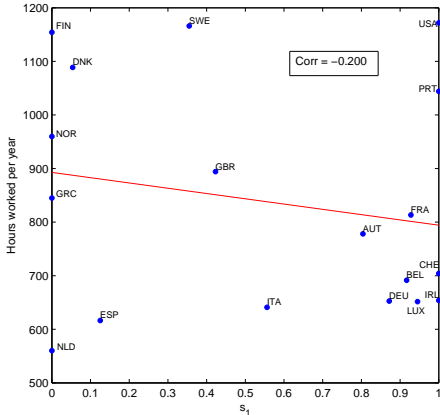
Note: The left panel shows the relationship between the annual hours worked and s_1, which is our measure of the degree of joint taxation of married couples, for all women. The right panel does the same for married women only.

Figure H.8: Share of Married and Divorced Women at Different Ages
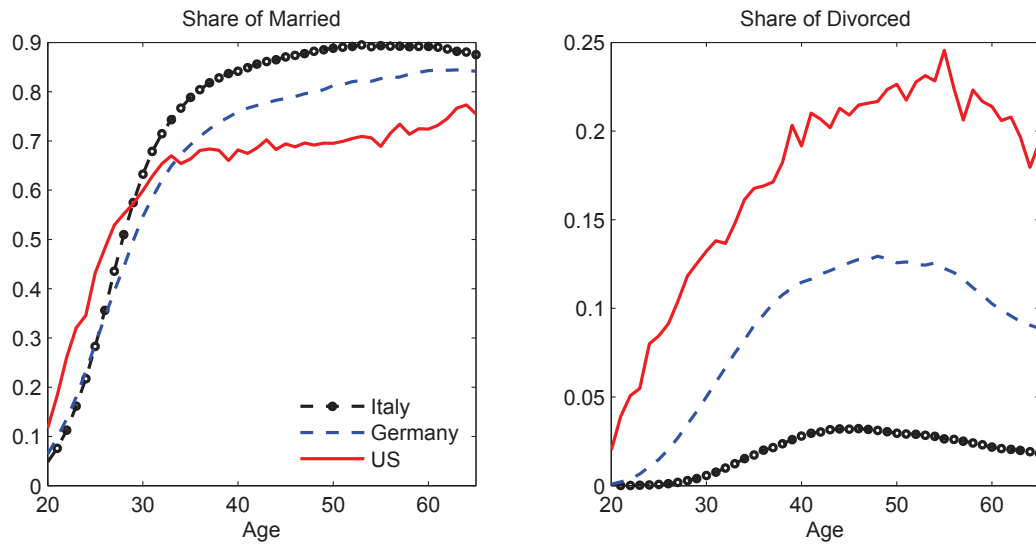
Note: This figure shows the fraction of married and divorced women by age in the U.S., Italy and Germany.

Table H.10: Tax-Related Measures by Country (OECD Tax Database, 2001)

Country	Max. rate	Earnings Level for Max Rate	Consumption tax	Average labor income tax	Progressivity wedge
(1)	(2)	(3)	(4)	(5)	(6)
Austria	42.7%	2.2*AE	20.0%	31.4%	0.213
Belgium	67.5%	1.2*AE	21.0%	43.0%	0.291
Denmark	62.9%	1.0*AE	25.0%	42.7%	0.303
Finland	59.1%	2.1*AE	22.0%	32.9%	0.272
France	49.5%	1.8*AE	19.6%	29.5%	0.155
Germany	51.2%	1.5*AE	16.0%	43.4%	0.265
Greece	51.6%	3.8*AE	18.0%	16.5%	0.276
Ireland	48.0%	1.1*AE	21.0%	23.0%	0.273
Italy	45.9%	3.7*AE	20.0%	27.1%	0.174
Luxembourg	50.1%	1.1*AE	15.0%	27.3%	0.268
Netherlands	52.0%	1.4*AE	19.0%	30.5%	0.192
Norway	55.3%	2.4*AE	24.0%	31.4%	0.220
Portugal	46.6%	4.9*AE	17.0%	21.3%	0.193
Spain	48.0%	4.2*AE	16.0%	20.1%	0.229
Sweden	55.5%	1.5*AE	25.0%	32.4%	0.191
Switzerland	49.5%	3.9*AE	7.6%	24.6%	0.110
UK	40.0%	1.3*AE	17.5%	25.5%	0.155
USA	47.4%	9.0*AE	8.4%	24.8%	0.163

Note: U.S. consumption tax data is from Vertex Inc. (2002). Column (2) reports the maximum marginal rate in the country. Column (3) reports the Earnings level where the maximum marginal rate becomes effective. Column (4) reports the consumption tax rate. Column (5) reports the average labor tax rate paid by the average worker in the country. Column (6) is the progressivity wedge for singles between 50% and 200% of AE. AE represents average earnings.

Table H.11: Contribution of Demographic Groups to the Difference in Annual Hours Worked with the U.S.

Country	Young				Prime-Aged				Old			
	Men		Women		Men		Women		Men		Women	
	Married	Single	Married	Single	Married	Single	Married	Single	Married	Single	Married	Single
Nordic												
Norway	1.6	-5.6	1.9	-0.0	38.6	11.7	21.9	22.7	1.8	0.9	1.4	3.1
Finland	0.8	-8.4	2.6	-1.7	42.6	14.1	-9.2	22.1	19.0	5.6	6.1	6.6
Denmark	2.8	-23.1	-1.6	-9.5	50.9	18.4	6.8	29.8	10.8	2.5	5.8	6.4
Sweden	2.9	-0.1	2.6	2.5	51.5	11.4	-3.8	26.2	6.3	0.9	-2.7	2.4
Central												
Austria	0.8	-16.6	1.1	-9.9	29.3	3.4	37.5	12.4	17.0	2.8	13.6	8.6
Belgium	1.0	3.4	0.0	4.9	23.5	7.5	22.6	12.8	10.0	2.1	7.6	4.4
Netherlands	0.8	-3.1	0.3	-1.1	20.5	3.2	41.0	15.9	7.6	1.8	8.0	4.9
Germany	1.0	-1.1	1.1	-1.6	29.5	11.2	28.7	11.7	8.1	1.6	6.2	3.7
Switzerland	-0.8	-65.6	-7.9	-64.3	30.2	-23.5	208.6	-3.9	-6.5	-8.5	30.2	12.1
France	1.2	4.2	0.7	5.5	23.6	8.3	19.0	13.8	11.4	2.2	6.3	3.9
Luxembourg	-0.1	4.0	0.4	5.7	17.6	0.8	37.6	5.4	12.5	1.7	9.7	4.8
UK	0.6	-19.8	0.3	-11.8	20.2	0.8	43.9	33.1	8.0	2.2	12.5	9.8
South												
Spain	0.4	-1.0	0.8	3.5	19.2	9.0	36.5	14.3	4.9	1.0	7.4	4.0
Greece	-1.2	-3.5	1.9	7.8	2.2	-3.8	48.2	21.0	5.3	1.3	10.5	10.2
Ireland	1.9	-10.5	0.5	-2.8	19.6	1.9	54.3	16.0	1.6	0.5	10.8	6.1
Italy	1.2	2.4	1.4	4.8	13.2	6.8	32.3	14.9	8.6	1.6	7.8	4.9
Portugal	-0.8	-16.5	-2.7	2.4	40.6	18.5	11.0	20.4	8.4	2.6	8.5	7.7
Mean (weighted):	0.9	-4.2	0.7	0.3	25.5	7.1	30.2	16.0	8.7	1.8	7.8	5.3
Mean (*Nordic*):	1.9	-9.0	1.4	-2.0	44.9	13.7	5.5	24.8	9.1	2.5	2.7	4.6
Mean (*Central*):	0.8	-2.7	0.4	-0.6	23.8	5.4	33.8	13.1	10.2	1.8	8.8	5.2
Mean (*South*):	0.6	-4.0	0.7	3.1	17.9	6.5	37.2	16.4	5.8	1.3	8.7	5.9

Note: This table reports additional details regarding the contributions of various demographic groups to the difference between aggregate labor supply in the U.S. and the European countries in our sample. Each column captures the differences in hours worked by various demographic groups in the two countries, assuming that the composition of the population in these two countries is the same. The data is divided into 12 demographic groups, according to gender, marital status and age (using three age groups). All columns in each row add up to 100%.

Table H.12: The Impact of Marriage Stability and Taxation on the Intensive and Extensive Margin

Country	Extensive Margin			Intensive Margin		
	Data	Divorce	Tax	Data	Divorce	Tax
Nordic countries						
Denmark	83.5	99.9	81.3	82.3	100.6	90.9
Finnland	85.5	101.4	103.8	81.3	101.0	89.4
Norway	80.6	99.6	100.4	81.7	100.6	91.9
Sweden	87.4	103.1	95.8	83.7	101.7	92.1
Mean:	84.3	101.0	95.4	82.3	101.0	91.1
Central Europe						
Austria	79.4	100.5	101.4	84.6	100.6	94.0
Belgium	68.4	96.9	88.9	73.9	99.4	90.4
Netherlands	73.5	97.8	103.7	85.4	99.9	92.3
Germany	67.9	97.3	86.1	71.3	99.7	97.4
Switzerland	91.3	98.5	99.6	101.3	100.1	100.4
France	72.4	99.1	97.4	75.0	100.4	97.4
Luxembourg	75.9	96.9	99.8	85.1	99.4	97.4
UK	87.3	98.5	107.4	94.5	100.1	95.3
Mean:	77.0	98.2	98.1	83.9	99.9	95.6
Southern Europe						
Greece	86.5	94.2	109.9	97.3	98.7	95.3
Ireland	82.9	97.9	101.0	93.0	100.3	96.9
Italy	72.0	94.1	106.3	82.3	98.9	92.8
Portugal	87.3	95.5	103.1	88.9	99.0	98.1
Spain	72.0	96.0	111.7	99.8	99.6	96.1
Mean:	80.1	95.5	106.4	92.3	99.3	95.9
Mean:	79.6	98.1	99.9	86.0	100.0	94.6
Corr(data, model)		0.705	-0.315		-0.455	0.201

Note: The table reports the impact of Marriage Stability and Taxation on the intensive and extensive margin. Numbers displayed are hours worked as percentage of U.S. hours.

Table H.13: Calibration Parameters

Panel A: Parameters Calibrated Outside the Model			
Parameter	Value	Description	Target
r	0.011	Risk free interest rate (annual)	3-mnth T-bill minus inflation (1947-2008)
e	1.0 or 1.7	$U^M(c, n_m, n_f) = \log(\frac{c}{e}) - \chi_m \frac{n_m^{1+\eta_m}}{1+\eta_m}$	OECD equivalence scale.
$1/\eta_m, 1/\eta_f$	0.3, 0.6	$-\chi_f \frac{n_f^{1+\eta_f}}{1+\eta_f} - F_m I\{n_m\} - F_f I\{n_f\}$	Kimmel and Kniesner (1998)
$\Gamma(t)$	Varies	Death probabilities	NCHS (1991-2001)
Fraction w. some college	0.533		CPS (1999-2001)
$\bar{\omega}_{intra\_ed.}$	0.737	Prob. of intra ed. marriage	CPS (1999-2001)
k_0	8260	Savings at age 20	NLSY97

Government budget, Transfers and Social Insurance

T	$8400	Income if not working	CEX 2000-2001
Ψ_m, Ψ_f	$12600, $9680	Social security	S.S. Admin. (2000)
ϑ	0.76	Government budget, Eq. 8	Government budget (2000)

Marriage and Divorce

$\bar{\omega}(t)$	Varies	Prob. of marriage	CPS (1999-2001)
$\pi(t)$	Varies	Prob of divorce	
M_0	0.126	Share of married 20 year-olds	

Taxes

θ_0, θ_1	0.734, 0.112	Tax function, single, Eq. D.1	OECD tax data (2001)
$s_1, \theta_0^{jnt}, \theta_1^{jnt}$	1.000, 0.786, 0.133	Tax function, married, Eq. D.2	
$\theta_0^{sep}, \theta_1^{sep}$	0.473, -0.014		
τ_c	0.084	Consumption tax	Vertex Inc. (2002)
τ_k	0.36	Capital tax	Trabandt and Uhlig (2011)

Wage and Earnings Shock

$\gamma_{1hsm}, \gamma_{2hsm}, \gamma_{3hsm}$	0.0533, -0.0146, 0.000142	$w_{hsm} = e^{(\gamma_{0hsm}+\gamma_{1hsm}x+\gamma_{2hsm}x^2+\gamma_{3hsm}x^3)}$	PSID (1968-1997)
$\gamma_{1cm}, \gamma_{2cm}, \gamma_{3cm}$	0.0721, -0.0209, 0.000214	$w_{cm} = e^{(\gamma_{0cm}+\gamma_{1cm}x+\gamma_{2cm}x^2+\gamma_{3cm}x^3)}$	
$\gamma_{1hsf}, \gamma_{2hsf}, \gamma_{3hsf}$	0.0556, -0.0165, 0.000161	$w_{hsf} = e^{(\gamma_{0hsf}+\gamma_{1hsf}x+\gamma_{2hsf}x^2+\gamma_{3hsf}x^3)}$	
$\gamma_{1cf}, \gamma_{2cf}, \gamma_{3cf}$	0.0714, -0.0204, 0.000185	$w_{cf} = e^{(\gamma_{0cf}+\gamma_{1cf}x+\gamma_{2cf}x^2+\gamma_{3cf}x^3)}$	
$\sigma_{hsm}, \sigma_{cm}, \sigma_{hsf}, \sigma_{cf}$	0.326, 0.337, 0.333, 0.347	$u' = \rho_{jg}u + \epsilon$	
$\rho_{hsm}, \rho_{cm}, \rho_{hsf}, \rho_{cf}$	0.761, 0.735, 0.717, 0.743	$\epsilon \sim N(0, \sigma_{jg}^2)$	

Panel B: Parameters Calibrated Endogenously				
Parameter	Value	Description	Moment	Moment Value
γ_{0hsm}	-0.656	$w_{hsm} = e^{(\gamma_{0hsm}+\gamma_{1hsm}x+\gamma_{2hsm}x^2+\gamma_{3hsm}x^3)}$	Mean male hs-wages	1.006
γ_{0cm}	-0.393	$w_{cm} = e^{(\gamma_{0cm}+\gamma_{1cm}x+\gamma_{2cm}x^2+\gamma_{3cm}x^3)}$	Mean male c-wages	1.493
γ_{0hsf}	-1.004	$w_{hsf} = e^{(\gamma_{0hsf}+\gamma_{1hsf}x+\gamma_{2hsf}x^2+\gamma_{3hsf}x^3)}$	Mean female hs-wages	0.705
γ_{0cf}	-0.739	$w_{cf} = e^{(\gamma_{0cf}+\gamma_{1cf}x+\gamma_{2cf}x^2+\gamma_{3cf}x^3)}$	Mean female c-wages	1.043
β	1.002	Discount factor	Mean assets	1.200
F_m	0.319	$U^M(c, n_m, n_f) = \log(\frac{c}{e}) - \chi_m \frac{n_m^{1+\eta_m}}{1+\eta_m}$	Male employment rate	0.840
F_f	0.021	$-\chi_f \frac{n_f^{1+\eta_f}}{1+\eta_f} - F_m I\{n_m\} - F_f I\{n_f\}$	Female employment rate	0.706
χ_m	46.48		Male hours	0.328
χ_f	12.70		Female hours	0.224

Note: The table reports the values of the calibrated parameters in our model and the target moments from the U.S. data. We try to use data from 2000 or the year closest to 2000 that we can obtain. The reason for this is that for the year 2000, we have data that can be used to construct divorce and marriage probabilities for all the countries in Western Europe. We also have tax data for all the countries starting in 2001. Panel A reports the set of parameters that are calibrated to direct empirical counterparts without solving the model. Parameters in Panel B are calibrated to match data moments written against them. We use the data from the European countries in our sample only to obtain the estimates of tax polynomials and age-specific marriage and divorce probabilities, which we use in Section 6 in our counterfactual experiments.

Table H.14: Annual hours and contribution to total difference in annual hours by women with and without small children (age 6 and less)

Panel A: Annual hours worked by women					
	No small children		With small children		Share with
	Hrs	%(U.S.)	Hrs	%(U.S.)	small child, %
Austria	1205.7	100.3	536.5	57.1	31.7
Belgium	890.2	74.0	704.1	74.9	28.6
France	849.4	70.7	599.8	63.8	28.8
Germany	996.3	82.9	349.5	37.2	23.7
Greece	951.6	79.2	690.8	73.5	22.3
Ireland	1215.1	101.1	710.6	75.6	24.1
Italy	824.5	68.6	504.3	53.6	17.6
Luxembourg	1050.4	87.4	642.1	68.3	34.2
Netherlands	1162.3	96.7	396.6	42.2	25.1
Portugal	1046.6	87.1	1135.5	120.8	29.4
Spain	823.0	68.5	584.3	62.1	14.5
UK	1398.7	116.3	534.3	56.8	35.4
United States	1202.2	100.0	880.3	100.0	29.9

Panel B: Contribution of women to the overall difference in annual hours worked					
Country	Women, total:	Women with small children	Women, no small children	Prime-aged women with small children	Prime-aged women, no small children
Austria	59.5	15.1	44.4	13.5	30.7
Belgium	52.1	5.0	47.2	3.8	31.0
Spain	66.5	8.3	58.2	7.1	43.4
Greece	97.3	7.0	90.3	4.2	65.7
Ireland	71.1	13.5	57.6	11.8	46.6
Italy	63.4	8.7	54.7	6.9	37.5
Netherlands	68.5	12.2	56.3	10.6	45.1
Germany	49.4	12.6	36.8	11.2	29.0
Portugal	52.6	-9.2	61.8	-10.1	45.0
France	42.8	6.1	36.7	4.5	23.1
Luxembourg	64.8	8.6	56.2	7.3	37.3
UK	79.4	26.4	53.0	22.5	47.3

Note: Panel A reports the annual hours worked by women with and without small children (age 6 and less). Panel B reports the contribution of women to the overall difference in annual hours worked, with respect to the U.S., in percent. The table contains only a subset of countries for which E.U. LFS provide information on children.