

Do women face a glass ceiling at home? The division of household work among dual-earner couples¹

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Abstract

In this paper we ask how division of household work varies across dual-earner couples with different relative wages. Using Survey of Income and Living Conditions we first show that high income married or cohabiting women work home twice as much as single women in Southern Europe. Moreover, women's time spent on household production (relative to their spouses' time) in Southern Europe is the same regardless of their relative wages, while in Western Europe we find positive elasticity of substitution between relative wages and time spend on household production. We thus present a positive evidence for the presence of a "second-shift" that women face in Southern Europe and that may stem from different gender norms. Our findings hold after instrumenting for relative wages using relative wages of similar socio-economic groups in other countries.

JEL: J12, J16, D13

Keywords: household production, division of labour, discrimination

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1. Introduction

Decades-long progress in many western countries, including the US, led to substantial convergence in labor market outcomes for men and women, including education attainment and labor market attachment. This is translated into a higher share of dual earner couples and a higher share of couples where women earn more than their spouses. In the US the share of couples in which the wife earns more than the husband increased from 20 percent in 1990 to 30 percent in 2015. Across European countries, the share of such couples increased from 16 to 24 percent in 2005-2015. Despite the fact that the share of dual earner couples is increasing, aggregate time-use statistics show very small changes in unpaid work. According to the American Time Use Survey, US women in 2015 spent about 40 percent more time on unpaid work than men (which is about the same as in 2003), while the raw gender pay gap has decreased (Blau & Kahn, 2017).

Economists have long studied also decisions within a household, starting with the static unitary model introduced by Samuelson (1956) and Becker (1974), which treats the household as a single economic unit. In line with this approach, the origins of the gender gaps and their decrease have been traditionally explained by technology, or psychological attributes and non-cognitive traits. However, in many developed countries the convergence has begun to slow down, which has made economists search for additional explanations. Economists and other social scientists have become more interested in how social norms affect economic outcomes. Bisin and Verdier (2001), Alesina and Fuchs-Schündeln (2007), Doepke and Zilibotti (2008), Roland (2010), and Voigtländer and Vogt (2012) all show, in various settings, that values and beliefs change very slowly, can be very persistent, and can have very significant long-term effects on societies. There is no reason to *a priori* believe that this persistence of social norms does not affect differences between genders. Recent works (Alesina, Giuliano, & Nunn, 2011, 2013; Bertrand, Kamenica, & Pan, 2015; Ichino, Olsson, Petrongolo, & Thoursie, 2018) put gender norms into the focus of empirical labor economists. Our work continues in this path by studying how social norms about gender roles can serve as a friction when bargaining about the division of labor in home production, which, in the canonical household labor supply model, is only a function of relative wages and relative productivities.

An international comparison of time use statistics shows a substantial variation in gender gaps in household work across countries. For example, according to time use survey women employed full-time in Italy spend on average over 100 minutes more than men during a working day on household work. In Germany, this difference is about 50% less (Cortes & Pan, 2016). Moreover, couples in different European countries can have very diverging views on gender norms. According to the 2008-2009 European Value Survey, approximately 51% of the respondents in the Western Europe agreed strongly that men should take the same responsibility for the home and children, compared to 32% in the Southern European countries. Almost three quarters of Southern European respondents agreed (“strongly” or “rather”) with the statement that a child with a working mother suffers, while only 46% of westerners were of this opinion.

In line with these statistics, Figure 1, calculated from the Survey of Income and Living Conditions, shows that marriage is associated with a much higher workload in the home in Southern Europe. High-income married or cohabiting women work in the home twice as much as single women in Southern Europe. On the other hand, high-income women in the West work

almost the same as single women in the West and much less than high-income women in the South. This also holds for women who work long hours.

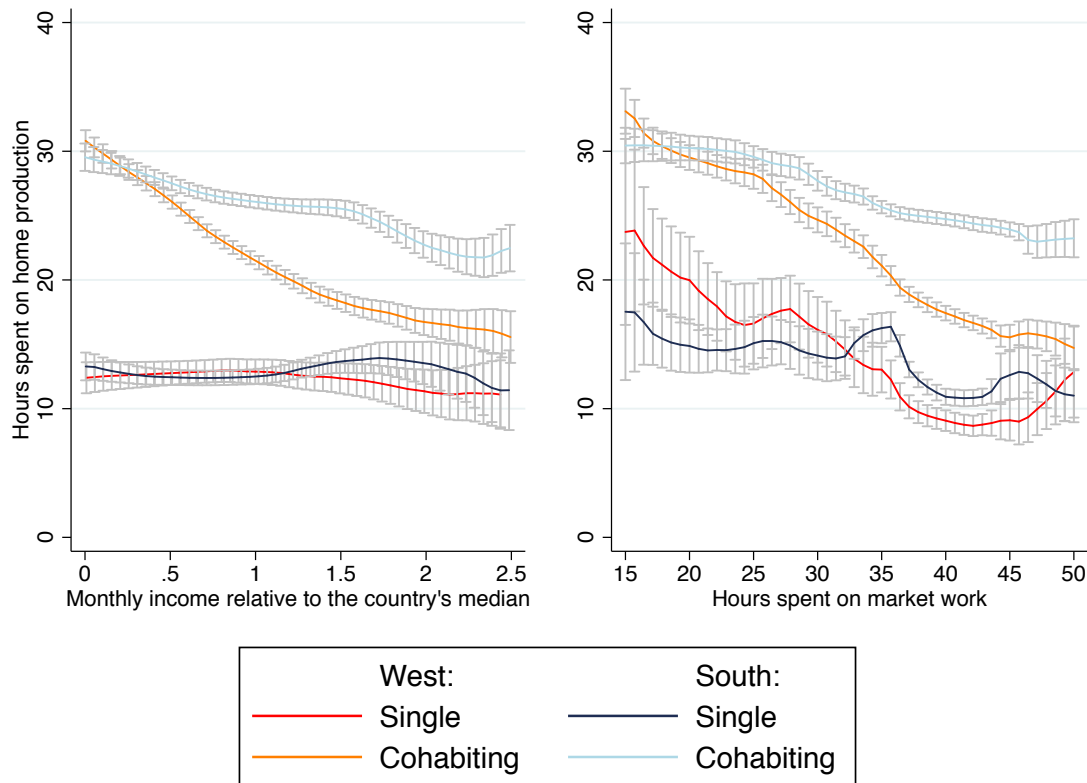


Figure 1: Time spent on home production by females in Southern and Western Europe

Motivated by this evidence we aim to estimate the elasticity of substitution between relative wages and the division of household chores with a special focus on differences between Western and Southern European countries and interhousehold heterogeneity. In many previous studies, the estimates of this elasticity were rather high, standing above two (Acemoglu, Autor, & Lyle, 2004; Hamermesh, 1996; Johnson & Keane, 2013; Weinberg, 2000; cited in Ichino et al., 2018). Knowles (2012) considers the elasticity of substitution to be around 3 for US.

While we provide convincing evidence about differences in the elasticity of substitution across Europe, we also provide a robustness check using the instrumental variable approach that addresses possible endogenous selection into marriage based on relative labor market prospects that may differ across regions. We take advantage of the fact that women (e.g. services) have traditionally dominated certain industries and men others (e.g., construction) to create gender-specific measures of prevailing local wages based on the industrial structure of socio-economic group defined by age and education.

We present evidence that women in Southern Europe on average spend much more time on chores compared to Western European women. This difference is more pronounced for couples where women earn more than their spouses in terms of both per hour and total monthly income, and in couples where women work more hours on market. In the South, married women do not report lower hours spent on household chores when their (relative) wage is higher compared to

their spouse. On the other hand, the amount of hours men spend on household chores is neither dependent on their (relative) wages, nor on their income or hours worked. Based on this descriptive finding, we estimate an elasticity of substitution between relative wages and relative household chores. We show that this elasticity is much lower (essentially zero) in Southern European countries (approximately 0.13, but statistically different from zero), in Western Europe. We also use the 2008-2009 European Value Survey to classify households into two groups based on their view on gender roles (either more traditional or more liberal). Using this classification, we obtain qualitatively similar results as in the comparison of Southern and Western countries, but insignificant for relative wages. It should, however, be stressed that our estimates are small even for Western countries, which suggests that values of elasticity of substitution between relative wages and relative chores employed in the existing literature are rather overstated.

Our evidence fits to existing theories that women and men have traditional division of spheres Lundberg and Pollak (1996). Pahl (1983) documents in a British study that husbands were often in charge of moving, finances, and the car, while wives made decisions regarding interior decoration, food, and children's clothing. These tasks may differ in how easy it is to outsource them. Couples, and individuals within them, may also derive different utility from home production. Second, multiple authors, from within the field of economics as well (Lippmann, Georgieff, & Senik, 2016), point to other types of norms that stem from the perception that women should do more housework than their male spouses.

This paper is organized as follows. Section 2 offers an overview of economic models of specialization. Section 3 describes the data and the descriptive statistics. Section 4 explains the empirical strategy. Section 5 presents the main results, alternative explanations of which are discussed in Section 6. We conclude in Section 7.

2. Specialization in economic household models

In a theoretical setting, the traditional and most widely used approach in economics to study household decisions is linked the static unitary model, introduced to the literature in seminal works of Samuelson (1956), Becker (1962) and Becker (1981). The key ingredient of the model is treating the household as a single economic unit, which is akin to assuming that preferences of the household can be aggregated such that the utility function does not depend in any way on individual household members. Several attempts were made to justify the unitary model, e.g. by assuming predetermined weights of each household member or by assuming transferable utility between them. The unitary model implies that after controlling for total income, individual incomes should have no effect on household behavior, a property known as income pooling. However, many empirical tests have refuted income pooling hypothesis (Attanasio & Lechene, 2002; S. J. Lundberg, Pollak, & Wales, 1997; Schultz, 1990; Ward-Batts, 2008).

Alternative approaches to the unitary model of household decisions in economics literature can be divided into two broad categories: collective models and noncooperative models. The former framework (e.g. Apps & Rees, 1988; Chiappori, 1988) explicitly acknowledges the non-unitary nature of household decision making but they directly assume that the resulting outcome lies on the Pareto frontier. The household therefore only solves a maximization problem with different Pareto weights attached to each spouse. The main difference compared to the unitary model is that household decisions now also depend on the relative decision power captured by the Pareto weights.

Our thinking is based on the latter approach and models the interaction of spouses as noncooperative and the outcome is reached only as bargaining Nash equilibrium, i.e. each agent maximizes its utility given the decisions of others. Outcomes of this type of models are generally Pareto inefficient. Recent examples of noncooperative static models include Browning, Chiappori, and Lechene (2010), Boone et al. (2014) and Doepke and Tertilt (2014) (2014). Household production is rarely studied in this strand of literature, however a notable exception is Doepke and Tertilt (2014). Their model implies that spouses should specialize narrowly on some specific goods and they also conclude that this specialization should be driven solely by their wages. This is however a different result from the bargaining model within “specific spheres” by Lundberg and Pollak (1996), where specialization depends mostly on social norms. Boone et al. (2014) test predictions of their non-cooperative model against the unitary model (rejecting the unitary model in case of two or more children), however the existing literature does not seem to have tested the static noncooperative model’s predictions on household chores.⁵

3. Data and descriptive statistics

This paper focuses on how gender differences in household work change with relative income. To this end, we use the European Union Statistics on Income and Living Condition (EU-SILC). The goal of the survey is to provide comparable statistics on income distribution and social inclusion across EU countries. EU-SILC is based on a nationally representative probability sample of the population living in private households within the country, irrespective of language, nationality or legal residence status. All private households and all people aged 16 and over within the household are interviewed.

Our research especially takes advantage of the 2010 wave, which contained a special module on the intra-household sharing of resources. However, this module was collected in only 11 EU countries (Belgium, Germany, Italy, Slovakia, Slovenia, Romania, Greece, Portugal, Malta, Ireland, and Bulgaria), so our analysis is necessarily limited to this group.

The question about the time spent on home production asked to all adult members of the household is formulated as follows:

How much time per week do you spend on household work in a typical week, including childcare and caring for other dependent household or family members?

In our analysis, we focus on dual earner couples that report a non-zero number of hours of household work for both individuals. We identify 12,458 such households. The main outcome variable we use is the number of hours spent on chores. Table 1 presents number of hours worked in a job, and the level of income relative to country mean. On average, women claim that they spend about twice as many hours on home production as males. For hours spent on market work, women report around 15 percent less than men.

⁵ More recently bargaining approach has been used in the literature also in the dynamic context, examples of search-matching-and-bargaining models include Greenwood, Guner and Knowles (2000, 2002), Knowles (2003) and Goussé, Jacquemet and Robin (2017).

Table 1 shows the descriptive statistics of couples with respect to relative income, hours spent both on chores and market work, relative education level, and relative chores. It also decomposes the level of chores and market hours worked separately for females and males.

It is obvious that the share of couples in which a female earns more than a male is 22 percent. At the same time, in only 12 percent of cases are there couples in which the wife works more hours than the husband. In 82 percent of couples, women spend more hours per week on housework than men. On average, women spend 25 hours per week on chores, whereas men only 11 hours. Our sample exhibits an average gap of 17 percent; the gap in hours worked on the labor market is 7 hours.⁶

Table 1: Descriptive statistics: Statistics on Income and Living Conditions

Variable	Mean	S.D.
Share of couples where female earns more	0,22	0,41
Share of couples where the female works more mkt hours than the male	0,12	0,32
Share of couples where the female works more chores than the male	0,82	0,38
Share of couples where the female is more educated than the male	0,14	0,35
Share of college educated males	0,30	0,46
Share of college educated females	0,31	0,46
Share of females working part-time	0,27	0,44
Share of males working part-time	0,02	0,15
Share of co-habiting pairs that are married	0,89	0,31
Chores (hrs/week -- female)	25,16	15,76
Chores (hrs/week -- male)	11,37	10,64
Market work (hrs/week -- female)	35,01	9,97
Market work (hrs/week -- male)	41,76	6,86
Gap (hours doing chores)	13,79	14,68
Gap (hours doing market work)	-6,76	11,59
Total number of couples	12458	

Note: Source EU-SILC 2010, own computations

Table 2 presents differences in unpaid work between men and women by countries. The gender gap is higher in Southern European countries – Portugal, Malta, Greece and Italy – where women spend almost three times more hours on home production than men. On the other hand, German or Slovakian women do only approximately twice as many chores than men. However, we do not provide more detailed cross-country comparisons, because of the small number of observations in certain countries. In this paper, we thus perform the analysis mainly on the whole sample and we leave cross-country analysis for further research. We divide the sample into Southern and Western countries, a division which also corresponds to differences in their

⁶ These statistics approximately corresponds to various European time use surveys.

beliefs about gender roles as evidenced by the gender value index that we constructed from the European Value Survey (Figure 8 in the Appendix).

Table 2: Country differences in hours spent on household production

	female	male	Diff.	
Belgium	25,04	11,21	13,83	West
Bulgaria	22,22	10,70	11,52	South
Germany	24,23	10,70	13,53	West
Greece	25,81	8,32	17,48	South
Ireland	26,78	12,24	14,54	West
Italy	27,58	11,54	16,05	South
Luxembourg	22,51	9,65	12,86	West
Malta	28,31	9,53	18,77	South
Portugal	24,16	7,74	16,42	South
Romania	21,41	13,51	7,90	South
Slovakia	29,62	15,99	13,63	-
Total	25,16	11,37	13,79	

Source: SILC 2010, own computations.

Household production in South and West and relative wages – graphical overview

In this part we graphically illustrate the main differences in the allocation of household production between Southern and Western Europe.⁷ We start with Figure 1 on page 2 showing that marriage is associated with a much higher level of household chores for women. Single women in Southern Europe spend about 12 hours on household production, regardless of their wage, which is about the same as in Western Europe. Married women in South Europe spend more than 25 hours on household production even if their wage is higher than 200 percent of the country-specific median wage.

⁷ We exclude Slovakia, because it is part of Central Europe and cannot be properly included neither into Western nor in Southern Europe.

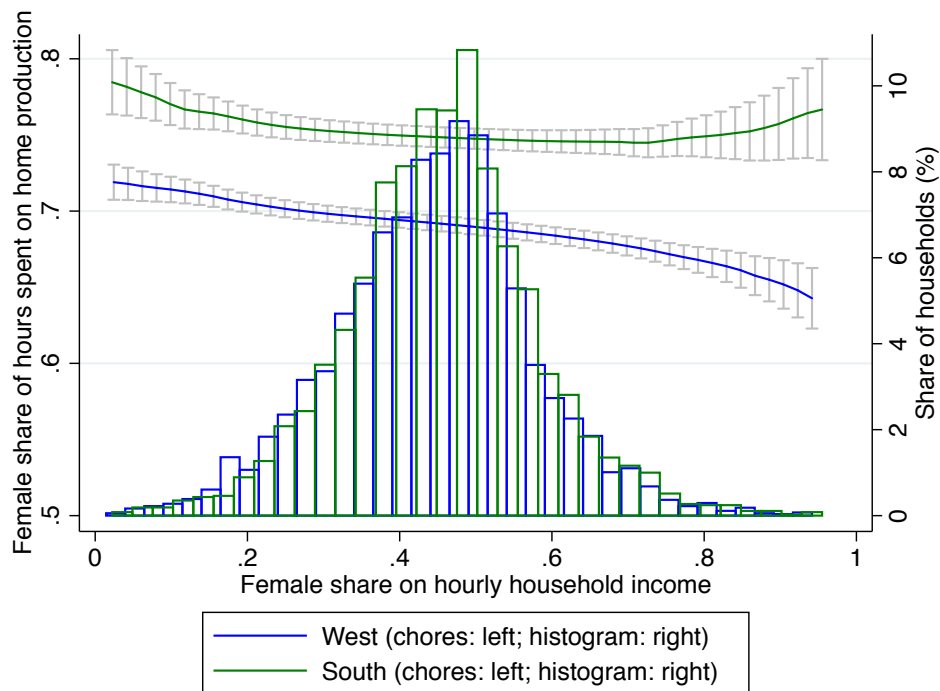


Figure 2: Share of hours spent on home production and share of hourly income (women)

Standard economic models of family labor supply argue that it is the relative wages that determine the division of labor in home production. Thus, we now turn our attention to the relationship between relative wages and division of household chores. Figure 2 shows that women in the South do a higher share of household chores, regardless of their relative wage within the household. The relationship between wage and household production in Figure 2 is more profound in Western Europe. More importantly, women with a higher relative wage spend almost the same number of hours on household chores than those with a lower relative wage. This stands in contrast with the West, where women report a lower relative share of home production when they earn higher relative wages. Figure 3 further shows that it is driven mainly by women decreasing their hours spent on housework, as men start increasing the amount of chores they do only when they earn very little compared to women. We also provide comparison

of distributions of relative wages in South and West. One can see sufficient number of observations in South and West along horizontal axis.

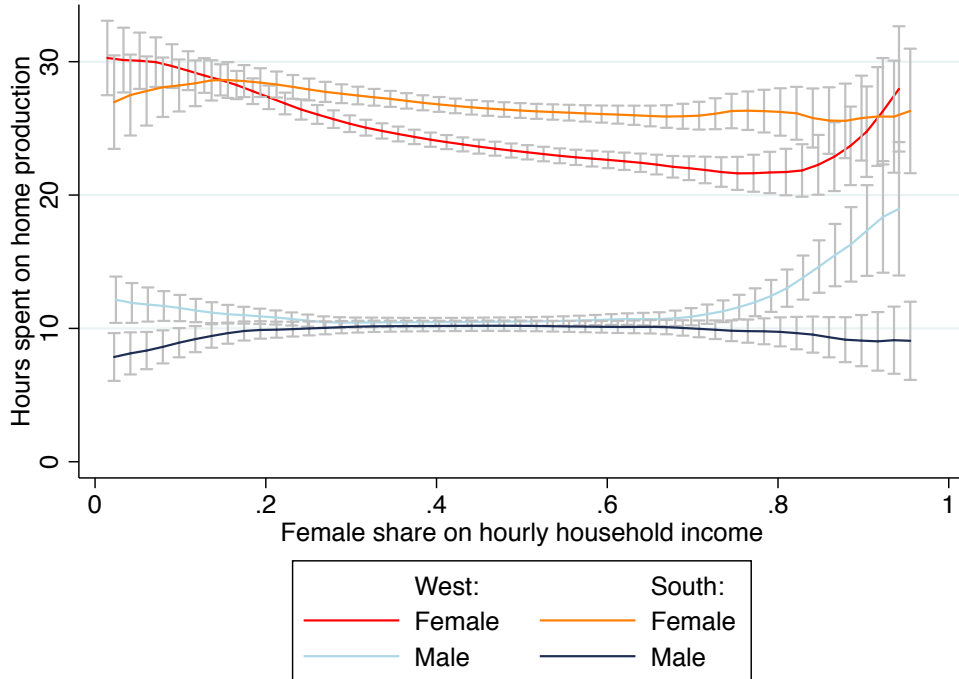


Figure 3: Hours spent by female and male on home production and relative income

Figure 3 also indicates that men’s working hours at home seem to be very inelastic with respect to the relative income. It suggests that men apparently do not simultaneously adjust their chores, working hours and relative income, as opposed to their spouses.

In the next section we describe our empirical strategy which sheds light on the issue of whether the depicted relationship can be possibly considered as causal and whether the differences between South and West are statistically significant.

4. Empirical strategy

The aim of this paper is to estimate the causal impact of relative wages on the division of labor in the home production. The point of departure is the optimization of the home production problem. As Knowles (2012) suggests the first-order conditions of the problem can be written in the following form:

$$\frac{h_w}{h_m} = \left(\frac{W_m \gamma}{W_w (1-\gamma)} \right)^{1/\mu},$$

where h is hours spent on household production, subscript w stands for female, subscript m for male, W is wage, γ is relative productivity in home production, $1/\mu$ is the elasticity of substitution.

By taking the logarithm of both sides of the above relationship we obtain Specification 1. We start by estimating the model of relative hours spent on household work depending on relative income:

$$1) \log(h_w/h_m) = \alpha + \beta \log \left(W_m/W_w \right) + X\gamma + \varepsilon ,$$

where $\alpha = \frac{1}{\mu} \log \frac{\gamma}{1-\gamma}$, $\beta = \frac{1}{\mu}$ (i.e. the elasticity of substitution), h_m and h_w represent hours spent on household production for husband and wife respectively, and W_m and W_w is income (hourly or monthly) of husband or wife. Their log-ratio can then be interpreted as male-female income gap. Vector X consists of other household characteristics, for example education of the wife and the husband, presence of children or country of residence.

Specification (1) is thus directly related to household optimization problem as presented Knowles (2012), who shows the equilibrium condition of couples when the consumption of market goods, home goods, and leisure is maximized. In fact, the relative division of chores is dependent on the relative outside option on the market, the relative productivity in household production and the elasticity of substitution, which is the parameter to be estimated.

While Specification (1) may indicate whether men and women substitute their own work while their relative wage is different, it does not speak to the problem of mechanism of adjustment. We proceed to estimate household level division of work as a function of relative income by gender, which should suggest whether the change in chores is symmetric between husband and wife when their relative income changes.

$$2) \log h_g = \alpha + \beta \log \left(W_w/W_m \right) + X_g\gamma + \varepsilon_g$$

In Specification (2) the left-hand side variable is a log of hours spent on chores in households and the key right-hand side variable is the log of ratio of wages in households – female-male income gap. Subscript g denotes gender. The relative productivity is assumed to be captured by the constant term, the observable characteristics, and the disturbance term, which calls for identification strategy described below.

In general, the key identification issue is the endogenous selection into marriage based on relative labor market prospects and other unobserved characteristics, such as the relative productivity in household chores.

In our case, we take advantage of the fact that women (e.g., services) have traditionally dominated certain industries and others by men (e.g., construction) to create gender-specific measures of prevailing local wages based on the industrial structure of socio-economic group defined by age and education. We thus instrument relative standing in the income distribution of a person in one labor market by the average standing of similar people in all other markets excluding the market of the instrumented person.

The instrument is constructed in the following way. In line with Bertrand (2016) we define relevant gender-specific marriage markets define by age, education and country. Our instrument of wages is defined accordingly:

$$\bar{w}_{east}^{g,p} \stackrel{\text{def}}{=} \sum_j \gamma_{jes,t-1} \times w_{eajt,-s}^{g,p},$$

where g is the index for gender, j for industry, a for age group, s for country, e for education, and p is the ventile in the national income distribution for specific group defined by g , e , a and s . Our data were collected in 2010, although $\gamma_{jes,t-1}$ are fractions of women and men with specific age and education working in specific industries in 2008 – before crisis hit the EU economy.

Specifications (1) a (2) are estimated separately using OLS and proposed IV estimations. The results are presented in the next section.

The main limitation of this strategy is the fact that there is no time variation in the instrument. It is in principle still a cross-sectional variation employed in the estimation of the elasticity. In general, we cannot rule out that some local marriage market specific unobservables remain in the cross-sectional variation of relative wages and relative chores. We thus consider our strategy mainly as a robustness check for the descriptive cross-regional differences.

5. Regression results

We start the exposition of results by presenting the estimated effect of the relative wage on the division of household chores as suggested by Specification 1. Subsequently, we test whether the relative wage affects absolute hours of females more than those of males. Finally, we implement our identification strategy to isolate the selection effect of relative wages on the division of household chores.

We first present the regressions related to Specification 1 with the log of the share of household chores as a key dependent variable. The main control variables are the total monthly income of the household relative to the median in the given country, the degree of urbanization of the area the household lives in, and number of children in the family. Finally, we add education and age of both members of the couple. Descriptive statistics of the explanatory variables are provided in Table A. 3 in the Appendix.

The baseline estimate of the elasticity of substitution for Western Europe is 0.119 ($p=0.02$). This is far less than estimates presented in the previous literature, but similar to the very recent estimates of Ichino et al. (2018). The estimated coefficient is similar for OLS and IV estimation. The IV estimate is higher and characterized by higher standard errors, which is to be expected, but remains statistically significant. The elasticity in Southern Europe, computed as the sum of the baseline coefficient and the interaction term of income gap and south dummy, is close to zero.⁸

It should be noted that we also test if the elasticity of substitution is different for couples where men has college degree and in households that we classify as liberal⁹. While we find signs of

⁸ Results are robust to dropping Belgium and Romania from the sample.

⁹ We classify household as liberal and traditional based on the European Value Survey. We take nine questions and using principal component analysis we create a gender index. We further match the values of gender norm index based on observable characteristics into EU-SILC. Details are provided in the Appendix of this paper.

the coefficients in line with our intuition, the interactions are not significantly different from zero.

Table 3: Elasticity of substitution in home production

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female-male chores gap	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Hourly income gapXliberal			-0.0555 (0.0386)	0.0277 (0.0524)				
Hourly income gapXcollege male					0.0349 (0.0410)	0.0505 (0.0534)		
Hourly income gapXsouth							-0.114*** (0.0397)	-0.124** (0.0547)
Male-female hourly income gap	0.119*** (0.0201)	0.132*** (0.0277)	0.0890*** (0.0281)	0.117*** (0.0396)	0.108*** (0.0242)	0.115*** (0.0339)	0.159*** (0.0248)	0.174*** (0.0335)
Monthly household income relative to the country's median	-0.0847*** (0.0269)	-0.0768** (0.0376)	-0.0845*** (0.0264)	-0.0761** (0.0375)	-0.0859*** (0.0265)	-0.0764** (0.0375)	-0.0845*** (0.0262)	-0.0751** (0.0374)
Household classified as liberal	-0.0415 (0.0296)	-0.0432 (0.0302)	-0.0550* (0.0309)	-0.0501 (0.0324)	-0.0422 (0.0296)	-0.0447 (0.0302)	-0.0418 (0.0295)	-0.0439 (0.0302)
Household lives in Southern Europe	0.00558 (0.0285)	0.00426 (0.0295)	0.00423 (0.0284)	0.00340 (0.0295)	0.00524 (0.0285)	0.00311 (0.0296)	0.0294 (0.0295)	0.0295 (0.0316)
Medium degree of urbanization	0.0929*** (0.0236)	0.0926*** (0.0236)	0.0936*** (0.0236)	0.0930*** (0.0236)	0.0925*** (0.0236)	0.0923*** (0.0236)	0.0921*** (0.0236)	0.0920*** (0.0236)
Low degree of urbanization	0.0837*** (0.0288)	0.0841*** (0.0289)	0.0849*** (0.0288)	0.0848*** (0.0289)	0.0840*** (0.0288)	0.0847*** (0.0289)	0.0843*** (0.0288)	0.0849*** (0.0288)
Number of children age<5	0.0313 (0.0245)	0.0309 (0.0245)	0.0302 (0.0245)	0.0304 (0.0246)	0.0311 (0.0245)	0.0307 (0.0245)	0.0297 (0.0245)	0.0293 (0.0245)
Number of children 5<age<16	0.0836*** (0.0125)	0.0831*** (0.0125)	0.0833*** (0.0125)	0.0829*** (0.0125)	0.0836*** (0.0125)	0.0830*** (0.0125)	0.0829*** (0.0125)	0.0824*** (0.0125)
Age of male	-0.000730 (0.00261)	-0.000940 (0.00263)	-0.000807 (0.00261)	-0.000978 (0.00262)	-0.000763 (0.00261)	-0.000988 (0.00262)	-0.000766 (0.00261)	-0.000965 (0.00263)
Age of female	0.0100*** (0.00273)	0.0101*** (0.00274)	0.0101*** (0.00273)	0.0101*** (0.00273)	0.0101*** (0.00273)	0.0101*** (0.00273)	0.00999*** (0.00274)	0.0100*** (0.00274)
Male college-educated	-0.0220 (0.0277)	-0.0276 (0.0291)	-0.0241 (0.0276)	-0.0287 (0.0291)	-0.0309 (0.0294)	-0.0409 (0.0314)	-0.0227 (0.0276)	-0.0284 (0.0291)
Female college-educated	-0.0891*** (0.0266)	-0.0868*** (0.0282)	-0.0871*** (0.0265)	-0.0861*** (0.0283)	-0.0879*** (0.0265)	-0.0859*** (0.0282)	-0.0888*** (0.0265)	-0.0875*** (0.0282)
Constant	0.513*** (0.0697)	0.510*** (0.0697)	0.522*** (0.0701)	0.515*** (0.0705)	0.517*** (0.0699)	0.516*** (0.0700)	0.507*** (0.0698)	0.505*** (0.0697)
Observations	6,790	6,790	6,790	6,790	6,790	6,790	6,790	6,790
R-squared	0.034	0.034	0.034	0.034	0.034	0.034	0.035	0.035

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Results for Specification 2 are reported in Table 4 for females and in Table 5 for males. We use an identical set of controls as in the estimation of the elasticity of substitution in Table 3.

OLS estimates in column (1) of Table 4 suggest that a 10 percent increase in the female-male gap (when the female monthly income increases or male income decreases) leads to a small but precisely estimated drop in household chores done by a woman of approximately 1 percent. The IV estimate, using the same instrument for the dependent variable as before, is almost identical with similarly accurate standard errors. In contrast, both OLS and IV estimates for males in Table 5 are essentially zero, indicating that males do not adjust the amount of household chores.

Interacting the hourly income gap with our measure of a liberal household and a dummy for men with a college degree leads to negative coefficient for women, suggesting that women in these households perform less chores. On the other hand, coefficient for the South has the opposite sign. None of these interactions seem to matter for men, as Table 5 shows.

6. Discussion – alternative explanations of the South/West differences

Evidence that motivated our study is the different gender norms in Southern and Western Europe. In the South people believe with higher likelihood that pre-school children suffer while mother is working. They also do not, on average, think that men and women should not share household duties equally. On the other hand, countries in Southern Europe are on average poorer, the outsourcing of services is less prevalent, and access to childcare is lower. This may cause the lower elasticity of substitution we presented in the previous part. However, as shown in Figure 4 women in the South do more chores regardless of the number of hours their children spend at childcare or school. This suggests that hours worked in the home are not directly related to the presence of children in institutional or babysitter care.

Moreover, labor markets may differ across countries, for example in the flexibility of contracts. Part-time work contracts with flexible hours are less prevalent in the South, so women there cannot react as strongly by changing working hours when their wage changes. In the following graph (Figure 5) we show that women in the South work more in the home even when their relative working hours at market work increase. This squares with Figure 1, which indicates that married women in the South have a higher workload at home when their working hours rise.

Finally, it may be the case that married or cohabiting couples react on changes in the relative total income rather than in the relative hourly income. This could imply, that women in the South gain bargaining power as their total income increases. Alternatively, as different theories (e.g. Bertrand et al., 2015) suggest, women may have to compensate their spouses if their income or working hours are higher, perhaps due to the social norm that the husband should earn more than the wife. Figure 6 demonstrates that women in the South spend similar hours on household production regardless of their relative income. On the other hand, we observe a steeper gradient for Western countries. The difference in the amount of chores between Western and Southern men is insignificant for the most part, except in the households where the share of income brought home by the male is very low. In such households, Western men do much more chores than their Southern counterparts.

Table 4: Log female chores and log hourly income gap

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(chores)	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Hourly income gapXliberal			-0.0735*** (0.0257)	-0.0558 (0.0368)				
Hourly income gapXcollege male					-0.0827*** (0.0295)	-0.0751* (0.0389)		
Hourly income gapXsouth							0.0938*** (0.0254)	0.0887** (0.0370)
Female-male hourly income gap	-0.105*** (0.0134)	-0.0937*** (0.0195)	-0.0680*** (0.0170)	-0.0654** (0.0255)	-0.0796*** (0.0150)	-0.0697*** (0.0230)	-0.142*** (0.0179)	-0.128*** (0.0252)
Monthly household income relative to the country's median	-0.143*** (0.0213)	-0.128*** (0.0260)	-0.142*** (0.0207)	-0.127*** (0.0259)	-0.146*** (0.0207)	-0.128*** (0.0259)	-0.142*** (0.0207)	-0.127*** (0.0259)
Household classified as liberal	-0.0126 (0.0198)	-0.0156 (0.0201)	-0.0303 (0.0210)	-0.0292 (0.0223)	-0.0143 (0.0197)	-0.0177 (0.0201)	-0.0132 (0.0197)	-0.0163 (0.0200)
Household lives in Southern Europe	0.214*** (0.0187)	0.209*** (0.0192)	0.212*** (0.0187)	0.208*** (0.0192)	0.213*** (0.0187)	0.208*** (0.0191)	0.233*** (0.0194)	0.228*** (0.0209)
Medium degree of urbanization	0.103*** (0.0161)	0.104*** (0.0161)	0.103*** (0.0161)	0.104*** (0.0161)	0.102*** (0.0161)	0.103*** (0.0161)	0.102*** (0.0161)	0.102*** (0.0161)
Low degree of urbanization	0.111*** (0.0195)	0.112*** (0.0196)	0.112*** (0.0195)	0.113*** (0.0196)	0.112*** (0.0195)	0.113*** (0.0196)	0.112*** (0.0195)	0.113*** (0.0196)
Number of children age<5	0.528*** (0.0175)	0.528*** (0.0176)	0.526*** (0.0176)	0.527*** (0.0176)	0.527*** (0.0175)	0.528*** (0.0176)	0.526*** (0.0176)	0.527*** (0.0176)
Number of children 5<age<16	0.285*** (0.00867)	0.286*** (0.00868)	0.285*** (0.00866)	0.285*** (0.00868)	0.286*** (0.00867)	0.286*** (0.00868)	0.285*** (0.00866)	0.285*** (0.00867)
Age of male	0.00626*** (0.00179)	0.00632*** (0.00180)	0.00617*** (0.00179)	0.00625*** (0.00180)	0.00620*** (0.00179)	0.00627*** (0.00180)	0.00621*** (0.00179)	0.00628*** (0.00180)
Age of female	0.0117*** (0.00187)	0.0116*** (0.00187)	0.0118*** (0.00187)	0.0116*** (0.00187)	0.0118*** (0.00187)	0.0115*** (0.00187)	0.0117*** (0.00187)	0.0115*** (0.00187)
Male college-educated	-0.0203 (0.0200)	-0.0225 (0.0211)	-0.0236 (0.0200)	-0.0252 (0.0212)	-0.0421* (0.0218)	-0.0431* (0.0236)	-0.0216 (0.0200)	-0.0237 (0.0211)
Female college-educated	-0.0711*** (0.0195)	-0.0785*** (0.0206)	-0.0678*** (0.0194)	-0.0765*** (0.0207)	-0.0673*** (0.0195)	-0.0763*** (0.0207)	-0.0701*** (0.0194)	-0.0780*** (0.0206)
Constant	1.969*** (0.0517)	1.967*** (0.0517)	1.980*** (0.0518)	1.975*** (0.0521)	1.979*** (0.0517)	1.975*** (0.0519)	1.963*** (0.0517)	1.961*** (0.0517)
Observations	7,766	7,766	7,766	7,766	7,766	7,766	7,766	7,766
R-squared	0.235	0.235	0.236	0.236	0.236	0.236	0.236	0.236

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table 5: Log male chores and log hourly income gap

	(1)	(2)	(3)	(4)	(5)	(6)
Log(chores)	OLS	2SLS	OLS	2SLS	OLS	2SLS
Hourly income gapXliberal	-0.00687 (0.0362)	-0.0270 (0.0498)				
Hourly income gapXcollege male			-0.0350 (0.0380)	-0.0112 (0.0499)		
Hourly income gapXsouth					-0.0128 (0.0377)	-0.0158 (0.0524)
Female-male hourly income gap	0.0213 (0.0269)	0.0561 (0.0391)	0.0288 (0.0231)	0.0450 (0.0325)	0.0221 (0.0232)	0.0466 (0.0312)
Monthly household income relative to the country's median	-0.0543*** (0.0179)	-0.0539 (0.0360)	-0.0556*** (0.0180)	-0.0545 (0.0360)	-0.0544*** (0.0179)	-0.0548 (0.0359)
Household classified as liberal	0.0389 (0.0300)	0.0338 (0.0320)	0.0397 (0.0286)	0.0402 (0.0294)	0.0406 (0.0286)	0.0406 (0.0294)
Household lives in Southern Europe	0.226*** (0.0276)	0.224*** (0.0292)	0.226*** (0.0276)	0.225*** (0.0291)	0.224*** (0.0289)	0.222*** (0.0313)
Medium degree of urbanization	0.0197 (0.0224)	0.0210 (0.0224)	0.0193 (0.0224)	0.0205 (0.0224)	0.0197 (0.0224)	0.0207 (0.0225)
Low degree of urbanization	0.0248 (0.0285)	0.0255 (0.0286)	0.0249 (0.0285)	0.0250 (0.0285)	0.0246 (0.0285)	0.0248 (0.0285)
Number of children age<5	0.519*** (0.0247)	0.520*** (0.0247)	0.519*** (0.0247)	0.520*** (0.0247)	0.519*** (0.0247)	0.521*** (0.0247)
Number of children 5<age<16	0.214*** (0.0122)	0.215*** (0.0122)	0.214*** (0.0122)	0.215*** (0.0122)	0.214*** (0.0122)	0.215*** (0.0122)
Age of male	0.00720*** (0.00256)	0.00746*** (0.00258)	0.00718*** (0.00257)	0.00748*** (0.00258)	0.00721*** (0.00256)	0.00749*** (0.00258)
Age of female	0.00174 (0.00264)	0.00156 (0.00266)	0.00176 (0.00264)	0.00156 (0.00266)	0.00175 (0.00264)	0.00157 (0.00266)
Male college-educated	0.00452 (0.0261)	0.00897 (0.0281)	-0.00422 (0.0277)	0.00714 (0.0304)	0.00486 (0.0261)	0.0102 (0.0281)
Female college-educated	0.00670 (0.0253)	-0.000495 (0.0275)	0.00774 (0.0253)	-0.00103 (0.0274)	0.00641 (0.0253)	-0.00116 (0.0275)
Constant	1.420*** (0.0677)	1.424*** (0.0681)	1.423*** (0.0675)	1.421*** (0.0677)	1.419*** (0.0674)	1.420*** (0.0675)
Observations	6,887	6,887	6,887	6,887	6,887	6,887
R-squared	0.108	0.107	0.108	0.107	0.108	0.107

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

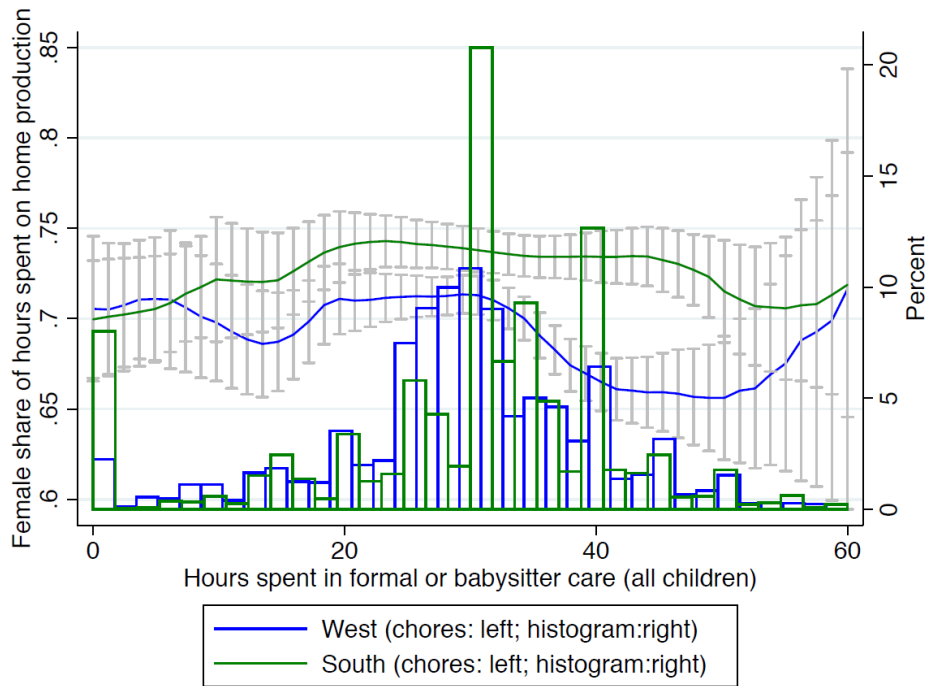


Figure 4: Female share of chores and childcare

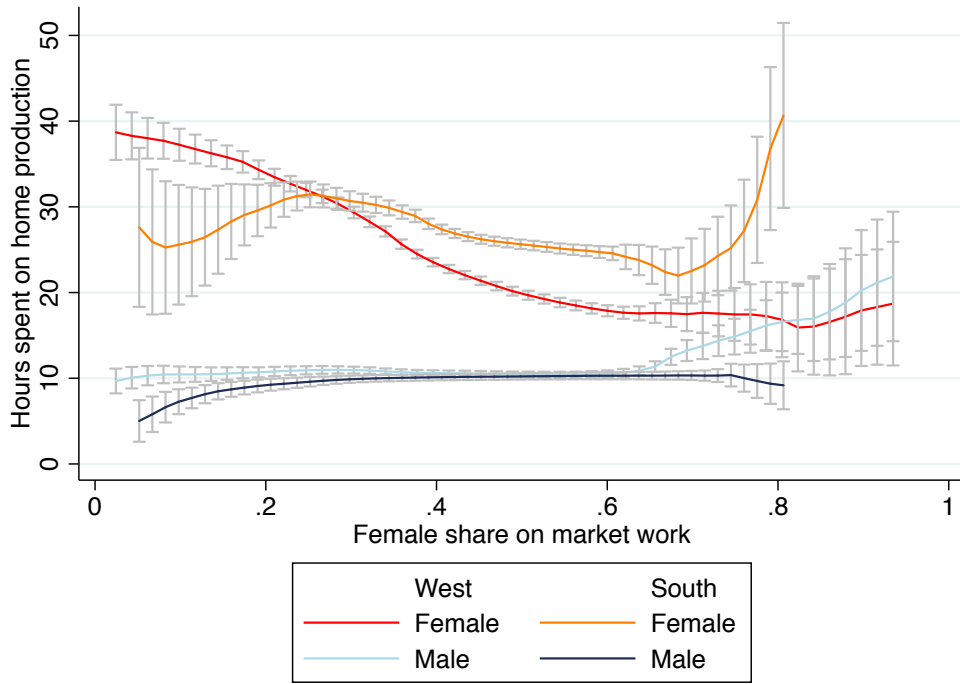


Figure 5: Female market work and female chores

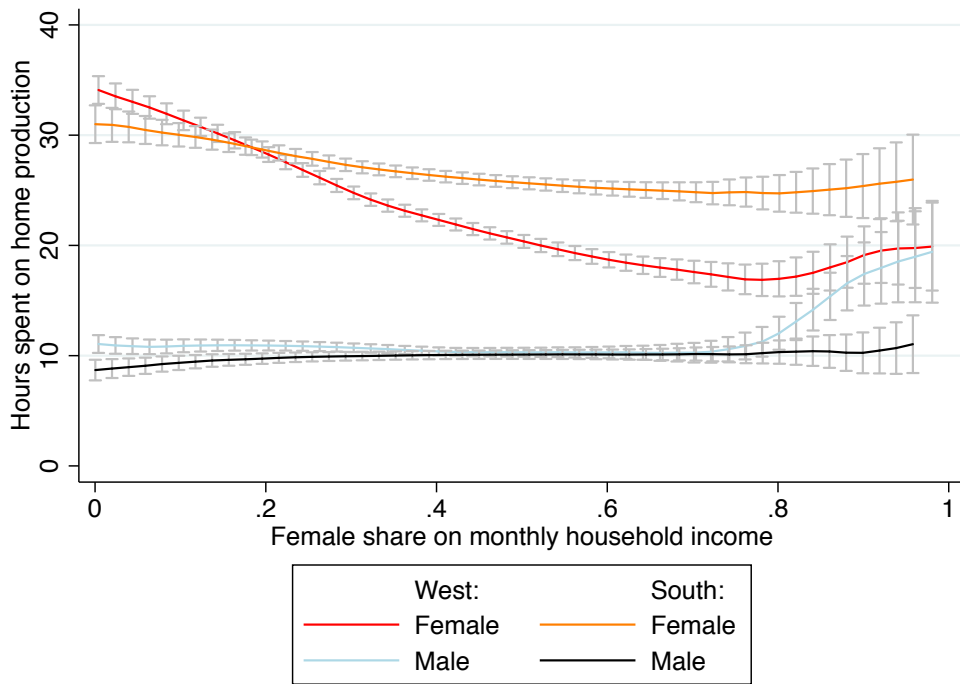


Figure 6: Male-female differences in hours spent on home production associated with relative monthly income

7. Conclusion

In this paper, we show that the relationship between relative income and household chores is weak and culturally dependent. Our results speak to a strong role for social norms in Southern European countries that may drive the relative division of household work. This implies that the elasticity of substitution between relative wages and the division of household work is close to zero in more traditional societies, and positive, but still quite small in more liberal societies. Our results also provide positive evidence for the “second shift” for women in Southern European countries. This may seriously limit their career, as well as other life-time decision. Southern Europe is for example well-known for very small fertility rate. One explanation for that may lie in high overall costs of having a child (both in terms of chores and foregone opportunities) that women have to bear.

The size of estimated elasticity for Western Europe is very similar to the one estimated by Ichino et al. (2018), who, however, estimated the effect of relative wages on the length of temporary parental leave in Sweden, which they used as an indicator of the overall housework. Both Ichino et al. and our estimates stand in contrast with the existing estimates of the elasticity of substitution often employed in the calibration of macroeconomic models of labor supply.

Our evidence thus does not support the notion that couples freely adjust unpaid work based on the relative outside option on the labor market. In fact, our estimates suggest that the substitutability of housework between spouses is very limited. Compared to previous literature, we, however, do not find much evidence for the “doing gender” hypothesis, which suggests that women do more chores when crossing fifty percent of the relative income.

We further show that the difference in chores is not necessarily driven by the availability of childcare services, but we do not have enough data to study the hypothesis that the differences between the South and the West are driven by other types of outsourcing.

We also add to the literature by showing the evidence from 10 European countries that women doing much more household work is a common situation. At the same time, we raise new questions that potentially relate the relative division of chores to cultural background within and across countries. We, however, believe that within-country (and more detailed cross-country) analysis requires more detailed data in terms of sample sizes as well as time use variables.

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Appendix

To see how attitudes toward gender roles correlate with the division of chores and female income, we take advantage of the European Value Survey, which is a research program collecting data on individuals' attitudes, beliefs and opinions about various social, economic, and political issues. We chose 9 questions that asked about opinions on the roles of women and men in various settings. The questions are listed in Table A. 1. The answers to these questions are coded from 1 (strongly agree) to 4 (strongly disagree). Table A. 2 shows the number of respondents in our countries of interest which have non-missing answers to all of these questions.

To decrease the dimensionality of the information contained in multiple answers we applied the principal component analysis. Table A. 1 shows its results. We termed the variable coming from the principal component analysis the "Gender values index", or GVI for short. It is clear from the signs of the components that we can consider the low values of the GVI as indicative of a more "traditional" view of the division of labor between genders, whereas higher values suggest more "liberal" attitudes towards the gender roles. Figure A. 1 and Figure A. 2 show the ranking of all the countries in the EVS and countries in our EU-SILC sample, respectively, according to the average value of GVI. Overall, the ranking follows the usual preconceptions, with Northwestern Europe on average having higher values of the GVI compared to South European countries. Bulgaria and Slovakia form interesting exceptions, being rather high in the ranking. However, when we check average responses to individual questions forming the index in these countries, the majority of them are indeed more "liberal" than the European average.

Given that the samples in the EVS and EU-SILC are different, to use the information from EVS in the analysis of EU-SILC data, we needed to know how strongly the demographic and socio-economic characteristics that are present in both datasets predict the value of the index for the given individual. In Table A. 1 we report the results from an OLS regression of GVI on the individual characteristics common to both datasets. Most of the individual characteristics are relatively strong predictors of the GVI, and their signs are quite intuitive. Blue collar occupations tend to have more traditional views of gender roles, as do less educated people (the basic category is people with complete or incomplete primary education). Also, older people tend to be more "conservative" when it comes to GVI. In order to combine the information from the EVS and the EU-SILC, we computed the average value of the index in the EVS for clusters defined by country, gender, age category, education level, occupation group (defined as professionals, services, and blue collar based on the first digit of the ISCO-88 code), and whether or not the individual has any children. These averages were then attributed to the individuals in the EU-SILC within the same clusters.

To determine which individuals are relatively more liberal than others without assuming an arbitrary cut-off point in the GVI, we divided the sample into two parts based on k-means clustering of the GVI. We did this for males and females separately.

Table A. 1: Components of the “Gender Values Index”

Variable	Component (eigenvector)	Question
v144	-0,050	important in marriage: share household chores
v159	-0,329	[possible for] working mother [to have] warm relationship with children
v160	0,553	pre-school child suffers with working mother
v161	0,516	women really want home and children
v162	0,437	being housewife as fulfilling as paid job
v163	-0,187	job best way for independence women
v164	-0,155	[important for] husband+wife [to] contribute to household income
v165	-0,203	fathers as well suited to look after children as mothers
v166	-0,158	men should take the same responsibility for home and children

Table A. 2: Number of observations in the EVS

Country	Freq.
BE	1 403
BG	1 032
DE	1 469
GR	1 303
IE	625
IT	1 000
LU	1 201
MT	1 028
PT	1 194
RO	1 191
SK	1 123
Total	12 569

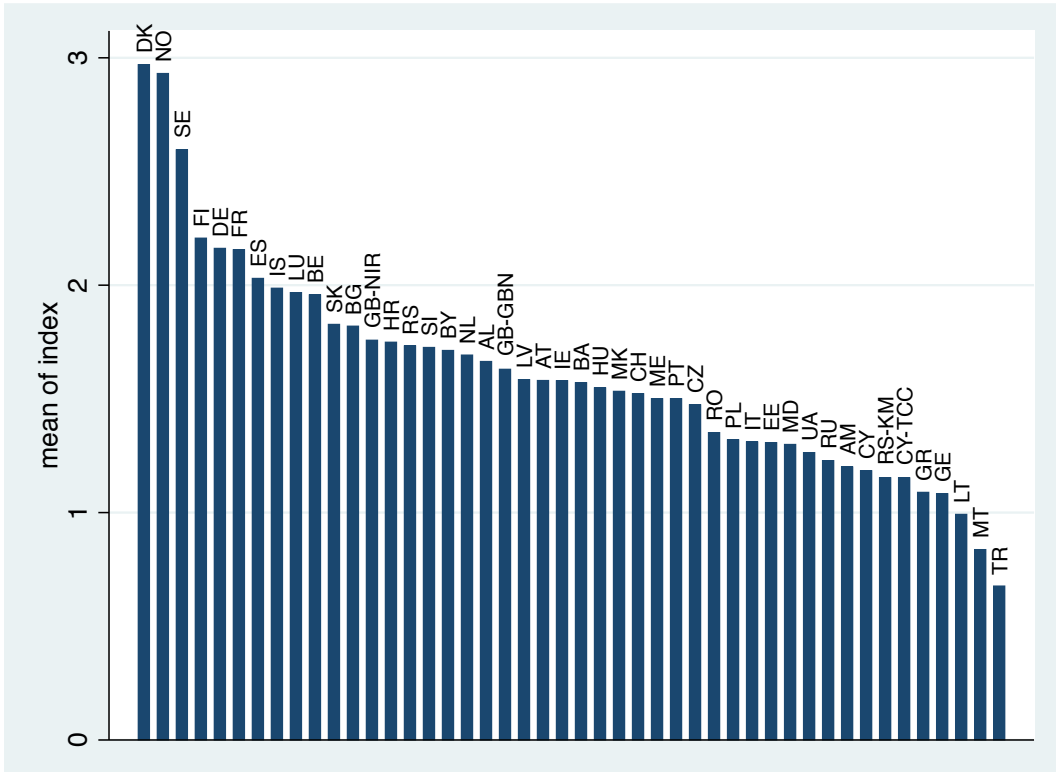


Figure A. 1: Ranking of all countries in the EVS according to the GVI

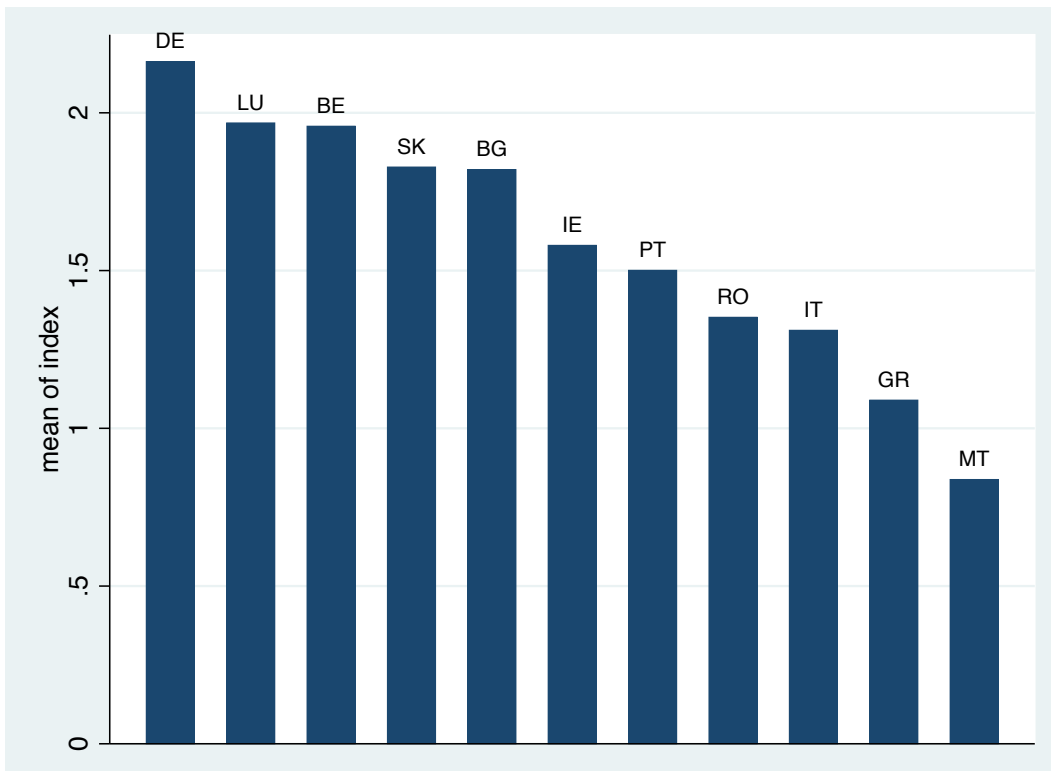


Figure A. 2: Ranking of selected countries according to the GVI

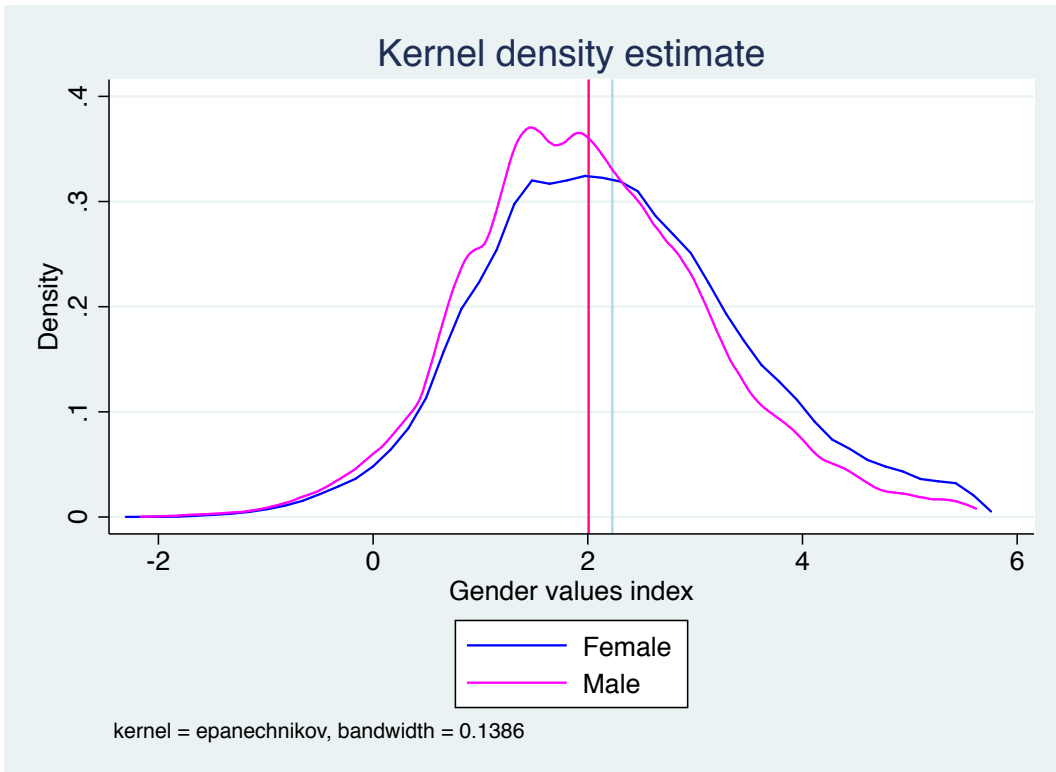


Figure A. 3: Distribution of GVI in the EVS data

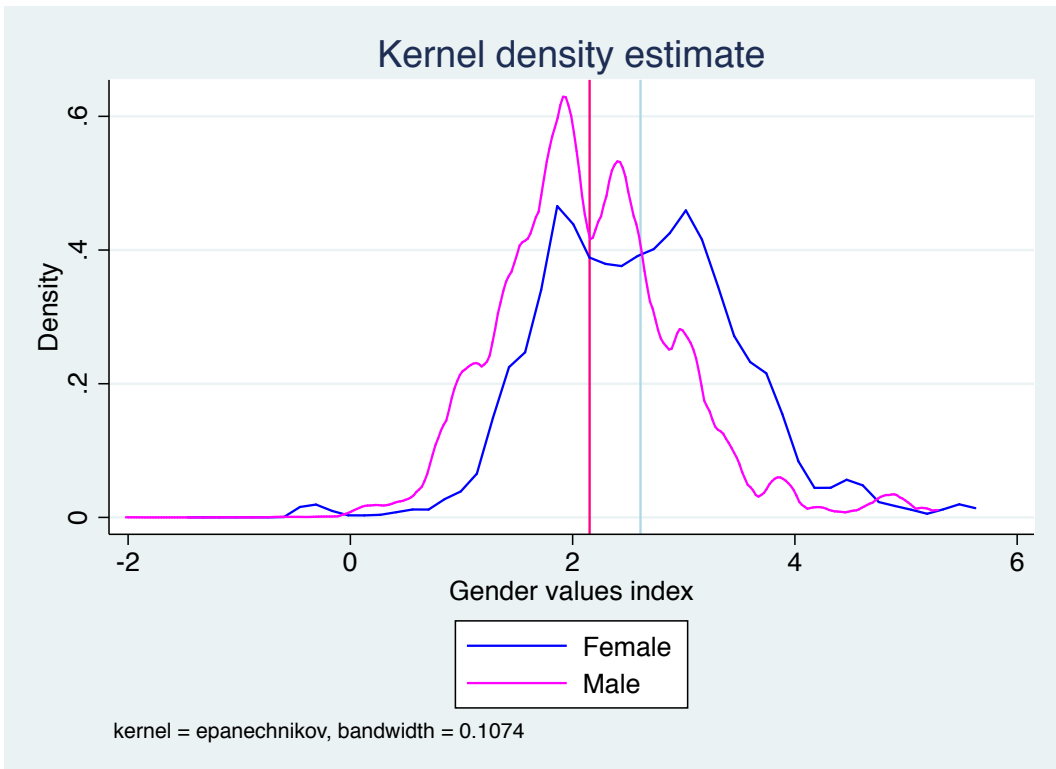


Figure A. 4: Distribution of GVI in the EU-SILC

Table A. 3: Descriptive statistics of the analyzed sample

Variable	Mean	S.D.
Female-male chores gap	0,90	0,88
Female-male monthly income gap	-0,56	0,86
Female-male hourly income gap	-0,22	0,58
Monthly household income relative to the median in the country	1,12	0,61
Number of children age<5	0,20	0,46
Number of children 5<age<16	0,67	0,84
Age of male	44,35	9,03
Age of female	41,85	8,81
Male college-educated	0,32	0,47
Female college-educated	0,33	0,47
Household classified as liberal	0,47	0,50
Household lives in Southern Europe	0,44	0,50
Household lives in Western Europe	0,56	0,50

Table A. 4: Determinants of the GVI

VARIABLES	coef	se
Occupation: Services	-0.111***	(0.0318)
Occupation: Manual workers	-0.180***	(0.0300)
Secondary education	0.340***	(0.0328)
Tertiary education	0.693***	(0.0443)
Female	0.325***	(0.0221)
Has children	-0.0677**	(0.0300)
age category 28-38	0.0249	(0.0421)
age category 38-48	0.0556	(0.0433)
age category >48	-0.105**	(0.0409)
country abbreviation = 6, BG	-0.196***	(0.0465)
country abbreviation = 12, DE	0.157***	(0.0530)
country abbreviation = 21, GR	-0.854***	(0.0449)
country abbreviation = 24, IE	-0.341***	(0.0612)
country abbreviation = 26, IT	-0.629***	(0.0497)
country abbreviation = 28, LU	-0.0471	(0.0515)
country abbreviation = 33, MT	-1.056***	(0.0467)
country abbreviation = 37, PT	-0.200***	(0.0490)
country abbreviation = 38, RO	-0.578***	(0.0443)
country abbreviation = 44, SK	-0.156***	(0.0499)
Constant	2.176***	(0.0622)
Observations	10,572	
R-squared	0.184	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

