**Consortium of Household Panels for European Socio-Economic Research**

# CHER

# Married women labour supply: a comparative analysis

by César Alonso-Borrego and Sergi Jiménez Martín

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## Abstract

In this paper we use a comparable data set from fourteen European countries to analyze labor supply decisions by married women. We focus on the role of the family financial conditions and family benefits. Our approach consists on a generalized selectivity model, in which we take account of the link between participation and labor supply decicisions, although, contrarily to the tobit model, we allow the determinants for these two interrelated decisions to be different. Concerning the decision on labor force participation, we find a positive effect of education, and a strong disincentive due to children, particularly enfants. In addition, the financial requirements that mortgage debt imposes on households suppose a positive and significant effect on the participation decision. With regard to the labor supply equation, the data reject the constraints of the tobit model in favor of the generalized selectitivity model. Furthermore, we find a large heterogeneity in the the elasticity of working hours with respect to both wages and income, what points out that flexibility in hours adjustment is expected to differ very much among countries.

*Keywords:* labor supply, married women, family benefits.

*JEL-Codes:* H55.

## I. Introduction

The analysis of female labor supply has deserved great attention because of the fact that female labor supply is more sensitive to economic conditions and policies than male labor supply is. Moreover, female labor participation is far from being stable across periods and countries. During the period 1977-1996 female labor force participation has increased in all the countries considered. However, there are important differences among countries. For instance, while the rise in Sweden and the UK has been modest (up to 85.8 and 74.5 percent from 77.5 and 66.7 percent, respectively), in the Netherlands or Spain the increment has been very important (from 30.9 and 29.1 percent to 67.2 and 58.0 percent, respectively). In this study we explore to what extent financial economic conditions and benefits are able to explain cross-country variations in the level of participation of married women. In more detail, we analyze married women labor supply patterns in relation to both family financial conditions and family benefits across fourteen European countries[1] in the 1994-1999 period.

Figure 1 illustrates the great variation of participation rates by gender and age in our sample of countries. There are countries for which married women participation is very close to that of married men, such as in Germany, UK and Denmark. On the contrary, there is another set of countries for which significant differences persist: Spain, Greece, Italy and Ireland. On the other hand, the typical U-shaped life-cycle pattern (reflecting participation before marriage and childbearing followed by withdrawal from the labor force during childbearing years and a later re-entering) is hardly detected in any country. In fact, it is only marginally detected in UK, The Netherlands and Denmark around age 35. In Ireland, it is detected 10 years earlier, at age around 25. In other countries, such as Belgium, France, and Austria married women participation declines steadily after age 25. Another interesting case is that of Hungary, where participation increases steadily from age 25 until age 40. Interestingly, the level of participation of Hungarian married women at that age is similar to that of men.

[1] Belgium, Germany, Hungary, Italy, Netherlands, U.K., Austria, Denmark, Finland, France, Greece, Ireland, Portugal and Spain.

As stated, the purpose of our paper is to analyze the determinants of married women participation, emphasizing the role of the educational attainment, the presence of children, the financial conditions of the family and the role of family benefits. We carry out our exercise using data from the CHER database, which combines the ECHP data with data for other non-EU countries such as Hungary or Poland in the 1994-1999 period.

There is an extense literature devoted to the analysis of the labor supply of married women (see, for instance, the survey by Killingsworth and Heckman, 1986, or, more recently, Blundell and MaCurdy, 1999), but little work has been devoted to comparative studies. Recent examples are Mincer (1985) and Knudsen and Peters (1994). The later paper studies labor supply in the US, Canada, UK and Germany.

More specifically, we could mention Mroz (1987), who studies the influence of the family financial conditions and taxes on the participation of a sample of married women from the PSID. Connelly (1992) studies the effect of child care costs on married women labor force participation. Finally, Reimers (1985) studies the influence of cultural differences on labor force participation.

The structure of the rest of the paper is as follows. Section II describes the data. In section III we describe the modeling strategy and the estimation methods. Section IV describes the results of the analysis. Finally, section V concludes.

## II. The data and preliminary evidence

The data for this analysis come from the CHER (Consortium of Household EuRopean Data: www.ceps.lu/cher/user_guide/user_guide.htm), which consists on a multi-country longitudinal dataset at the individual and household level, containing mainly data on European countries and some additional countries like US, Canada and Australia. In the construction of this dataset, previously existing datasets have been exploited, where the

definitions of the different items have been harmonized in order to get comparable relevant information for the different countries. The original datasets comprise national household surveys and the ECHP (European Community Household Panel).

We have restricted our study to European countries, in particular to 14 countries for which there exists the required information. The list of countries appears in Table 1. As selection criteria, we have maintained those observations for which there are not missing values on the variables needed for the analysis. We have considered household consisting on married couples with or without children where the wife was born between 1941 and 1965. Therefore, given the ages of these women, they are old enough to have already finished their education cycle, and young enough in order to disregard retirement decisions.

In our sample, we observe the activity status of each individual (whether she is active – employed or unemployed- or inactive –voluntarily not working or retired-). We also observe several individual and household characteristics. Among the individual characteristics, we observe age, highest attained educational level, individual income disaggregated by source, country of origin, and health status. Among the household characteristics, we observe the characteristics of the family members living at home (from which we can observe the number of enfants and the number of older children, as well as the number of elder people), the tenancy of the home (rented or owned), etc.

In Table 1, we report the labor force participation rates of married women calculated from the CHER dataset since 1994. First, we can see that the availability of data over time differs very much among countries; in fact, 1996 is the only year for which data are available for all countries. We observe a large heterogeneity in female labor participation among countries. Particularly, in 1996, the rate of labor force participation of married women ranged from values about 50 percent for Southern European countries like Spain, Italy, Greece and Ireland to 90 percent for Scandinavian countries like Finland and Denmark. The remaining countries have participation rates that are

mostly between 60 and 70 percent. The only Easter European country in our sample, Hungary shows a very high participation rate, 82 percent.

At first sight, we can thus remark the low participation rates of married women in Southern Europe. On the other extreme, we find the high participation rates in Nordic countries. A potential explanation behind this result is the different cultural and social framework between these two groups of countries, but also the different degree of economic development. However, Portugal appears as an exception to this rule. As a further source for the differences in the rates of labor force participation, we could remark the different degree of labor market regulations (see Lazear, 1990, and Addison and Grosso, 1996). Notwithstanding, Southern European countries are characterized (taking apart Portugal, which shows a clear Anglo-Saxon influence) by stringent labor market regulations and small flexibility in labor contracts (for instance, part-time employment, which is particularly attractive for many women with children under their care, is not very used by companies in these countries). On the other hand, labor market regulations in Anglo-Saxon (as in the United Kingdom) and Nordic countries are very scarce. Certainly, Ireland appears also as an exception to this, because although the organization of its labor market resembles very much that one for the United Kingdom, the rate of female labor force participation is very low, what can be possibly interpreted as the result of cultural differences. Finally, the countries in the core of continental Europe, the largest being Germany and France, show more akin rates of labor force participation.

## III. The Model

Our purpose is to characterize the simultaneous decision of labor force participation and supply of hours decisions. In his review of the main empirical contributions, Zabel (1993) remarked the Heckman's (1974) model as the most prevalent in the empirical literature. Such model establishes a strong link between labor force participation and supply of hours, given that parameters in the reduced form for the supply of hours are proportional to the parameters in the participation equation. Nevertheless, such

proportionality appears to be too restrictive (see Mroz, 1987), since individuals are usually constrained in their choice about labor supply hours in a greater extent that they are in their participation choice.

A more general framework, which we consider, consists on the generalized selectivity model (see Heckman, 1978), in which separate equations for participation and labor supply are allowed for, and no restrictions on the relationship among the parameters in these two equations are imposed. This model encompasses the constraints due to fixed-costs of work and minimum working hours required by the firm as especial cases, which in general cannot be identified separately given that the empirical predictions of these alternative constraints are very similar.

The implicit theoretical model is a static household labor supply in which strong separability in the stochastic utility function between labor supply and consumption decisions is assumed. Therefore, intertemporal considerations are not taken into account in our setting.[2]

The generalized selectivity model relaxes the constraints of the standard Tobit model in two instances. First, the proportionality between the parameters of the participation equation and those of the labor supply equation is not imposed. Second, the variables explaining participation need not to coincide with the variables which determine supply of hours of work.

The participation equation can be written as

$$\boldsymbol{D_i^* = z_i' \gamma + v_i}$$

where $D_i^*$ is a latent continuous variable which measures the tendency to work, $z_i$ is a vector of explanatory variables, $\gamma$ is a vector of unknown parameters, and $v_i$ is a stochastic term containing unobserved factors affecting the tendency to work. The

[2] See Blundell and McCurdy (1999) for a description of the classical model and alternative approaches.

variable $D_i^*$ is not observed: instead, we just observed its sign, which can be summarized by means of a binary variable $D_i$ which takes on value 1 if $D_i^*$ has positive sign (i.e., if the woman participates in the labor market) and zero otherwise.

The equation for the supply of hours of work can be written as

$$\boldsymbol{H_i^* = x_i'\beta + u_i}$$

where $H_i^*$ denotes the desired hours of work, $x_i$ is a vector of explanatory variables which include individual characteristics as well as the logarithm of the wage and non labor income (that is, household income excluding wife's labor income), β is a vector of unknown parameters, and $v_i$ is a stochastic term containing unobserved individual factors affecting the desired hours. Notice that the observability of $H_i^*$ depends critically on whether the woman participates in the labor market (that is, on whether $D_i^* > 0$): otherwise, wife's desired hours of work, as well as wage, are not observed.

In the Tobit model, we have that the variables determining participation and the variables explaining desired hours of work are the same, and that the coefficients of the participation equation are proportional to the coefficients in the desired labor supply equation, that is, $\gamma = \kappa\beta$. These constraints are not imposed on the generalized model. It is usually assumed that the joint distribution of the unobserved terms in both the participation and the labor supply equations, $v_i$ and $u_i$, conditional on all the explanatory variables $z_i$ and $x_i$, follows a bivariate normal. Under such assumption, the parameters in these two equations, $\gamma$ and $\beta$, as well as those of the variance-covariance matrix of the unobserved error terms, can be estimated by maximum likelihood.

Alternatively, Heckman (1978) shows that the parameters can be consistently estimated under the assumptions above by means of a two-step procedure. First, the parameters of the participation equation can be estimated (up-to scale), under the assumption of normality of $v_i$, by estimating a probit model using maximum likelihood. Afterwards, the parameters of the labor supply equation can be estimated applying OLS, with the

subsample of uncensored observations (that is, those for which the desired hours of work $H_i^*$ are observed, which are precisely those women who have chosen to work), to the hours equations above, augmented to take account of the sample selection bias that is induced when conditioning on the subsample of working women.

Formally, the augmented equation for working hours for the subsample of working women can be written as follows:

$$\boldsymbol{H_i^* = x_i'\beta + \delta\lambda_i + u_i',}$$

where $\lambda_i$ is an additional variable which captures the bias due to the truncation of the sample. Under the normality assumption for the error term in the participation equation, $\lambda_i$ is the inverse of the Mills' ratio evaluated at $z_i'\gamma$.

$$\lambda_i = \phi(z_i'\gamma)/[1-\Phi(z_i'\gamma)]$$

where $\phi(.)$ and $\Phi(.)$ are the density and the cumulative distribution of the standard normal. Even though $\gamma$ is unobserved, it can be consistently estimated (under the normality assumption) by means of a probit model for participation. Heckman (1978) proved that substituting the true $\lambda_i$ by a estimated $\lambda_i$ based on consitent estimates of $\gamma$ provides consistent estimates of the parameters of interest in the labor supply equation.

The main advantage of the two-step procedure is that, even though the estimators are inefficient (as opposite with maximum likelihood estimators), they are robust to certain departures from statistical assumptions. In particular, our estimators will be consistent to departures from normality in the labor supply equation (which would cause, in turn, inconsistency of the maximum likelihood estimators), as long as the error term in this equation follows a symmetric distribution. Therefore, we will look for more robust estimators at the expense of efficiency.

## IV. Estimation results

Our estimation approach considers two stages. In the first one, we will estimate the participation equation. In the second one, we will estimate the equation for working hours for the subsample of working women, taking account of the sample selection bias by means of an additional variable whose values depend on the estimated parameters of the participation equation.

The participation equation is just a a discrete choice model, where the probability of participating $P_i$ differs among individuals as a function of individual and household characteristics,

$$P_i = \Phi(z_i'\gamma)$$

Where $\Phi(.)$ is the cumulative distribution of the standard normal. The rationale behind this model can be summarized, following McFadden (1981), assuming random utility maximization with additively separable errors. The individual chooses between participate or not in the labor market. Let $D_i$ be a binary variable for individual $i$ which takes on value one if she participates and zero otherwise.

The information of interest in this context will be the marginal partial effect of a unit change in a particular explanatory variable $z_{ij}$ on the probability of participating in the labor market. This information is not directly provided by the estimated coefficients, but can be easily computed from the following expression,

$$\partial P_i/\partial x_{ij} \equiv d\Phi(z_i'\gamma)/d(z_i'\gamma) \times \gamma_j = \gamma_j \phi(z_i'\gamma),$$

where $\gamma_j$ denotes the parameter associated with the variable $x_{ij}$, and $\phi(.)$ is the density of the standard normal distribution. Notice that the marginal effects do vary among individuals. Hence, to summarize the information we will consider the value of the vector of explanatory variables evaluated at the mean in the case of continuous variables, and at zero in the case of binary dummy variables.

The estimation of the participation models has been done for year 1996, which is the one in which there are information available for the fourteen countries. In Table 2 we have reported the average values of the main explanatory variables for the whole sample and for each country, and we particularize on the subsample of participating women in Table 3. We find remarkable differences in education among countries (from 5 percent of graduates in Portugal to 41 in Finland), and also in their family composition (from 0.12 enfants in Hungary to 0.40 in Ireland). Concerning the subsample of active married women, some of the averages are quite different (although these differences are not statistically significant) than for the whole sample. Particularly, we observe a higher percentage of active women with university degree, and a lower number of children. In any case, we are more interested on examining partial effects which provide us the incidence of a variable given constant values of the remaining conditioning variables.

For expository purposes, we have also estimated the model separately for each country. Nevertheless, to control for sample selection bias in the labor supply equation, we will consider a probit model in which we allow the coefficients of all the covariates to differ among countries.

As explanatory variables referring to the individual, we use a second order polynomial in age,[3] binary variables for educational attainment (*edu2* for secondary studies, *edu3* for graduate studies, the reference group being primary studies or lower), and a binary variable *foreign* for nationality (taking on value 1 if the individual has either the nationality of the country or of any EU country, and zero otherwise). Concerning the household characteristics, we consider variables for family composition, housing tenancy, income, family and disability benefits, and long term-debt. Regarding family composition, we include the number of enfants (children under six years old), *kl6*, the number of older children (aged between 6 and 18 years), and the number of elder people (*elder*) in the household. For housing tenancy, we consider the binary variable *owner*, which equals one if the family own the home where they live, and zero otherwise. Non

[3]Age is usually used to control, among other things, for potential experience.

labor income *income* is defined as total household income excluding wife's income from employment or unemployment. Family and disability benefits are the net subsidies received by the family on these respects. These three income variables are measured in local currency units deflated by the average exchange rate in the sample year. Finally, we also consider a binary variable *mortg* which equals one if the household has a mortgage and zero otherwise. Last, we consider health variables and subjective variables related with individual's satisfaction. Concerning health variables, we have included three binary variables on whether individual suffers a *chronic disease*, on whether she is *dishampered*, and whether she suffers of *bad health*. In addition, we have also considered the *number of visits to the doctor* (excluding the dentist). With regard to satisfaction variables, we have included two binary variables which indicate whether the individual is *not satisfied* with *income* or *housing*, respectively.

We also want to stress that some of the variables are not available for all the countries. However, we have preferred to include them for those countries for which such variables are available. Furthermore, in a few countries some variables where dropped for estimation for they where perfect predictors of one of the two alternatives.

In Table 4, we report the marginal effects based on the probit estimates. As explained earlier, the marginal effects have been evaluated for each country at the average value of the continuous variables, and at zero for the binary variables. Therefore, for a continuous variable $x_j$, the reported marginal effect is $\gamma_j \phi(\bar{z}'\gamma)$, whereas the effect of the binary dummy variables is calculated as $\Phi(\bar{z}_1'\gamma) - \Phi(\bar{z}_0'\gamma)$, where $\Phi()$ is the cumulative distribution function of the standard normal, and $\bar{z}_1$, $\bar{z}_0$, are $\bar{z}$ but with the binary variable *j* set at 1 and 0, respectively.

The effect of age variables differs widely across countries: whereas we find large and significant positive effects on Hungary, Italy and Spain, their effect is smaller and eventually not significant in many other countries. As shown in Figure 1, the pattern of participation by age does not have a clear profile for most of the countries.

Concerning education, we find that the propensity to participate increases with the educational level. We find that the lower effect of education happens to be for UK, Denmark and Finland, which are precisely those countries with highest female participation rate. Given the estimates, taking primary or lower education as reference, having a secondary degree increases, on average, the propensity to participate in about 12 percent, and this probability roughly increases by the same amount if the woman has a university degree. These effects are particularly larger in Italy and Spain, where, relative to a primary degree, having a secondary degree increases the participation probability in 27 and 17 percent, respectively; and having a university degree rises this probability about 43 percent. We should mention the cases of Hungary and Greece, where having a secondary degree does not provide a significant increase in the propensity to participate, but the rise in the participation probability for a women with university degree is sizeable, particularly in Greece (35 percent). In general, we find that the effect in the participation probability of having a university degree is much higher in the countries with the lowest rates of participation: Southern countries (Spain, Italy, and Greece) and Ireland.

The effect of being foreign and not having EU nationality, given by *foreign*, could not be estimated for all the countries due to the lack of data. For the ones for which data is available, the effect in the participation probability is predominantly negative, although it is not always statistically significant. For the significant values, the range of the average probability decrease is between 21 percent for France and 38 percent for Ireland and Belgium. With the exception of Greece, the effect is not significant in South European countries, what probably reflects the fact that the amount of immigrants in the sample year was not so important as in other countries in the sample. Nevertheless, the small number of immigrants in the sample may reflect an underrepresentation of this collective in our sample.

We go on with the effect of household characteristics on participation. The effect of children is remarkably negative, particularly for enfants (children younger than six years). The reduction in the probability of participation of having an enfant ranges from

about 3.5 percent in Finland and Denmark, respectively, to about 23 percent in Austria and Germany. This effect is close to 10 percent in low female participation countries like Spain, Italy, Greece, and Ireland, very far from the incidence of enfants in Germany, suggesting that childcare by itself does not solely explain the low participation rates: social organization is surely another part of the story. Finally, the effect of older children is generally negative, but much smaller in absolute value, and not always significant. Roughly, the reduction of the propensity to participate because of a children above 6 is around half the reduction that is due to an enfant. Regarding children, the public policy on childcare could be very important to understand the differences in the women propensity to participate across countries. Finally, the existence of elder people in the household has not significant effect in married women participation in most countries.

The effect of income (excluding employment or unemployment wife's income) is clearly negative and significant in most countries. Although the comparability is not fully obvious given that the purchasing power of a monetary unit may differ among countries, we find a remarkably larger effect for Hungary (whose relative magnitude is probably reflecting, at least partly, a larger purchasing power for the same amount of money). Family benefits are insignificant in most cases, what can reflect that in most cases they are no related with the labor market decisions. An exception to this is, on the one hand, Hungary, where family benefits entail a negative effect on participation, and Spain, where it is found a positive effect. The disability transfers, when significant, appear to have a negative effect, particularly large in Hungary, Ireland and Portugal.

Surprisingly, housing tenancy does not generally have a large effect on participation, and it appears to be very heterogeneous among countries. We attribute this to the fact that the public policy towards housing (tax incentives, rental subsidies, etc.) differs widely among them. However, we have also considered the existence of a mortgage debt for those households that own their home. The effort required to pay back this debt tends to increase the propensity to participate. The significant effect range between 3.7 and 15 percent, which appear to be very important effects.

The effects of the health variables are very heterogeneous among countries. In general, having bad health, when significant, tends to have a negative impact on participation. Finally, being dissatisfied either with income or with housing does not have large effects on participation; in any case, when these variables are significant, they tend to have a positive impact on participation.

In Table 5 we show the estimates of the labor supply equation using the Heckman's two-step procedure. We have pooled all the observations for the different countries, and allowed the coefficients to vary among countries both in the hours equation and in the selection (participation) equation. In the reported results we have restrict the coefficients of non significant variables in each of the two equations to be equal to zero. In particular, the age variables appear in the selection equation, yet they do not appear in the working hours equation. Furthermore, while we have allowed the coefficients on all the variables included in the selection equation to be different, in the final specification that we report we have dropped the interactions of the country dummies with the conditioning variables whenever they were clearly non significant. We have established Germany as the reference country, so that interaction of covariates with country dummies capture differences with respect to the reference country.

Our results confirm the convenience of the generalized selectivity model instead of the tobit model. First, not all the variables which affect participation are also determinants of the supply of hours. Second, the magnitude of the effects of the variables affecting both participation and hours are remarkably different. We also find that the selectivity correction term is significant (the p-value is below 1 percent), what reinforces the idea of endogenous sample selection.

Our definition of hours is hours worked in the sample year. Given that the wage is introduced in natural logarithms, we should interpret the wage coefficient as the average increase in working hours after a one percent wage increase. For the reference country, the estimated expected increase is about 9.4 hours. This estimated effect, which

corresponds to Germany, Denmark and France, is considerably lower for the remaining countries. In particular, this effect drops to just about 3 hours for Austria and Portugal. In any case, the estimated semi-elasticity of the wage appears to be low.

Concerning education variables, we find that the higher the education level, the lower the supply of hours. Moreover, the negative effect of college education is about twice the effect of secondary education.

Regarding family composition, we find that whereas enfants tend to reduce labor supply, the effects of older children is negligible. Interestingly, the effect of elder relatives in the household is positive (about 3.4 hours), what suggests the possibility that they may help to reduce housing care effort.

Although we find that non labor income reduces on average the supply of hours, for many countries this effect is almost negligible. In particular, it happens to be the case for Greece, Ireland and Spain. The explanation behind this can be that workers have a very limited flexibility in the hours' choice within their job. We find that home ownership does not affect the number of hours worked; the same occurs if we consider the fact of having a mortgage debt.

Concerning health variables, we find that suffering of bad health exerts a negative effect on working hours, and the same thing can be said about the number of visits to the doctor.

## V. Conclusions

The main concern of this paper has been to analyze the determinants of labor force participation by married women in European countries. For this purpose, we use a comparable dataset from fourteen European countries and estimate for each country probit models for the participation decision of married women in 1996. Afterwards, we exploit the probit estimates to compute the sample selectivity correction term, which we

include in the augmented labor supply equation in order to get consistent estimates when conditioning in the subsample of working women.

Our results for the participation decision can be summarized as follows. First, we find that the higher the educational level, the higher the probability to participate. This effect is particularly strong in the case of university education. Furthermore, the education level is a particularly important determinant of participation in the South European countries, the ones with the lowest female participation rates. Second, children have a significantly negative effect on married women participation, particularly in the case of enfants, who entail higher childcare costs. Remarkably, the incidence of enfants in participation is lower in Southern countries, pointing out that additional factors are behind their low female participation rates. Third, there is evidence about the importance of financial conditions on wife's participation, given by the fact that having a mortgage debt increases her participation probability between 5.5 and 11.5 percent.

With regard to the labor supply equation, we first confirm the need to control for sample selection bias (as shown by the fact that the inverse of the Mills' ratio appears to be significant). Second, the importance of a generalized sample selection model is confirmed by the fact that the constraints that would be required by the (more restrictive) tobit model are rejected by the data. Third, we find important differences among countries in the effect of wages and non labor income on hours of work. In particular, the wage semi-elasticity is much larger for Germany, France and Denmark than for some other countries, such as Austria and Portugal. Moreover, the effect of non labor income is almost negligible for some countries like Greece, Ireland and Spain. We believe that behind these results there exist important differences in the flexibility of workers to adjust their working hours in the different countries that we have considered.

Our results appear in line with previous work by Mroz (1987) and others. However, there is much scope for future research. First, institutional differences are crucial to understand the differences in the qualitative and quantitative results among countries. In order to shed light on this, information on the labor market institutions and on the social

benefit systems is needed. Second, our results can serve as a basis for a latter analysis on the determinants of working hours by married women.

Figure 1. Married labor force participation rate by age, gender and country.

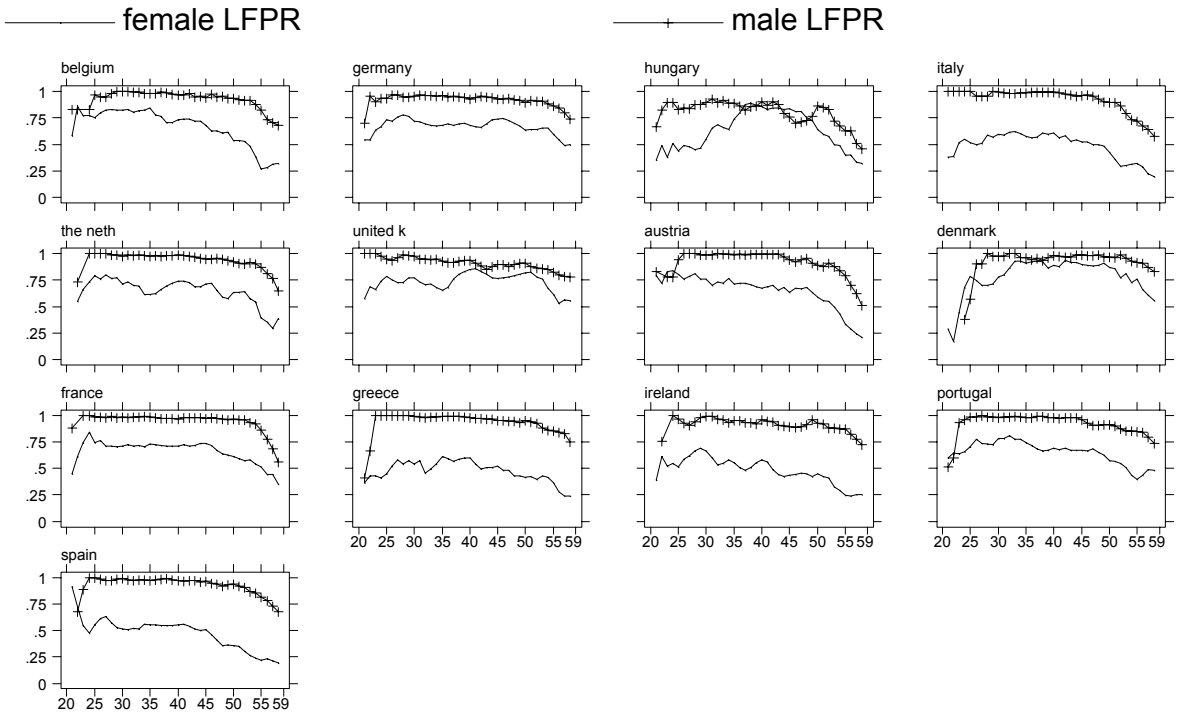

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Table 1
Female activity rates (%)
Sample of married women born between 1941 and 1965

| Country | Year | | | | | |
|---|---|---|---|---|---|---|
| | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** |
| Belgium | 69.8 | 71.2 | 73.2 | 72.5 | 71.0 | |
| Germany | 70.9 | 70.8 | 69.0 | 69.9 | 69.0 | 69.1 |
| Hungary | 84.5 | 85.6 | 82.0 | 75.1 | | |
| Italy | 55.9 | 54.3 | 52.5 | 53.1 | 52.3 | 49.8 |
| Netherlands | 61.9 | 62.8 | 66.1 | 66.2 | 67.5 | 67.7 |
| U.K. | 77.5 | 78.2 | 79.9 | 80.4 | 79.1 | 79.2 |
| Austria | | 65.6 | 66.8 | 67.0 | 64.0 | 65.9 |
| Denmark | 90.7 | 90.5 | 89.9 | 90.7 | 91.2 | 91.6 |
| Finland | | | 91.9 | | 92.2 | 92.3 |
| France | 73.1 | 69.7 | 68.9 | 68.4 | 68.9 | 67.5 |
| Greece | 56.5 | 54.6 | 51.4 | 53.4 | 52.3 | 47.7 |
| Ireland | 44.9 | 46.3 | 48.1 | 52.5 | 52.6 | 52.9 |
| Portugal | 64.9 | 66.0 | 64.9 | 65.0 | 66.7 | 65.1 |
| Spain | 50.4 | 51.2 | 48.4 | 49.9 | 49.9 | 47.4 |

Table 2

Summary of statistics (means and standard deviations)

| Country | Variable name | | | | | | | # obs. |
|---|---|---|---|---|---|---|---|---|
| | **age** | **edu1** | **edu2** | **edu3** | **kl6** | **k618** | **elder** | |
| Belgium | 41.5 | 0.35 | 0.26 | 0.39 | 0.28 | 1.04 | 0.01 | 937 |
| | *6.4* | *0.48* | *0.44* | *0.49* | *0.59* | *1.02* | *0.12* | |
| Germany | 42.1 | 0.28 | 0.47 | 0.25 | 0.18 | 0.96 | 0.01 | 2159 |
| | *6.4* | *0.45* | *0.50* | *0.43* | *0.46* | *1.01* | *0.12* | |
| Hungary | 42.7 | 0.46 | 0.36 | 0.18 | 0.12 | 0.93 | 0.07 | 495 |
| | *6.3* | *0.50* | *0.48* | *0.38* | *0.37* | *0.95* | *0.27* | |
| Italy | 42.9 | 0.59 | 0.33 | 0.08 | 0.20 | 0.83 | 0.04 | 2851 |
| | *6.5* | *0.49* | *0.47* | *0.27* | *0.47* | *0.87* | *0.21* | |
| Netherlands | 42.6 | 0.24 | 0.61 | 0.16 | 0.22 | 1.11 | 0.00 | 1457 |
| | *6.2* | *0.43* | *0.49* | *0.36* | *0.54* | *1.10* | *0.00* | |
| U.K. | 42.6 | 0.59 | 0.09 | 0.33 | 0.26 | 0.90 | 0.01 | 1423 |
| | *6.6* | *0.49* | *0.28* | *0.47* | *0.57* | *1.02* | *0.11* | |
| Austria | 42.3 | 0.30 | 0.62 | 0.08 | 0.22 | 1.00 | 0.09 | 1119 |
| | *6.7* | *0.46* | *0.48* | *0.26* | *0.51* | *1.04* | *0.33* | |
| Denmark | 43.2 | 0.22 | 0.33 | 0.45 | 0.24 | 0.90 | 0.00 | 715 |
| | *6.5* | *0.42* | *0.47* | *0.50* | *0.52* | *0.98* | *0.05* | |
| Finland | 43.2 | 0.25 | 0.34 | 0.41 | 0.27 | 1.07 | 0.01 | 1513 |
| | *6.3* | *0.43* | *0.47* | *0.49* | *0.58* | *1.07* | *0.13* | |
| France | 42.7 | 0.40 | 0.39 | 0.21 | 0.23 | 1.05 | 0.01 | 1967 |
| | *6.3* | *0.49* | *0.49* | *0.41* | *0.53* | *1.10* | *0.12* | |
| Greece | 42.5 | 0.59 | 0.22 | 0.18 | 0.16 | 0.94 | 0.12 | 1810 |
| | *6.4* | *0.49* | *0.42* | *0.39* | *0.43* | *0.95* | *0.37* | |
| Ireland | 43.0 | 0.45 | 0.42 | 0.14 | 0.40 | 1.53 | 0.04 | 1227 |
| | *6.6* | *0.50* | *0.49* | *0.34* | *0.70* | *1.31* | *0.20* | |
| Portugal | 43.1 | 0.88 | 0.07 | 0.05 | 0.17 | 0.99 | 0.07 | 1655 |
| | *6.5* | *0.33* | *0.25* | *0.23* | *0.45* | *1.02* | *0.30* | |
| Spain | 42.3 | 0.70 | 0.14 | 0.16 | 0.24 | 1.01 | 0.11 | 2279 |
| | *6.4* | *0.46* | *0.35* | *0.37* | *0.50* | *0.94* | *0.36* | |
| All | 42.6 | 0.48 | 0.32 | 0.20 | 0.23 | 1.00 | 0.04 | 21607 |
| | 6.5 | 0.50 | 0.47 | 0.40 | 0.52 | 1.03 | 0.23 | |

Standard deviations in italics

Table 3
Subsample of active women
Summary of statistics (means and standard deviations)

| **Country** | **Variable name** | | | | | | | **# obs.** |
|---|---|---|---|---|---|---|---|---|
| | **age** | **edu1** | **edu2** | **edu3** | **kl6** | **k618** | **elder** | |
| Belgium | 40.6 | 0.28 | 0.26 | 0.46 | 0.30 | 1.05 | 0.01 | 686 |
| | *6.1* | *0.45* | *0.44* | *0.50* | *0.58* | *0.99* | *0.12* | |
| Germany | 42.0 | 0.23 | 0.48 | 0.29 | 0.13 | 0.86 | 0.01 | 1490 |
| | *6.4* | *0.42* | *0.50* | *0.45* | *0.40* | *0.92* | *0.12* | |
| Hungary | 42.0 | 0.41 | 0.39 | 0.20 | 0.11 | 0.98 | 0.07 | 406 |
| | *5.9* | *0.49* | *0.49* | *0.40* | *0.35* | *0.92* | *0.28* | |
| Italy | 41.9 | 0.45 | 0.42 | 0.13 | 0.22 | 0.83 | 0.04 | 1498 |
| | *6.2* | *0.50* | *0.49* | *0.34* | *0.48* | *0.85* | *0.21* | |
| Netherlands | 42.3 | 0.20 | 0.61 | 0.19 | 0.21 | 1.10 | 0.00 | 963 |
| | *6.0* | *0.40* | *0.49* | *0.40* | *0.52* | *1.08* | *0.00* | |
| U.K. | 42.9 | 0.56 | 0.09 | 0.35 | 0.20 | 0.86 | 0.01 | 1137 |
| | *6.5* | *0.50* | *0.28* | *0.48* | *0.47* | *0.99* | *0.12* | |
| Austria | 41.6 | 0.26 | 0.65 | 0.09 | 0.20 | 0.99 | 0.10 | 748 |
| | *6.5* | *0.44* | *0.48* | *0.29* | *0.49* | *1.01* | *0.36* | |
| Denmark | 43.0 | 0.19 | 0.34 | 0.48 | 0.23 | 0.91 | 0.00 | 643 |
| | *6.4* | *0.39* | *0.47* | *0.50* | *0.50* | *0.97* | *0.06* | |
| Finland | 43.2 | 0.24 | 0.33 | 0.43 | 0.25 | 1.06 | 0.01 | 1390 |
| | *6.2* | *0.43* | *0.47* | *0.50* | *0.55* | *1.04* | *0.13* | |
| France | 42.3 | 0.33 | 0.42 | 0.25 | 0.20 | 1.01 | 0.01 | 1356 |
| | *6.2* | *0.47* | *0.49* | *0.43* | *0.48* | *0.99* | *0.13* | |
| Greece | 42.0 | 0.52 | 0.20 | 0.27 | 0.15 | 1.01 | 0.14 | 931 |
| | *6.3* | *0.50* | *0.40* | *0.45* | *0.41* | *0.97* | *0.41* | |
| Ireland | 42.1 | 0.34 | 0.45 | 0.22 | 0.38 | 1.36 | 0.03 | 590 |
| | *6.4* | *0.47* | *0.50* | *0.41* | *0.67* | *1.20* | *0.18* | |
| Portugal | 42.4 | 0.83 | 0.09 | 0.08 | 0.18 | 0.95 | 0.07 | 1075 |
| | *6.5* | *0.37* | *0.28* | *0.27* | *0.44* | *0.95* | *0.31* | |
| Spain | 41.3 | 0.56 | 0.17 | 0.27 | 0.25 | 1.01 | 0.08 | 1104 |
| | *6.0* | *0.50* | *0.38* | *0.44* | *0.51* | *0.95* | *0.31* | |
| All | 42.2 | 0.39 | 0.34 | 0.26 | 0.21 | 0.98 | 0.04 | 14017 |
| | *6.3* | *0.49* | *0.48* | *0.44* | *0.49* | *0.99* | *0.22* | |

Standard deviations in italics

Table 4
Probit estimates by country: marginal effects

| Country | Variable name | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **age** | **age^2** | **edu2** | **edu3** | **Foreign** | **kl6** | **k618** | **elder** |
| Belgium | 0.0338 | -0.0006 | 0.1014 | 0.2539 | -0.3863 | -0.0918 | -0.0367 | 0.0315 |
| | *0.0382* | *0.0004* | *0.0325* | *0.0313* | *0.1473* | *0.0332* | *0.0215* | *0.1106* |
| Germany | -0.0116 | 0.00002 | 0.1257 | 0.2161 | -0.0652 | -0.2393 | -0.1299 | 0.1062 |
| | *0.0274* | *0.0003* | *0.0312* | *0.0279* | *0.0450* | *0.0345* | *0.0184* | *0.1074* |
| Hungary | 0.0816 | -0.0010 | 0.0343 | 0.0913 | | 0.0409 | 0.0377 | 0.0538 |
| | *0.0262* | *0.0003* | *0.0247* | *0.0204* | | *0.0401* | *0.0234* | *0.0508* |
| Italy | 0.0832 | -0.0011 | 0.2651 | 0.4317 | -0.3270 | -0.1009 | -0.0699 | 0.1018 |
| | *0.0259* | *0.0003* | *0.0222* | *0.0223* | *0.2140* | *0.0271* | *0.0143* | *0.0524* |
| Netherlands | 0.0688 | -0.0009 | 0.1103 | 0.2705 | -0.0242 | -0.1311 | -0.0642 | |
| | *0.0380* | *0.0004* | *0.0349* | *0.0328* | *0.1727* | *0.0380* | *0.0332* | |
| U.K. | 0.0020 | -0.00001 | | 0.0036 | | -0.0255 | -0.0050 | |
| | *0.0085* | *0.0001* | | *0.0067* | | *0.0126* | *0.0073* | |
| Austria | 0.0285 | -0.0006 | 0.1115 | 0.2057 | -0.0591 | -0.2315 | -0.1046 | 0.0803 |
| | *0.0344* | *0.0004* | *0.0344* | *0.0417* | *0.1007* | *0.0396* | *0.0209* | *0.0548* |
| Denmark | -0.0011 | -0.00002 | 0.0306 | 0.0509 | -0.1974 | -0.0366 | 0.0034 | |
| | *0.01564* | *0.0002* | *0.0127* | *0.0171* | *0.1578* | *0.0183* | *0.0095* | |
| Finland | 0.0579 | -0.0007 | 0.0148 | 0.0638 | | -0.0347 | -0.0125 | -0.0534 |
| | *0.0157* | *0.0002* | *0.0154* | *0.0172* | | *0.0178* | *0.0082* | *0.0354* |
| France | 0.0479 | -0.0007 | 0.1228 | 0.2304 | -0.2072 | -0.1402 | -0.0464 | 0.0473 |
| | *0.0266* | *0.0003* | *0.0234* | *0.0228* | *0.0706* | *0.0264* | *0.0138* | *0.0894* |
| Greece | 0.0309 | -0.0004 | 0.0534 | 0.3524 | -0.3639 | -0.1109 | 0.0261 | 0.1811 |
| | *0.0354* | *0.0004* | *0.0389* | *0.0344* | *0.1538* | *0.0393* | *0.0202* | *0.0447* |
| Ireland | 0.0437 | -0.0007 | 0.1127 | 0.3991 | -0.3771 | -0.1059 | -0.0835 | -0.1444 |
| | *0.0448* | *0.0005* | *0.0412* | *0.0469* | *0.1313* | *0.0351* | *0.0201* | *0.0874* |
| Portugal | 0.0399 | -0.0006 | 0.1523 | 0.3393 | | -0.0863 | -0.0832 | 0.0217 |
| | *0.0315* | *0.0004* | *0.0463* | *0.0253* | | *0.0368* | *0.0253* | *0.0428* |
| Spain | 0.0904 | -0.0011 | 0.1977 | 0.4504 | -0.0727 | -0.0973 | -0.0423 | -0.0195 |
| | *0.0299* | *0.0003* | *0.0348* | *0.0278* | *0.2579* | *0.0297* | *0.0152* | *0.0364* |

Table 4 (ctd.)
Probit estimates by country: marginal effects

| Country | non labor income ($\times 10^{-6}$) | Family benefits ($\times 10^{-6}$) | Disab. Benefits ($\times 10^{-6}$) | Owner | mortg. |
|---|---|---|---|---|---|
| Belgium | -4.39 | -7.25 | 27.2 | 0.1011 | |
| | *0.97* | *7.67* | *15.6* | *0.0515* | |
| Germany | -2.43 | 21.4 | | -0.1657 | 0.1145 |
| | *0.48* | *13.8* | | *0.0378* | *0.0358* |
| Hungary | -10.70 | -153.4 | -255.4 | -0.1969 | 0.9793 |
| | *5.40* | *60.9* | *51.8* | *0.0322* | *0.0054* |
| Italy | -2.52 | 5.63 | -63.6 | -0.0798 | 0.0579 |
| | *0.69* | *27.4* | *35.6* | *0.0274* | *0.0290* |
| Netherlands | -0.63 | 6.87 | -37.3 | -0.0206 | 0.0366 |
| | *0.34* | *29.8* | *9.84* | *0.0868* | *0.0856* |
| U.K. | 0.29 | 14.3 | | | 0.0491 |
| | *0.26* | *11.4* | | | *0.0356* |
| Austria | -1.21 | 14.9 | -64.5 | 0.0170 | -0.0116 |
| | *0.54* | *6.26* | *24.3* | *0.0423* | *0.0379* |
| Denmark | 0.12 | | -22.8 | 0.9983 | -0.2282 |
| | *0.24* | | *7.69* | *0.0007* | *0.0384* |
| Finland | -0.08 | -5.91 | -21.3 | 0.0196 | -0.0135 |
| | *0.25* | *3.13* | *3.59* | *0.0274* | *0.0158* |
| France | -2.75 | -11.0 | -56.2 | 0.0231 | 0.0486 |
| | *0.50* | *3.96* | *14.6* | *0.0344* | *0.0300* |
| Greece | -2.41 | 43.0 | -23.5 | -0.0076 | 0.1056 |
| | *0.78* | *35.4* | *67.7* | *0.0422* | *0.0426* |
| Ireland | -0.24 | -30.4 | -138.2 | 0.0606 | 0.1544 |
| | *0.25* | *32.4* | *52.6* | *0.0785* | *0.0414* |
| Portugal | -2.48 | 89.7 | -181.9 | -0.0150 | 0.0778 |
| | *1.17* | *78.0* | *47.7* | *0.0320* | 0.0343 |
| Spain | -2.08 | 88.4 | -29.7 | -0.0525 | 0.0672 |
| | *0.69* | *15.6* | *14.4* | *0.0372* | *0.0315* |

Table 4 (ctd.)
Probit estimates by country: marginal effects

| Country | Variable name | | | | | |
|---|---|---|---|---|---|---|
| | **Chronic disease** | **Dishampered** | **Bad health** | **#visits to doctor** | **Dissatisf. w. income** | **Diss. w. housing** |
| Belgium | -0.1225 | -0.0290 | -0.1254 | 0.0009 | 0.0155 | -0.1063 |
| | *0.1162* | *0.1141* | *0.1035* | *0.0025* | *0.0355* | *0.0595* |
| Germany | | 0.0136 | -0.0758 | -0.0032 | 0.0366 | |
| | | *0.0283* | *0.0379* | *0.0023* | *0.0304* | |
| Hungary | -0.0064 | | | | -0.0569 | 0.0156 |
| | *0.0320* | | | | *0.0255* | *0.0344* |
| Italy | 0.0193 | -0.0429 | -0.0383 | 0.0031 | -0.0697 | 0.0218 |
| | *0.0881* | *0.0971* | *0.0558* | *0.0015* | *0.0261* | *0.0405* |
| Netherlands | -0.0755 | -0.0396 | -0.3048 | -0.0014 | -0.0539 | 0.1287 |
| | *0.0847* | *0.0889* | *0.0801* | *0.0020* | *0.0742* | *0.0826* |
| U.K. | | | | -0.0024 | -0.0033 | |
| | | | | *0.0013* | *0.0107* | |
| Austria | -0.1863 | 0.1684 | -0.3368 | -0.0001 | 0.0908 | -0.0357 |
| | *0.0948* | *0.0718* | *0.0902* | *0.0020* | *0.0415* | *0.0911* |
| Denmark | -0.0128 | 0.0161 | -0.0713 | -0.0009 | -0.0218 | 0.0257 |
| | *0.0233* | *0.0174* | *0.0749* | *0.0009* | *0.0555* | *0.0096* |
| Finland | -0.0318 | 0.0156 | -0.0400 | 0.0003 | -0.0217 | 0.0102 |
| | *0.0232* | *0.0206* | *0.0420* | *0.0015* | *0.0209* | *0.0298* |
| France | 0.0067 | | -0.1495 | | -0.0408 | 0.0783 |
| | *0.0354* | | *0.0594* | | *0.0290* | *0.0542* |
| Greece | -0.0038 | 0.0056 | -0.2832 | -0.0031 | 0.0265 | 0.0690 |
| | *0.1216* | *0.1314* | *0.0906* | *0.0033* | *0.0348* | *0.0566* |
| Ireland | -0.0691 | -0.0874 | -0.1595 | -0.0064 | -0.0198 | 0.1280 |
| | *0.0828* | *0.0949* | *0.1452* | *0.0033* | *0.0469* | *0.0769* |
| Portugal | -0.0628 | -0.0126 | -0.0197 | -0.0038 | 0.0618 | 0.0001 |
| | *0.1075* | *0.1076* | *0.0474* | *0.0026* | *0.0306* | 0.0525 |
| Spain | 0.0540 | -0.0632 | -0.0659 | -0.0015 | 0.0778 | -0.0261 |
| | *0.0516* | *0.0654* | *0.0588* | *0.0018* | *0.0288* | *0.0453* |

Table 4 (ctd.)
Probit estimates by country: marginal effects

| **Country** | #Obs. | **log-L** | **Pseudo-$R^2$** |
|---|---|---|---|
| Belgium | 832 | -386.8 | 0.1846 |
| Germany | 1551 | -845.6 | 0.1120 |
| Hungary | 453 | -124.6 | 0.3609 |
| Italy | 2411 | -1476.0 | 0.1158 |
| Netherlands | 1143 | -662.7 | 0.1014 |
| U.K. | 481 | -48.6 | 0.3068 |
| Austria | 1013 | -577.3 | 0.0981 |
| Denmark | 537 | -91.0 | 0.4673 |
| Finland | 1234 | -282.0 | 0.2299 |
| France | 1965 | -1084.8 | 0.1094 |
| Greece | 1190 | -751.7 | 0.0873 |
| Ireland | 859 | -495.8 | 0.1646 |
| Portugal | 1368 | -810.2 | 0.0933 |
| Spain | 1721 | -1062.3 | 0.1075 |

Table 5
Labor supply equation

| Country | Variable name | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Ln(W)** | **Edu2** | **Edu3** | **Kl6** | **K618** | **elder** | **Non Labor income ($\times 10^{-5}$)** | **Disab. Benefits ($\times 10^{-5}$)** |
| All | 9.3764 | -2.0983 | -4.1027 | -1.6430 | -0.1177 | 3.4149 | -4.46 | -52.14 |
| | *0.3064* | *0.4223* | *0.5318* | *0.3729* | *0.1576* | *0.7521* | *0.93* | *23.27* |
| Belgium | -2.9412 | | | | | | | |
| | *0.7837* | | | | | | | |
| Hungary | -4.2080 | | | | | | -66.81 | |
| | *0.9858* | | | | | | *37.08* | |
| Italy | -4.1946 | | | | | | 0.85 | |
| | *0.5434* | | | | | | *2.74* | |
| Netherlands | -1.5918 | | | | | | 3.54 | |
| | *0.6164* | | | | | | *1.58* | |
| U.K. | -2.5606 | | | | | | | |
| | *0.6114* | | | | | | | |
| Austria | -6.2983 | | | | | | -0.04 | |
| | *0.7117* | | | | | | *2.43* | |
| Denmark | | | | | | | 1.86 | |
| | | | | | | | *2.61* | |
| Finland | -2.5262 | | | 2.1098 | | | | |
| | *0.5060* | | | *0.8603* | | | | |
| France | | | | | | | | |
| Greece | -2.0988 | | | | | | 3.83 | |
| | *0.8503* | | | | | | *3.26* | |
| Ireland | -1.5334 | | | 0.9028 | | | 3.91 | |
| | *0.7369* | | | *1.0883* | | | *1.48* | |
| Portugal | -6.5429 | | | 1.5662 | | | | |
| | *0.5702* | | | *1.2190* | | | | |
| Spain | -2.1934 | | | 1.7298 | | | 3.69 | |
| | *0.6232* | | | *1.1289* | | | *2.99* | |

Table 5 (ctd.)
Labor supply equation

| Country | Variable name | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Owner** | **Mortg.** | **Chronic disease** | **Dishamp-ered** | **Bad health** | **#visits to doctor** | **Diss. w/ income** |
| All | 0.5711 | -0.7190 | -0.7054 | 0.8172 | -1.8281 | -0.1143 | -0.7081 |
| | *0.4408* | *0.4072* | *0.6316* | *0.6581* | *0.7105* | *0.0283* | *0.4019* |
| # obs. | 18819 | | | | | | |
| # Uncensored obs. | 10290 | | | | | | |
| Selectivity term | -2.0761 | | | | | | |
| | *0.7976* | | | | | | |