Unemployment Duration of Spouses: Evidence From France

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Abstract

This paper analyzes the conditional probability of leaving unemployment of French married individuals from 1991 to 2002. We find that the effect of spousal labor income on unemployment duration is asymmetric for men and women. In particular, the probability of men to find a job is increasing in wife labor income, while it is decreasing in husband's earnings for women. To adjust for endogenous selection into marriage, we use the quarter of birth as an instrumental variable for the spousal wage. Finally, we show that introducing a breadwinner *stigma* in a joint job search model generates the positive correlation observed for men in the data.

Keywords: unemployment duration, hazard models, labor income, marriage, joint search theory

JEL Classification: J12, J64, J65

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1 Introduction

An important factor affecting unemployment duration is the time elapsed in searching for an offer. The determinants of the search time are several, and mostly include the labor market conditions and the socio-economic characteristics of the searcher, who is usually assumed to be acting individually. But in a society where more than 60 percent of the agents are married or live in couples, it is important to consider how the individual's decisions depend on the characteristics of the partner. We know that the possibility of sharing economic and social resources is an important reason that leads to marriage, or any other form of partnership.[1] In particular, marriage is seen as a sort of small insurance pool against life's uncertainties, reducing the spouses' need to protect themselves from unexpected events. Hence, during a period of unemployment, we expect that the effort exerted to find a job by a married individual depends on individual and local characteristics, but also on the spousal income.

We find a significant elasticity of unemployment duration to spousal earnings, and the effect is shown to be asymmetric for men and women. In particular, the elasticities of 1.27 for men and -0.24 for women are found to be significant for the entire sample. In other words, a 10 percent increase in a worker's wage is associated with a 12.7 percent *increase* in the husband's hazard rate of leaving unemployment, and with a 2.4 percent *decrease* in the wife's hazard rate. The coefficients on the other characteristics (demographics and labor market conditions) have the expected signs for both spouses. Most notably, we find that being a recipient of unemployment benefits decreases the hazard rate of exiting unemployment. The econometric analysis is carried out using data from the French Labor Force Survey from 1991 to 2002.

Endogeneity bias is surely a concern in this study because it is reasonable to believe that spouses do not select themselves randomly, and couple formation may be subject to assortative mating. At the same time, the asymmetric results that we find for men and women cannot be easily viewed as the consequences of positive or negative assortative mating. In both cases, we would expect

[1] An example is provided by Waite [1995].

symmetric reactions of husbands and wives unemployment duration to their spousal labor income. To support this reasoning, we show that our results persist when we add an instrumental-variables-type technique to adjust for endogenous selection into marriage on unobservables. We instrument for the spousal wage using her (or his) quarter of birth, following the analysis of Grenet [2010]. He shows that French men born at the end of the year incur a small but significant penalty in terms of labor market outcomes, in the form of lower wages and higher unemployment rates.

The contribution of our paper is twofold. First, it provides an empirical investigation of the relevance of the spousal characteristics on the probability of finding a job. Second, it proposes a stylized model which builds on the existing theory of job search to ground the empirical findings.

The paper adds to the rich empirical literature on individual job search by incorporating the characteristics of the partner. One can find numerous empirical studies on the effect of wealth, unemployment benefits, and other characteristics on unemployment duration. An example is the seminal paper of Meyer [1990] which studies the individual behavior during the weeks just prior to the end of the unemployment insurance, and shows the negative effect of unemployment benefits on the probability of leaving unemployment. Danforth [1979] and Bloemen and Stancanelli [2001] find that high levels of wealth result in higher reservation wages, and thus lower probability of leaving unemployment. Related works from Lentz and Tranas [2005] and Lentz [2009] estimate empirically the optimal savings and job search behavior of a risk averse worker as she moves back and forth between employment and unemployment. A general study on the determinants of individual unemployment durations in Britain is provided by Arulampalam and Stewart [1995]. All these papers show the importance of wealth and unemployment benefits in determining the hazard rate of leaving the unemployment state. But none of them includes the spousal income which plays an important role in the intra-household risk sharing, and consequently in eliminating part of the uncertainty faced by the couple.

From a theoretical point of view, the literature on joint search is still preliminary. Burdett [1978] has been the first contributor to the topic, laying out a two-person search model and some characterization of its solution. Only recently, Garcia-Perez and Rendon [2004] have numerically

simulated a household search model in which consumption and job search decisions are made jointly. Dey and Flinn [2008] extend the standard partial equilibrium labor market search model to a multiple searcher setting with the inclusion of multi-attribute job offers, where some of the attributes are treated as public goods within the household. Gemici [2011] estimates a rich structural model to assess the implications of joint location constraints on the migration patterns, labor market outcomes, and marital stability of men and women. Finally, a mostly theoretical work by Guler et al. [2012] analyzes a joint search and location problem of a household formed by a couple who pools income. They characterize the reservation wage behavior of the couple and compare it to the single-agent problem.

We build on Guler et al. [2012] to explain the asymmetric response in spousal income. We show that, in an environment where both spouses are risk neutral and perfectly pool their income, the presence of a *stigma* or breadwinner cost bear by the husband may generate a positive correlation between his reservation wage and the labor income of his wife. A justification for this social cost can be found in the sociological literature (Sayer et al. [2011]) where it has been documented that while social pressure discouraging women from working outside home has weakened, pressure on husbands to be breadwinners largely remains.

We also use the model to draw some conclusions on the effect of unemployment insurance. It shows that the reservation wages of both spouses depend positively on their own unemployment benefits, but the size of their changes may be different. This suggests the implementation of a gender-based unemployment policy. A policy directed to reduce the unemployment duration should establish an unemployment insurance scheme more generous for men than for women, as the elasticity is lower for the former.

The paper is organized as follows. The description of the data is in section 2. Next, section 3 contains the empirical analysis. In particular, in section 3.1, we specify the econometric model. The results are presented in section 3.2. The endogeneity issue is discussed in section 3.3, and the instrumental variable model is in section 3.4. The theoretical joint search model is described in section 4. Section 5 concludes. Figures, Tables, and Proofs are relegated to the Appendix.

2 Data and Descriptive Statistics

The data used are from the *Enquête Emploi*, the French Labor Force Survey. Conducted by the INSEE (National Institute of Statistics and Economics) since 1950, the Labor Force Survey is a longitudinal panel survey that measures unemployment in the sense of the ILO (International Labor Organization). In March of every year until 2002, members of around 65,000 French households are interviewed. One third of the household sample is renewed each year, so that a given individual is interviewed in three consecutive years. We use the data of those who entered the survey in 1991, 1994, 1997, and 2000.

The survey provides information on the professions, on the activity of women and young people, working hours and casual employment. Moreover, extensive information is collected on the labor market behavior of individual respondents in the year preceding the moment of the interview. The respondents are asked to report the main labor market state they were in, for each month in that year, including the month of the interview.[2] Some measurement errors may arise as a respondent who has worked less than 50% of the time in a month may declare to be unemployed for the entire month. Also, a respondent may declare to be unemployed even if he is not registered as such at the public employment agency (*Agence nationale pour l'emploi*). By comparing individual labor market states of consecutive months in the periods from March 1990 to March 2002, individual unemployment durations can be constructed as a number of calendar months.

The initial and final number of individuals for the survey years used in the analysis are in Table 1. We select men and women older than 14 and younger than 60 years old, who are married or cohabiting, and who reported inflow into unemployment at least once during the observation period. We create an inflow sample of unemployment durations for spouses (husbands and wives) with available information on spousal labor earnings and other labor market and demographic characteristics.[3] We

[2]Respondents are asked to choose one among the following states: (1) employed for an unlimited period; (2) on his own or helping a family member in her activity; (3) fixed-term contracts, temporary job, training, seasonal work; (4) Vocational Training, or another paid internship; (5) unemployed; (6) student, or unpaid internship; (7) military; (8) retired, early retirement, out of business, housewife, other.

[3]To organize the data set for the empirical analysis, we follow the procedure described by Cleves [1999].

only include spells starting within the mentioned period to avoid problems related to left censored observations.[4] The resulting unbalanced panel of four waves consists of 1,945 husbands and 6,807 wives. The number of transitions from unemployment to employment is 1,981 for the former, and 4,859 for the latter.[5] These data are collected in Table 2.

From the last interview in March 1993, 1996, 1999, and 2002, we select a set of demographic characteristics that are assumed to be time-constant over the three years in which the individuals are followed. The labor earnings of the spouses are computed as the median of the deflated hourly wages earned over the years in which the data are available. Following Laroque and Salanié [2002], we exclude from the samples the observations with an hourly wage lower than two-third of the minimum wage of the respective year.[6] The hourly labor earnings of the spouses are computed from the monthly salary that includes non-monthly premiums, and divided by the usual hours worked in a month. Tables 4 and 5 describe our sample.

The set of characteristics contains the age; the level of education; several indicator variables for being legally married; having children younger than 18 years old; living in a certain region of France; having the French nationality; and being a real estate owner. At the time of the last interview, husbands are on average 44 years old, and the majority of them (about 68 percent) have (at least) a high school diploma. Eighty percent of them are legally married, geographically located in the north of France, and owners of the house where they have been interviewed. Wives have similar characteristics: they are about 40 years old; have the French nationality, mostly legally married, and 65 percent of them are (at least) high school educated. The majority of them live in the north of France, and are owners of their house.

To control for the labor market situation before the last unemployment spell, we include several

[4] At each interview, the respondents describe their labor market history of the past 12 months. Consider the following case. Two answers are available on the labor market state of March 1991 as the same question is asked retrospectively in the survey of 1992. Most of the studies that use the French Labor Force Survey data discuss the the existence of recall errors. See Lollivier [1994], Magnac [1994], and van den Berg and van der Klaauw [2001] for an extensive discussion. We assume that if two answers on the labor market state in March differ, then the most recent one is correct.

[5] The empirical implications of the substantial higher number of unemployment spells for women than men are discussed in section 3.2, and in Appendix C.

[6] See Table 3 for details on the minimum legal hourly wage (SMIC).

variables, such as: the labor market status (employment or inactivity), the occupation, and the employment status (self-, government or other employed). Men are equally likely to come from a permanent or temporary employment condition than from a non participation status. On the contrary, women are more likely to enter unemployment from a state of inactivity. Both men and women have been previously employed in low skilled occupations, and only a small percentage (17-18 percent) have been self- or government employed.

The set of control variables also includes (the logarithm of) the amount of unemployment benefits received during the spell. About 30 percent of the unemployed husbands and wives have declared to be registered at National Employment Agency (*Agence National Pour l'Emploi (ANPE)*).[7] The regional unemployment rate is included as the average of the regional unemployment rate over the three years.

Nonparametric Kaplan-Meier estimates of the survival functions for men and women in couples are plotted in Figure 1. In all cases, there is evidence of negative duration dependence. That is, the longer an individual remains in the initial state, the smaller the hazard of exiting from the state becomes. The hazards are highest towards the beginning of a spell and mostly decline monotonically thereafter. It is also true for both men and women. As expected, the probability of surviving in the risk pool (i.e. to remain unemployed) is higher for women than for men.

3 Duration Analysis

3.1 Baseline Estimation and Unobserved Heterogeneity

We estimate a duration model that incorporates the available information about a worker's jobless spell. Our goal is to provide an insight into the nature of duration dependence in transitions out (or into) employment, together with an appreciation of the extent to which these transitions are

[7]The ANPE was the French government agency which provided counseling and aid to those who are in search of a job or of training. In 2008, a new public agency was created, resulting from the merging of the ANPE with the *Undic* administration.

influenced by observed characteristics, controlling also for unobserved heterogeneity.

The information available to us on durations is highly discrete: we only know the monthly employment status. This makes continuous time duration models inappropriate. For this reason, we estimate a standard discrete time proportional hazard model.[8] The estimation approach used here is based on Meyer [1990]. The shape of the hazard is semi-parametrically estimated. The method entails several advantages. First, the probabilities of surviving each period are constrained to lie between 0 and 1; second, it helps avoiding inconsistent estimation of covariate coefficients due to misspecified baseline hazard; and third, it is relatively easy to extend the model to test for unobserved heterogeneity.

Let T_i be the length of individual i's unemployment spell. Then, the hazard rate for individual i at time t, $\lambda_i(t)$, is defined by the equation

$$\lim_{h \to 0^+} \frac{Pr[t + h > T_i \geq t | T_i \geq t]}{h} = \lambda_i(t). \tag{1}$$

The hazard is parameterized using the proportional hazard form,

$$\lambda_i(t) = \lambda_0(t) \exp[X_i' \beta], \tag{2}$$

where $\lambda_0(t)$ is the unknown baseline hazard at time t; X_i is a vector of explanatory variables for individual i, and β is a vector of parameters to be estimated. The probability that a spell lasts until time $t+1$ given that it has lasted until t is written as a function of the hazard:

$$\begin{aligned} Pr[T_i \geq t+1 | T_i \geq t] &= \exp\left[- \int_t^{t+1} \lambda_i(u) du \right] = \exp\left[- \exp(X_i'\beta) \cdot \int_t^{t+1} \lambda_0(u) du \right] \\ &= \exp\left[- \exp(X_i'\beta + \gamma(t)) \right] \end{aligned} \tag{3}$$

[8] More precisely, this is defined as a grouped specification in the literature.

where

$$\gamma(t) = \log\left\{\int_t^{t+1} \lambda_0(u)du\right\}. \tag{4}$$

The log-likelihood for a sample of N individuals can be written as a function of (3):

$$L(\gamma,\beta) = \sum_{i=1}^{N}\left[\delta_i \log\left[1-\exp\left\{-\exp\left[X_i'\beta+\gamma(k_i)\right]\right\}\right] - \sum_{t=1}^{k_i-1}\exp\left[X_i'\beta+\gamma(t)\right]\right], \tag{5}$$

where $\gamma = [\gamma(0)\gamma(1)\cdots\gamma(T-1)]'$. Define C_i to be the censoring time. Hence, $\delta_i = 1$ if $T_i \leq C_i$ and 0 otherwise; $k_i = \min(int(T_i), C_i)$. The first term is non-zero (i.e. $\delta_i = 1$) when a spell ends between k_i and $k_i + 1$. The second term represents the probability that a spell lasts at least until k_i. As explained by Meyer [1990], we make no assumptions about the baseline hazard. For a non-parametric baseline, we create duration-interval-specific dummy variables, one for each spell month at risk of failure, defining the failure event as exiting the unemployment state. The estimation is implemented with a discrete complementary log-log (cloglog) proportional hazard model.[9]

To account for unobserved heterogeneity between individuals, we incorporate a random variable θ_i with unit mean and a certain probability distribution function $\mu(\theta_i)$. Moreover, θ_i is assumed to be independent of X_i. Then, the instantaneous hazard rate becomes

$$\lambda_i(t) = \theta_i\lambda_0(t)\exp[X_i'\beta]. \tag{6}$$

The log-likelihood for the augmented model is the following:

$$L(\gamma,\beta,\mu) = \sum_{i=1}^{N}\left[\int \exp\left[-\theta\sum_{t=0}^{k_i-1}\exp\left\{X_i'\beta+\gamma(t)\right\}\right]d\mu(\theta) - \delta_i\int \exp\left[-\theta\sum_{t=0}^{k_i}\exp\left\{X_i'\beta+\gamma(t)\right\}\right]d\mu(\theta)\right]. \tag{7}$$

In this study, the existence of unobserved heterogeneity (frailty) is tested by estimating a cloglog model which incorporates a normally distributed random effects term with mean zero to summarize unobserved frailty connected to each spell. The random effects term describes unexplained heterogeneity, or the influence of unobserved risk factors in the model. The assumption of a normal

[9]We also provide the results of a probit estimation, where the hazard has been adequately changed.

distribution is usually the most convenient in the case of discrete duration models for computational reasons.

The results are reported in Tables 6 and 7. Each Table reports the estimated coefficients of five models: (1) and (2) refers to a discrete complementary log-log proportional hazard model; (3) reports the results of a probit model. The results in column (4) are discussed in the section 3.3. In Table 6, we show the results of models (1) to (3) from the merged sample of men and women.

3.2 Discussion

In this section we discuss the results of our estimations. Tables 6 and 7 report the values of β that maximize equations (5) and (7). Note that a positive coefficient indicates a positive effect on the hazard rate, so that the unemployment duration is expected to be decreasing in the relevant independent variable.[10] More precisely, the estimated coefficient on the logarithm of the spousal labor income should be interpreted as the elasticity of the hazard rate with respect to her/his wage. We estimate the models on three different samples: men, women, and the pooled sample. In this latter case, the coefficient of the spousal wage for women is found as the difference between the coefficient on the spousal wage for men and the interaction term between the spousal wage and the indicator variable for the gender. The difference is tested to be significantly different than zero, using a standard Student's t-test. The result is reported at the bottom of Table 6. For men, a 10 percent increase in the wife hourly earnings is associated with a 0.8 percent increase in the hazard in specification (1), up to 14.9 percent in specification (2). For women, a 10 percent increase in husband hourly earnings corresponds to a 1 percent decrease in the hazard, up to 2.4 percent from specification (3). These results imply that while the unemployment duration of men is expected to be decreasing in their wife labor earnings, the unemployment duration of women is expected to increase in their husbands' wage.

Figure 2 shows the estimated hazard rate, or probability to exit unemployment, as a function

[10]The hazard rate can be found by taking the exponential of the coefficient of interest.

of spousal income, resulting from specification (1). Panel (a) shows that the probability of leaving unemployment for men is constantly higher when their wives' wages are in the highest percentile. The opposite is true for women, as shown in panel (b). Tables 8 and 9 report the complete estimates.

The signs of the coefficients on the remaining independent variables are in line with those found in the literature. Let us focus on the results of Table 7, the most complete specification (2), where we control for unobserved heterogeneity.[11] The coefficients on the unemployment benefit have the expected signs and are significantly different than zero. Hence, being an UI recipient is found to have a negative effect on the probability of leaving unemployment, as established by Meyer [1990]. The hazard rate also falls with age. The coefficient on the marital status (marriage vs cohabitation) is negative indicating that marriage is expected to increase unemployment duration, but it is not significant. The coefficients on the education level, when significant, are positive. This implies that a having schooling degree increases the probability of exiting unemployment.[12]

The significant hazard rates of unemployed spouses with children differ for fathers and mothers. While the hazard of leaving unemployment of men is increasing in the number of children, it is decreasing for women. In particular, the coefficient is significantly negative for mothers of three or more children. Hence, children provide incentives to fathers to accelerate their return to activity, but their presence is quite costly for unemployed mothers. The coefficients on the occupation before entering unemployment shows that the unemployment duration is expected to increase for high skilled professions, with respect to skilled worker. It takes longer to exit unemployment the higher is the qualification level of the profession in which they were employed before the last unemployment spell. Moreover, being self-employed before the last unemployment spell decreases the expected unemployment duration with respect to other forms of employment. The coefficient on the inflow from employment into unemployment is significantly positive. Note that, the inflow from employment alone could be capturing the effect of being unemployed after employment and not being registered to the ANPE. The reason is that we are simultaneously controlling for employment status before

[11] Similar conclusions can be drawn from the results of specification (3).

[12] The reference group is composed by agents with no diploma.

unemployment and registration to the ANPE. The coefficient on the regional unemployment rate is significant and has a positive sign. This means that a rise in the unemployment rate for a given region is associated with a shortening of unemployment spells in that region. An explanation for this result is that layoffs are counter cyclical: in recessions the fraction of unemployment due to layoffs rises, and layoff spells tend to be shorter.

3.3 Endogeneity

Endogeneity bias is a concern in this study because it is reasonable to believe that spouses do not select themselves randomly. In other words, couple formation may be subject to assortative mating. At the same time, the asymmetric results that we find for men and women cannot be easily viewed as the consequences of positive or negative assortative mating. In both cases, we would expect symmetric reactions of husbands and wives. To be more clear, let us consider few examples that lead to negative or positive correlation between the labor market conditions of the two spouses.

We may observe a negative correlation when men who have high labor market productivity marry women who work fewer labor market hours. The lower (or zero) labor market hours of these women may suggest a high reservation wage relative to their potential market wage. This may, in turn, reflect a high valuation of leisure, a high shadow wage in home production, or a low potential market wage.

A negative correlation between wife's work hours and husband's wage might also reflect income effects. Marriage to high earning husband makes it possible for wife to work fewer hours, while marriage to a low earning husband causes the wife to work more hours. In addition, marriage to a high earning wife makes it possible for the husband to work fewer hours, in which case his lower wage may then reflect the lower productivity of part-time work, or to take a more pleasant, lower-paying job.

But, assortative mating could also push the correlation in the opposite direction. Men who have a high labor market productivity may marry women who also have high labor market productivity.

This type of marital matching would actually lead to a positive relationship between wife's work hours and husband's wages. Marriage to a high earning wife makes the husband able to search longer and achieve a better job match if the wife is working and providing income during his job search. We would expect a similar behavior from the wife, and hence a positive correlation between the number of hours that she works and her husband's wage.

From all of these examples, we can see that assortative mating does not automatically predict an asymmetric behavior of husbands and wives, but rather a similar response to each other spousal income, either positive or negative. In our view, regardless of the type of assortative mating into marriage, the source of the asymmetry has to be searched in a particular characteristics of a spouse's utility function that leads him (her) to react differently than his spouse (as in the model we propose), or in a gender specificity of the labor market (as in the model of Guler et al. [2012]).

In the next section, we present an instrumental variable specification to corroborate a causal effect interpretation of the main results. In particular, we instrument for hourly wage of the spouse using a set of dummies for her (his) quarter of birth.

3.4 Estimation With Endogeneity

To empirically address the endogeneity issue, we consider a set of instrumental variables that affect the spousal hourly earnings but are not correlated with her (his) spouse variation in the possibility to exit unemployment. We use the quarter of birth of the spouse, which through the institutional features of educational systems can have effects propagating to labor market outcomes. To motivate our choice, we refer to recent work by Grenet [2010], where he shows that French men born at the end of the year incur a small but significant penalty in terms of labor market outcomes, in the form of lower wages and higher unemployment rates. The French educational system provides a particularly valuable empirical setting to analyze date of birth effects, since it combines both the extensive use of grade retention and the practice of early secondary school tracking, two features that are likely to affect pupils differently depending on their date of birth.

From a methodological point of view, as Kuhn and Skuterud [2002] stress out, there is no widely-used technique for estimating a duration model with an endogenous variable. Following Kiefer [1988], we write the integrated baseline hazard as follows:

$$\gamma(t) = -(X_i'\beta + y_i'\alpha) + \nu_i \tag{8}$$

where y_i (previously included in X_i) is the logarithm of the hourly earnings of agent's i spouse, with coefficient α. Moreover, y_i is defined as follows:

$$y_i = Z_i'\lambda + v_i \tag{9}$$

where Z_i is a vector of exogenous, non-time varying covariates X_i, plus an instrumental variable excluded from X_i. The error term (ν_i, v_i) follows a bivariate normal distribution, which implies that also the conditional distribution of ν given v is normal as follows:

$$\nu|v, Z \sim N(\rho v, 1 - \rho^2) \tag{10}$$

With the exception of the interval nature of our duration measure, our approach follows a standard instrumental variable probit estimation method.

The results are reported in columns (4) of Table 7. They confirm a significant positive elasticity of 1.71 of unemployment duration of married men to their wife's hourly earnings, and a negative elasticity of -0.49 of unemployment duration of married women to their husband's hourly earnings. Moreover, the size of the coefficients in columns (4) diverges away from those of the potentially biased estimation in columns (3). The asymmetry between men's and women's coefficients being wider under the IV strategy suggests that if there is an endogeneity bias, it works towards making the asymmetry smaller rather than bigger. We can conclude that our findings are not due to some kind of selection.

4 Model

In this section, we propose a simple theoretical mechanism that replicates the empirical findings. The asymmetry is generated by assuming that the utility of husbands depends negatively on the difference between the spouses' wages. We call this gap a *stigma*, or breadwinner cost.

A rationale for this *stigma* can be found in the sociological literature where it has been documented that while social pressure discouraging women from working outside home has weakened, pressure on husbands to be breadwinners largely remains. Recent work by Sayer et al. [2011] claims that men's nonemployment is a serious violation of the gendered norm of male breadwinning, and that gender change has been so asymmetric that even if women's employment has grown, the norm mandating men's employment is still fully in force.[13]

An alternative source of asymmetry is described by Guler et al. [2012]. They provide a numerical example of a joint search framework with multiple locations that replicates the gender asymmetry, under the assumption that married women have a higher exogenous separation rate than men. The parameters are calibrated to U.S. data. They show that, when the unemployed wife receives an offer from the outside location, she turns it down or she accepts it and the couple lives apart, for almost all husband's wages. Instead, when the unemployed husband receives an outside offer, there is a wide range of wife's wage where she chooses to quit her job and moves to a new location with her husband. This asymmetry is induced by the larger separation rate for the wife. In fact, it is rarely the optimal choice for the husband to quit a high wage job to follow his wife on a precarious job in a different location. Our model builds on the theoretical framework of Guler et al. [2012]. However, we focus on the breadwinner cost, because of the existing evidence of low geographical mobility in Europe provided by David et al. [2010].

We consider an economy populated by married couples who participate in the labor force. Agents are either employed or unemployed. Time is continuous and there is no aggregate uncertainty. An unemployed worker is entitled to an instantaneous benefit b, and receives wage offers w at rate α

[13] See also http://www.sciencedaily.com/releases/2011/06/110620183244.htm.

from an exogenous wage offer distribution $G(w)$ with support $[0,1)$. There is no recall of past wage offers. The worker observes the wage offer w and decides whether to accept it or reject it. If she (he) rejects the offer, she (he) continues to be unemployed and to receive job offers. If she (he) accepts the offer, she (he) becomes employed at wage w.

A couple is defined as an economic unit composed of two individuals, a female f and a male m, who may have different preferences. The two individuals *perfectly pool* income to purchase a market good which is jointly consumed by the couple. We assume that individuals have not access to risk-free saving, and are not allowed to borrow. Couples make their job search decisions in order to maximize their common welfare. A couple can be in three labor market states. First, both spouses are unemployed and searching (dual-searcher couple). Second, both spouses are employed (dual-worker couple). Given our assumption of absence of job destruction, this is an absorbing state. Finally, one spouse is employed and the other is unemployed (worker-searcher couple).

4.1 Value Functions

Denote by U the value function of a dual-searcher couple; $\Omega^i(w_j)$ the value function of a worker-searcher couple, for $i,j=f,m$, when the worker's wage is w_j; and $T(w_f,w_m)$ the value function of a dual worker couple earning wages w_f and w_m. Let r be the subjective rate of time preference, and $u(\cdot)$ the instantaneous utility function. We assume that workers randomly meet employers and then change state from unemployed to employed. This event is modeled using a Poisson process: as time ϵ goes to zero, the couple receives at most one offer. The flow value in the three states becomes:

$$rT(w_f,w_m) = u(w_f+w_m); \tag{11}$$

$$\begin{aligned} rU &= u(b_f+b_m)+\alpha_f\int_0^{\overline{w}_f}\max\{\Omega^m(w_f)-U,0\}\,dG(w_f) \\ &\quad +\alpha_m\int_0^{\overline{w}_m}\max\left\{\Omega^f(w_m)-U,0\right\}dG(w_m); \end{aligned} \tag{12}$$

$$\begin{aligned} r\Omega^f(w_m) &= u(b_f+w_m) \\ &\quad +\alpha_f\int_0^{\overline{w}_f}\max\left\{T(w_f,w_m)-\Omega^f(w_m),\Omega^m(w_f)-\Omega^f(w_m),0\right\}dG(w_f); \end{aligned} \tag{13}$$

$$
\begin{aligned}
r\Omega^{m}\left(w_{f}\right) &= u\left(w_{f}+b_{m}\right)-s\left(w_{f}-b_{m}\right) \\
&\quad +\alpha_{m}\int_{0}^{\overline{w}_{m}}\max\left\{T\left(w_{f},w_{m}\right)-\Omega^{m}\left(w_{f}\right),\Omega^{f}\left(w_{m}\right)-\Omega^{m}\left(w_{f}\right),0\right\}dG\left(w_{m}\right),
\end{aligned}
\tag{14}
$$

where $s(\cdot)$ is an increasing and convex function of the gap between the wife's wage w_f and the husband's unemployment benefit. This function can be interpreted as a *stigma* or breadwinner cost that the husband faces when unemployed and having a working wife.

When both spouses are employed, their flow value is equal to the total instantaneous earnings of the household (equation (11)). When they are both unemployed, their flow value is equal to the total utility of consumption (which equals the total amount of unemployment benefits) plus the expected gain in case a wage offer is received (equation (12)).[14]

The value functions of a worker-searcher couple require a bit more of an explanation as they are less standard. Let us analyze equation (13) where the husband is working and the wife is searching for a job. Upon receiving a wage offer, the couple faces three choices. First, the unemployed spouse can accept the job offer and both spouses become employed, which increases the value by $T(w_f, w_m) - \Omega^f(w_m)$. In this joint search model, the reservation wage of each spouse may depend on the income of the other spouse. When there is a transition in the job status, the reservation wage of the previously employed spouse may also change, which could lead to exercising the quit option. Hence, the second term in the max operator represents the gain in the case where the unemployed spouse accepts the wage offer w_f and the employed spouse simultaneously quits his job and search for another one. Third, the unemployed worker can reject the offer, in which case there is no change in value. A symmetric reasoning can be conducted for equation (14), where the husband is unemployed.

[14] Since time is continuous, the probability of both spouses receiving offers simultaneously is negligible and hence ignored.

4.2 Characterizing the Couple's Decisions

Consider the problem of a worker-searcher couple where the spouse j is unemployed. Let us assume that it is not optimal to exercise the quit option upon acceptance, i.e. $\Omega^i(w_j) < T(w_i, w_j)$, for $i, j = f, m$. In this case, a job offer w_j will be accepted when $T(w_i, w_j) \geq \Omega^j(w_i)$. The associated reservation wage function $\phi^j(w_i)$ solves

$$T\left(w_i, \phi^j(w_i)\right) = \Omega^j(w_i). \tag{15}$$

Now, suppose that it is optimal to quit upon acceptance, $\Omega^i(w_j) \geq T(w_i, w_j)$. Then, the job offer will be accepted when $\Omega^i(w_j) \geq \Omega^j(w_i)$. A similar reasoning is valid if the spouse i is unemployed.

Proposition 1. *With risk-neutral preferences, i.e.* $u''(\cdot) = 0$*, the reservation wage function of the worker-searcher couple is independent of the husband's wage when the unemployed spouse is the wife, and it is decreasing in the wife's wage when the unemployed spouse is the husband. Moreover, it is never optimal to exercise the quit option.*

Proof. See the Appendix. □

By conjecturing that the quit option is never exercised and using the value functions described above, the problem of the wife boils down to a standard single search model, where the reservation wage function depends on the utility from leisure and not on the husband earnings. Hence, she does not exercise the quit option, confirming the conjecture.

When the unemployed spouse is the husband, the presence of the breadwinner cost in his utility function generates a negative relationship between his reservation wage and the wage of his wife. This implies that he will never exercise the quit option, as the acceptance of a wage offer by his wife decreases his reservation wage.

Unemployment Insurance. Using a similar strategy, we can also show that the reservation wage of the unemployed worker depends positively on his (her) own unemployment benefit. But the elasticity to changes in unemployment benefits is of different size for men and women. With

risk-neutral preferences, the derivative of the men's reservation wage function (19) with respect to unemployment benefits is

$$\frac{\partial \phi^m(w_f)}{\partial b_m} = \frac{1+\partial s/\partial b_m}{1+\frac{\alpha_m}{r}\left[1-G\left(\phi^m\right)\right]} = \frac{1+\partial s/\partial b_m}{1+H_m} > 0, \tag{16}$$

where H_m is the hazard rate of men. For women, the derivative of (18) is equal to

$$\frac{\partial \phi^f(w_m)}{\partial b_f} = \frac{1}{1+\frac{\alpha_f}{r}\left[1-G\left(\phi^f\right)\right]} = \frac{1}{1+H_f} > 0, \tag{17}$$

where H_f is the hazard rate of women. The comparison between (16) and (17) shows that the size of the increase in the reservation wages depends on the breadwinner cost and on the arrival rate of jobs.[15] If $(1+H_m)/(1+H_f) > [1+\partial s/\partial b_m]$, the elasticity of the husband's reservation wage to unemployment benefits is lower than the elasticity of his wife's reservation wage.

The comparative static exercise shows a reaction to changes in unemployment insurance that is symmetric (i.e. positive for both spouses) but different in size. This suggests the implementation of a gender-based unemployment policy.[16] A policy directed to reduce the aggregate unemployment duration should be less generous with women than men, as the elasticity is higher for the former. A planner that aims to exploit the difference in elasticities should implement an unemployment insurance scheme that transfers unemployment benefits from women to men. Each transferred euro generates an increase in the search intensity of women that overcomes the decrease in men's search effort.

Note that these theoretical results are supported by the empirical findings. In fact, in all of the estimations, we obtain that being a recipient of unemployment insurance decreases the hazard rate of women more than the hazard rate of men. For example, in specification (2) of Table 7, a 10 percent increase in unemployment benefits decreases by 1.5 percent the hazard rate of men, and by 3 percent the hazard rate of women.

[15] Here we assume that the job offer distribution is the same across gender.

[16] The denomination is borrowed from Alesina et al. [2011] in their description of the gender-based taxation system.

5 Conclusions

In this paper, we document the existing asymmetry in the probability of leaving unemployment between French married men and women. We show that the results are robust when controlling for unobserved heterogeneity and endogeneity of the explanatory variables.

Most of the literature on household economics studies the intra-household behavior of husbands and wives, and the different incentives schemes that lead them to participate or not in the labor market. A vast literature is dedicated to the consequences of fertility choices, or exogenous differences in the labor market, on the labor market choices of married women. But there is no intersection with the standard search theory, that mostly focuses on single-agent problems. Not too much space has been dedicated so far to models where labor market frictions generate asymmetric reactions of married men and women, as the ones we observe empirically in this study.

We propose a first step in that direction by building on existing works to provide a simple theoretical model of joint search that replicates the gender asymmetry observed in the data. In particular, we show that the presence of a breadwinner *stigma* generates a positive correlation between the husband's reservation wage and his spouse's labor income. The theoretical model suggests the potential need for a gender-based unemployment policy, in line with the emerging literature on gender-based policies, as proposed by Alesina et al. [2011].

Further research should strive to bring a richer model of household bargaining to micro data and quantify the importance of joint search, and a more accurate design of unemployment insurance schemes that take into consideration the labor market situation of the household members, and not only the individual wage history.

A Figures

Figure 1: Kaplan-Meier Survival Estimates

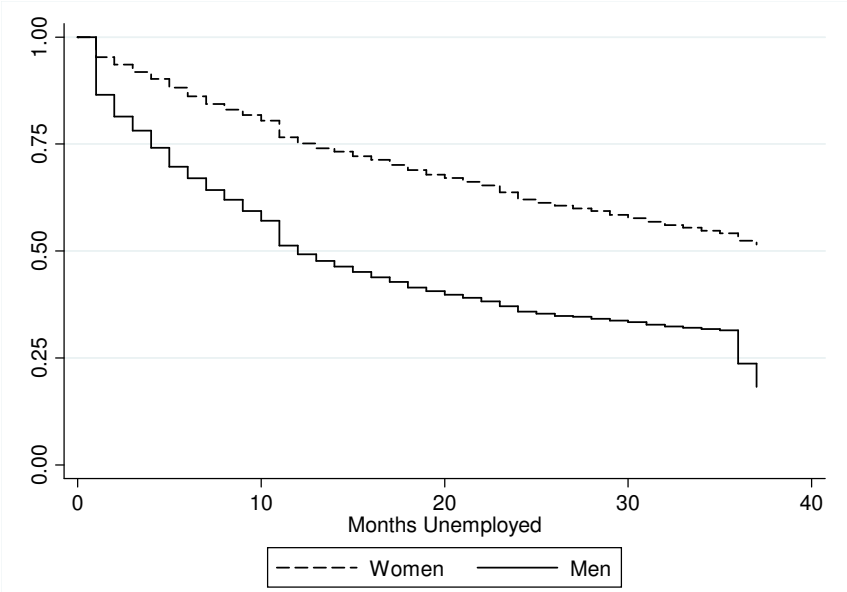
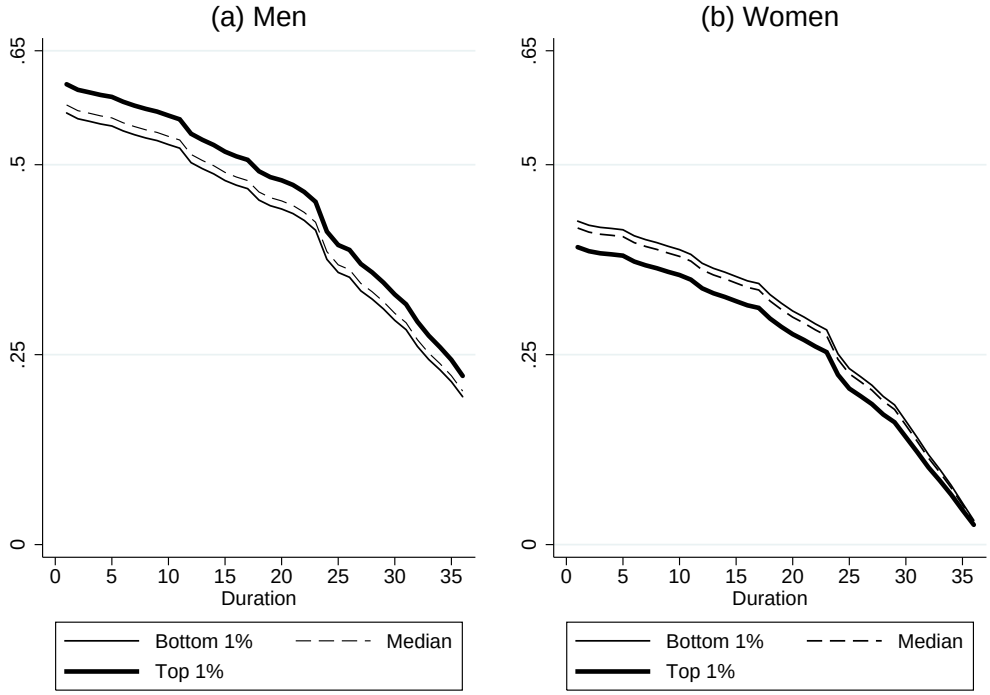


Figure 2: Estimated Hazard, Model (1)



B Tables

Table 1: Survey Years and No. of Observations After Restrictions

Survey Year	No. Initial Obs.	No. Final Obs.	No. Husbands	No. Wives
1991	137,298	966	298	668
1992	141,053	700	216	484
1993	146,803	642	226	416
1994	151,590	683	201	482
1995	151,146	581	195	386
1996	150,365	637	214	423
1997	148,891	2,835	452	2,383
1998	149,132	859	199	660
1999	182,155	781	172	609
2000	182,066	2,774	443	2,331
2001	178,143	797	155	642
2002	175,939	793	181	612

Table 2: Transition from Unemployment to Employment

HUSBANDS	Total	Mean	Min	Median	Max
no. of subjects	1,945				
no. of records	3,398	1.75	1	2	8
(first) entry time		0	0	0	0
(final) exit rate		20,64	1	22	37
subjects with gap	1,042				
time on gap if gap	5,431	3.93	1	1	35
time at risk	34,721	17.85	1	13	36
total failures	1,981	1.02	0	1	7
WIVES					
no. of subjects	6,807				
no. of records	11,781	1.73	1	1	9
(first) entry time		0	0	0	0
(final) exit rate		26,92	1	36	37
subjects with gap	3,249				
time on gap if gap	15,609	3.24	1	1	32
time at risk	167,608	24.62	1	34	36
total failures	4,859	0.71	0	0	9

Table 3: *Salaire minimum interprofessionnel de croissance (SMIC)*

Year	Amount in euros of hourly gross SMIC
1991	4.98
1992	5.19
1993	5.31
1994	5.42
1995	5.64
1996	5.78
1997	6.01
1998	6.13
1999	6.21
2000	6.41
2001	6.67
2002	6.83

Source: INSEE

Table 4: Summary Statistics - Husbands - Panel 1991 to 2002

Variable	**Mean**	**(Std. Dev.)**	**Min.**	**Max.**	**N**
Median wives' hourly wage	6.44	(3.62)	3.35	99.12	1,945
Unemployment benefits	617.29	(1,123.76)	0.10	24,985.88	527
Age	43.76	(9.95)	23	59	1,945
Married	0.76	(0.42)	0	1	1,945
Schooling					
Graduate	0.09	(0.28)	0	1	1,945
Undergraduate	0.09	(0.28)	0	1	1,945
High school	0.11	(0.31)	0	1	1,945
Basic technical training	0.32	(0.47)	0	1	1,945
Junior high school	0.08	(0.26)	0	1	1,945
No diploma	0.32	(0.47)	0	1	1,945
Number of children:					
0 children	0.47	(0.50)	0	1	1,945
1 child	0.25	(0.43)	0	1	1,945
2 children	0.21	(0.41)	0	1	1,945
3 or more children	0.07	(025)	0	1	1,945
Region of residence:					
North	0.49	(0.50)	0	1	1,945
South	0.17	(0.37)	0	1	1,945
Center	0.35	(0.47)	0	1	1,945
Nationality:					
French nationality	0.93	(0.26)	0	1	1,945
Non-French nationality	0.07	(0.26)	0	1	1,945
Real Estate:					
Owner of real estate	0.55	(0.50)	0	1	1,945
Renter	0.45	(0.50)	0	1	1,945
Labor market status status before last unemployment spell:					
Inflow after permanent employment	0.48	(0.50)	0	1	1,945
Inflow after any other non participation state	0.52	(0.50)	0	1	1,945
Occupation before last unemployment spell:					
Agricultural workers	0.00	(0.05)	0	1	1,262
Upper managers	0.05	(0.22)	0	1	1,262
Lower managers	0.15	(0.36)	0	1	1,262
Intermediary occupations	0.27	(0.44)	0	1	1,262
Salaried workers	0.11	(0.32)	0	1	1,262
Skilled workers	0.41	(0.49)	0	1	1,262
Employment status before last unemployment spell:					
Self-employed	0.06	(0.24)	0	1	1,263
Government employed	0.12	(0.32)	0	1	1,263
Other employed	0.82	(0.38)	0	1	1,263
Registered to the ANPE	0.41	(0.49)	0	1	1,945
Regional unemployment rate	9.31	(2.00)	5.03	15.32	1,945

Table 5: Summary Statistics - Wives - Panel 1991 to 2002

Variable	**Mean**	**(Std. Dev.)**	**Min.**	**Max.**	**N**
Median husbands' hourly wage	7.24	(4.39)	3.34	147.02	6,807
Unemployment benefits	405.16	(1,044.30)	9.17	34,261.03	1,114
Age	40.03	(8.89)	20	59	6,807
Married	0.82	(0.38)	0	1	6,807
Schooling					
Graduate	0.05	(0.22)	0	1	6,807
Undergraduate	0.08	(0.28)	0	1	6,807
High school	0.12	(0.33)	0	1	6,807
Basic technical training	0.29	(0.45)	0	1	6,807
Junior high school	0.10	(0.30)	0	1	6,807
No diploma	0.35	(0.48)	0	1	6,807
Number of children:					
0 children	0.32	(0.46)	0	1	6,807
1 child	0.26	(0.44)	0	1	6,807
2 children	0.26	(0.44)	0	1	6,807
3 or more children	0.17	(0.37)	0	1	6,807
Region of residence:					
North	0.48	(0.50)	0	1	6,807
South	0.16	(0.37)	0	1	6,807
Center	0.36	(0.48)	0	1	6,807
Nationality:					
French nationality	0.93	(0.25)	0	1	6,807
Non-French nationality	0.07	(0.25)	0	1	6,807
Real Estate:					
Owner of real estate	0.53	(0.50)	0	1	6,807
Renter	0.48	(0.50)	0	1	6,807
Labor market status status before last unemployment spell:					
Inflow after employment	0.27	(0.44)	0	1	6,807
Inflow after any other non participation state	0.73	(0.47)	0	1	6,807
Occupation before last unemployment spell:					
Agricultural workers	0.00	(0.04)	0	1	4,761
Upper managers	0.01	(0.12)	0	1	4,761
Lower managers	0.04	(0.19)	0	1	4,761
Intermediary occupations	0.15	(0.36)	0	1	4,761
Salaried workers	0.57	(0.49)	0	1	4,761
Skilled workers	0.22	(0.41)	0	1	4,761
Employment status before last unemployment spell:					
Self-employed	0.02	(0.15)	0	1	4,763
Government employed	0.16	(0.37)	0	1	4,763
Other employed	0.82	(0.39)	0	1	4,763
Registered to the ANPE	0.29	(0.47)	0	1	6,807
Regional unemployment rate	9.54	(2.20)	5.03	15.32	6,807

Table 6: Pooled Sample - Wives and Husbands, Coefficients - The dependent variable is Employment

VARIABLES	(1) cloglog	(2) cloglog u.h.	(3) probit u.h.
Spousal log(hourly wage)	0.080***	1.489***	1.269***
	(0.015)	(0.193)	(0.383)
(1=Female)*Spousal log(hourly wage)	-0.182***	-1.508***	-1.505***
	(0.017)	(0.221)	(0.210)
1=Female	-0.204***	1.986***	2.311***
	(0.032)	(0.384)	(0.383)
log(Unemployment benefits)		-0.196***	-0.092***
		(0.030)	(0026)
Age		-0.028***	-0.031***
		(0.004)	(0.004)
1=Legally Married		0.787***	0.535***
		(0.081)	(0.082)
Schooling (base: no diploma)			
Graduate		2.020***	1.397***
		(0.154)	(0.144)
Undergraduate		-1.678***	-1.606***
		(0.168)	(0.198)
High school		1.621***	1.400***
		(0.129)	(0.127)
Basic technical training		0.570***	0.422***
		(0.076)	(0.079)
Junior high school		-1.415***	-1.256***
		(0.118)	(0.137)
Number of children (base: 0 children)			
1 Child		1.081***	0.875***
		(0.073)	(0.078)
2 Children		-0.700***	-0.753***
		(0.076)	(0.083)
3 and more children		-0.149	-0.151
		(0.104)	(0.117)
Region of residence (base: center)			
North		-0.249***	-0.507***
		(0.074)	(0.084)
South		-0.080	-0.009
		(0.140)	(0.120)
1=French nationality		2.065***	1.773***
		(0.118)	(0.209)
1=Owner of real estate		-0.292***	-0.182**
		(0.071)	(0.080)
1=Inflow after employment		-0.311***	-0.228***
		(0.030)	(0.025)
Occupation before last unemployment spell (base: agricultural workers)			
Upper manager		0.179	0.659*
		(0.422)	(0.398)
Lower manager		-1.617***	-1.076***
		(0.120)	(0.115)
Intermediary occupations		-1.480***	-0.954***
		(0.107)	(0.113)
Salaried worker		-0.807***	-0.565***
		(0.080)	(0.077)
Employment status before last unemployment spell (base: other employed)			
Self-employed		-2.862***	-2.758***
		(0.074)	(0.432)
Government employment		1.992***	1.480***
		(0.186)	(0.149)
1=Registered to the ANPE		-1.969***	-1.357***
		(0.132)	(0.041)
Regional unemployment rate		0.334***	0.266***
		(0.018)	(0.010)
Duration-interval-specific dummy variables	YES	YES	YES
Test: [Spousal log(hourly wage) + (1=Female)*Spousal log(hourly wage) = 0]			
	-0.102***	-0.020	-0.236*
	(0.134)	(0.009)	(0.124)
Log likelihood	-72274926	-16312.889	-27390.919

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

Table 7: Separated Samples, Coefficients - The dependent variable is Employment

VARIABLES	MEN				WOMEN			
	(1) cloglog	(2) cloglog u.h.	(3) probit u.h.	(4) probit IV	(1) cloglog	(2) cloglog u.h.	(3) probit u.h.	(4) probit IV
Spousal log(hourly wage)	0.078***	0.461*	0.377*	1.714***	-0.101***	-0.068	-0.075	-0.492*
	(0.015)	(0.244)	(0.213)	(0.367)	(0.009)	(0.183)	(0.169)	(0.287)
log(Unemployment benefits)		-0.152***	-0.099***	-0.026*		-0.301**	-0.254**	-0.098***
		(0.045)	(0.035)	(0.016)		(0.131)	(0.104)	(0.020)
Age		-0.074***	-0.062***	-0.022***		-0.027***	-0.025***	-0.001
		(0.012)	(0.010)	(0.001)		(0.008)	(0.007)	(0.003)
1=Legally Married		-0.028	-0.079	0.074**		-0.221	-0.215	-0.090***
		(0.244)	(0.222)	(0.031)		(0.136)	(0.136)	(0.017)
Schooling (base: no diploma)								
Graduate		-0.404	-0.185	-0.464***		0.228	0.217	0.263***
		(0.588)	(0.528)	(0.132)		(0.457)	(0.413)	(0.052)
Undergraduate		-0.635	-0.414	-0.562***		0.677***	0.540**	0.332***
		(0.478)	(0.396)	(0.099)		(0.265)	(0.237)	(0.065)
High school		0.704**	0.705***	0.014		0.399**	0.277	0.203***
		(0.306)	(0.245)	(0.081)		(0.017)	(0.175)	(0.051)
Basic technical training		0.249	0.297	0.031		0.024	-0.001	0.040
		(0.230)	(0.200)	(0.030)		(0.137)	(0.136)	(0.026)
Junior high school		0.281	-0.202	0.040		0.123	0.098	0.037
		(0.372)	(0.315)	(0.038)		(0.206)	(0.199)	(0.038)
Number of children (base: 0 children)								
1 Child		0.645***	0.543**	0.062***		-0.105	-0.133	0.006
		(0.243)	(0.215)	(0.025)		(0.130)	(0.081)	(0.016)
2 Children		0.181	0.191	-0.026		0.020	-0.006	0.061***
		(0.256)	(0.227)	(0.027)		(0.161)	(0.147)	(0.017)
3 and more children		0.660	0.611*	0.142***		-0.513**	-0.457**	-0.111***
		(0.448)	(0.374)	(0.033)		(0.210)	(0.193)	(0.023)
Region of residence (base: center)								
North		-0.238	-0.208	-0.200***		-0.161	-0.143	-0.004
		(0.223)	(0.196)	(0.022)		(0.145)	(0.137)	(0.025)
South		-0.384	-0.316	-0.204***		-0.477***	-0.415**	-0.059*
		(0.344)	(0.283)	(0.031)		(0.183)	(0.169)	(0.030)
1=French nationality		-0.589*	-0.505*	-0.440***		0.360*	0.392**	0.153***
		(0.321)	(0.288)	(0.043)		(0.193)	(0.172)	(0.038)
1=Owner of real estate		-0.052	-0.020	-0.111***		0.139	0.130	0.151***
		(0.210)	(0.170)	(0.034)		(0.119)	(0.115)	(0.028)
1=Inflow after employment		-0.319***	-0.240***	-0.045**		-0.209***	-0.245***	0.060***
		(0.061)	(0.049)	(0.019)		(0.022)	(0.018)	(0.012)
Occupation before last unemployment spell (base: agricultural workers)								
Upper manager		-1.806	-1.461**	-0.679***		-2.375	-1.814	-0.968***
		(1.204)	(0.637)	(0.119)		(2.082)	(1.851)	(0.178)
Lower manager		0.340	0.107	-0.289***		0.158	0.284	0.055
		(0.352)	(0.295)	(0.071)		(0.456)	(0.373)	(0.102)
Intermediary occupations		-0.227	-0.251	-0.217***		-0.357	-0.278	-0.081
		(0.213)	(0.191)	(0.030)		(0.235)	(0.211)	(0.060)
Salaried worker		-0.135	-0.149	0.093***		-0.185	-0.107	-0.066**
		(0.354)	(0.293)	(0.032)		(0.139)	(0.138)	(0.032)
Employment status before last unemployment spell (base: other employed)								
Self-employed		1.905	1.510**	0.672***		2.394***	2.013***	-0.028
		(1.261)	(0.749)	(0.127)		(0.655)	(0.547)	(0.138)
Government employment		0.731	0.584	0.128*		-0.139	-0.109	-0.065**
		(0.741)	(0.546)	(0.073)		(0.181)	(0.169)	(0.032)
1=Registered to the ANPE		-4.179***	-3.816***	-0.464***		0.029	0.038*	0.004
		(0.367)	(0.314)	(0.077)		(0.028)	(0.022)	(0.043)
Regional unemployment rate		0.314***	0.184***	0.011***		0.023	0.017	0.022***
		(0.061)	(0.058)	(0.006)		(0.031)	(0.027)	(0.008)
Duration-interval-specific dummy variables	YES	YES	YES	YES	YES	YES	YES	YES
Log likelihood	-17528345	-4808.4855	-4704.4621	-16896.674	-54655567	-24948.022	-24504.805	-41589.007

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

Table 8: Estimated Hazard Rates from Model (1), Men

	Percentiles of Wife Labor Income									
Spell	1	2	3	4	5	6	7	8	9	10
1	0.5681307	0.5717313	0.5740378	0.5764908	0.5787139	0.5811312	0.5839177	0.5876448	0.592774	0.6059438
2	0.5604966	0.5641105	0.5664497	0.5688965	0.57113	0.573559	0.5763494	0.5800862	0.5852475	0.5985749
3	0.5571887	0.5608156	0.5631503	0.5656064	0.5678342	0.5702754	0.5730643	0.5768151	0.5819847	0.5952938
4	0.5536302	0.5572791	0.5596115	0.5620728	0.5642955	0.5667416	0.5695209	0.5733036	0.5784863	0.5918593
5	0.5509996	0.5546362	0.5569725	0.5594308	0.5616671	0.5641051	0.5668961	0.5706894	0.575868	0.5892816
6	0.5444905	0.5481303	0.5504758	0.5529301	0.5551813	0.5576295	0.5604259	0.5642104	0.5694009	0.5828834
7	0.5395352	0.5431829	0.545523	0.547987	0.5502425	0.5526974	0.5554915	0.5592887	0.5644722	0.5777963
8	0.5352041	0.5388551	0.5411986	0.5436671	0.545929	0.5483875	0.5511767	0.5549907	0.5601676	0.5735053
9	0.5318019	0.5354356	0.5377831	0.5402582	0.5425221	0.5449777	0.547768	0.5515769	0.5567524	0.5699149
10	0.5265662	0.5302137	0.5325739	0.5350459	0.5373055	0.5397544	0.5425658	0.5463824	0.5515658	0.564758
11	0.5217793	0.5254332	0.5278037	0.5302733	0.5325428	0.5349864	0.5377947	0.5416152	0.5467809	0.5597559
12	0.5027835	0.5064085	0.5088045	0.5112942	0.5135554	0.5160317	0.5188348	0.5226634	0.5278106	0.5407566
13	0.4948119	0.498422	0.5008226	0.5033012	0.5055771	0.5080433	0.5108448	0.5146753	0.5198505	0.5327633
14	0.4879692	0.4915859	0.4939741	0.4964631	0.4987415	0.5012123	0.5040281	0.5078547	0.5130255	0.5259783
15	0.479176	0.4827572	0.4851567	0.487635	0.4899217	0.4923852	0.4952142	0.4990305	0.5042086	0.5172048
16	0.4730941	0.4766497	0.4790614	0.48154	0.4838245	0.4862872	0.4891101	0.492926	0.4980984	0.511078
17	0.4684884	0.4720324	0.4744528	0.4769194	0.4791912	0.4816684	0.4844851	0.4882736	0.4934958	0.5064303
18	0.4534361	0.4569623	0.4593696	0.461808	0.4640912	0.4665664	0.4693814	0.4731514	0.4783264	0.4913678
19	0.4460464	0.4495839	0.4519843	0.4544379	0.4566902	0.4591785	0.4619912	0.4657559	0.4709324	0.4837188
20	0.4417643	0.445299	0.4476884	0.4501576	0.452393	0.4548788	0.4576884	0.4614355	0.4666521	0.4794772
21	0.4357459	0.4392814	0.4416672	0.4441426	0.4463797	0.4488621	0.4516466	0.4553932	0.4606106	0.4734035
22	0.4266775	0.4301833	0.4325676	0.4350427	0.4372625	0.4397216	0.4425363	0.446261	0.4514612	0.4641633
23	0.4138257	0.4173026	0.4196711	0.4221213	0.4243448	0.4267859	0.4296009	0.4332944	0.4385009	0.4511648
24	0.3754666	0.3788059	0.3811466	0.3835551	0.3856849	0.3880468	0.3908641	0.3944806	0.3994489	0.4120156
25	0.3582085	0.3614881	0.3637693	0.3661632	0.3682538	0.3706228	0.3734041	0.3769107	0.3818589	0.3943284
26	0.3518749	0.35517	0.3574142	0.3598085	0.3618777	0.3642348	0.3669983	0.3704816	0.3754231	0.3878992
27	0.3339769	0.3372434	0.3394443	0.3418072	0.3438121	0.3461454	0.3488869	0.3522659	0.357148	0.369439
28	0.32317	0.3263699	0.3285543	0.3308679	0.3328564	0.3351689	0.3378757	0.3412064	0.3460085	0.3583547
29	0.3102255	0.313378	0.3155477	0.3178053	0.3197688	0.3220322	0.3247071	0.3279445	0.3327425	0.3448972
30	0.2951666	0.2981949	0.3003323	0.3025364	0.3044707	0.3066905	0.3092993	0.3124786	0.317197	0.3292453
31	0.2829099	0.2858752	0.287985	0.2901557	0.2920518	0.2942285	0.296771	0.299915	0.3045602	0.3162896
32	0.2609091	0.2637556	0.2657937	0.2678964	0.2696988	0.2717883	0.2742665	0.2772525	0.2816981	0.2934355
33	0.2436815	0.2464115	0.2483988	0.250394	0.2521492	0.2541793	0.2565525	0.2594769	0.2637197	0.2750005
34	0.2299429	0.2325699	0.2344849	0.23643	0.2381233	0.2401033	0.2424187	0.2451935	0.2493293	0.2597938
35	0.2144423	0.2169626	0.2188153	0.2206984	0.2223059	0.2242172	0.2264524	0.2291316	0.2331054	0.243238
36	0.1946488	0.1970313	0.1987636	0.2005462	0.2020802	0.2038788	0.2059629	0.2084782	0.2122881	0.2220506

Table 9: Estimated Hazard Rates from Model (1), Women

	Percentiles of Husband Labor Income									
Spell	1	2	3	4	5	6	7	8	9	10
1	0.4257655	0.4228636	0.4208883	0.4188965	0.4166949	0.4142188	0.4114052	0.4079804	0.4027411	0.3915409
2	0.4203475	0.4174508	0.415485	0.4134957	0.4113034	0.4088293	0.4060268	0.4026149	0.3973958	0.3861973
3	0.4175571	0.4146574	0.4126916	0.4107058	0.4085166	0.4060493	0.4032534	0.3998415	0.3946474	0.3834248
4	0.4161256	0.413218	0.4112482	0.4092665	0.4070799	0.4046152	0.4018229	0.3984147	0.3932185	0.3820349
5	0.4143786	0.4114802	0.4095093	0.4075234	0.4053461	0.4028781	0.4000916	0.3966867	0.3914927	0.3803107
6	0.4064267	0.4035412	0.4015842	0.3996079	0.3974414	0.3949839	0.3922105	0.3888226	0.3836624	0.3725559
7	0.4014196	0.3985325	0.3965817	0.394614	0.3924526	0.3900063	0.387248	0.3838693	0.3787193	0.367629
8	0.3974529	0.3945655	0.3926189	0.3906573	0.3884976	0.3860606	0.3833107	0.379949	0.3748032	0.3637335
9	0.3926073	0.3897487	0.3878029	0.3858483	0.3837048	0.3812673	0.3785323	0.375184	0.37006	0.3590179
10	0.3882492	0.3854072	0.383469	0.3815221	0.3793809	0.3769529	0.3742226	0.3708954	0.3657957	0.3548456
11	0.3819744	0.3791483	0.3772205	0.3752841	0.3731548	0.370735	0.3680271	0.3647199	0.3596554	0.348732
12	0.3703125	0.3674786	0.3655767	0.3636657	0.3615544	0.3591493	0.3564852	0.3531975	0.3482099	0.337308
13	0.3636199	0.3607926	0.3589043	0.3570039	0.3549052	0.3525138	0.3498665	0.346599	0.3416493	0.3307978
14	0.3586284	0.3558216	0.3539453	0.3520496	0.3499594	0.3475792	0.3449515	0.3417012	0.3367799	0.3259933
15	0.3528357	0.3500505	0.348186	0.3463009	0.3442183	0.3418553	0.33925	0.3360183	0.3311175	0.3203965
16	0.347139	0.3444085	0.3425518	0.3406779	0.3386083	0.3362566	0.3336699	0.3304579	0.3255977	0.314972
17	0.3436638	0.3409386	0.3390861	0.33722	0.3351557	0.3328167	0.3302409	0.3270471	0.3222086	0.3115838
18	0.3290246	0.3263461	0.324524	0.3226908	0.3206613	0.3183706	0.3158415	0.3127039	0.307963	0.2975289
19	0.3177308	0.3150842	0.3132915	0.3114835	0.3094789	0.3072301	0.3047424	0.3016581	0.2969977	0.2866383
20	0.3074978	0.3049019	0.3031394	0.3013527	0.2993779	0.2971614	0.2947189	0.2916815	0.2870873	0.2769645
21	0.2995199	0.2969762	0.2952367	0.2934671	0.2915168	0.2893275	0.2869168	0.2839148	0.2793944	0.2693389
22	0.290532	0.2880481	0.2863341	0.2845828	0.2826685	0.2804993	0.278136	0.275171	0.2707104	0.260813
23	0.282632	0.2801886	0.2784964	0.2767638	0.2748792	0.2727381	0.2704118	0.2674892	0.263091	0.2533264
24	0.2510592	0.2488792	0.2472816	0.2456616	0.2438947	0.2418664	0.2396977	0.2369534	0.2328072	0.2235105
25	0.2317209	0.2296109	0.2280809	0.2265347	0.2248399	0.2229158	0.2208291	0.2182134	0.2142405	0.2053758
26	0.2210092	0.2189665	0.2174726	0.2159721	0.2143173	0.212451	0.2104188	0.2078778	0.2040229	0.195415
27	0.2097702	0.2077817	0.2063393	0.2048833	0.2032747	0.2014718	0.1995066	0.1970384	0.1933193	0.1849572
28	0.1950365	0.1931366	0.1917554	0.1903611	0.1888242	0.1871033	0.1852221	0.1828593	0.179306	0.1712966
29	0.1839271	0.1820854	0.180748	0.1794095	0.1779309	0.1762707	0.1744598	0.1721788	0.1687616	0.161042
30	0.1625827	0.160885	0.1596568	0.1584199	0.157055	0.1555293	0.1538562	0.1517523	0.1485838	0.1414923
31	0.1409769	0.1394383	0.1383244	0.1371978	0.1359617	0.1345783	0.1330505	0.1311509	0.1282844	0.121893
32	0.1183749	0.1170097	0.116031	0.115029	0.1139403	0.1127195	0.1113685	0.1096919	0.1071649	0.1015571
33	0.0989502	0.0977476	0.0968951	0.0960157	0.0950595	0.09399	0.0928022	0.0913385	0.0891209	0.0842264
34	0.0780899	0.0770991	0.0763827	0.0756481	0.074849	0.0739593	0.0729614	0.0717447	0.0698857	0.0658284
35	0.05477 3	0.0540205	0.0534796	0.0529194	0.052319	0.0516478	0.0508909	0.0499705	0.0485824	0.0455312
36	0.0319394	0.0314539	0.031105	0.0307436	0.0303553	0.0299262	0.0294382	0.0288527	0.0279585	0.0260313

C Sample Bias Correction

To correct for the possible sampling bias due to the over representation of women in the sample, we adopt two strategies. First, we apply the sample weights EXTRI (*Coefficient de pondération des individus*) to all of the econometric specifications reported in the paper. Second, we follow Wooldridge (2002), and estimate a (probit) Heckman selection model. The selected sample includes women who are married (or cohabiting) and unemployed for at least one month. In the first stage, using all observations, we estimate a binary probit model, where the binary dependent variable is equal to 1 for selected women. In this stage, we obtain the Mills ratio for each observation. The exclusion variable is a categorial variable that indicates the willingness to work, which is called SOUH in the data set. In the second stage, we run a probit model on the selected sample, where the dependent variable is the binary variable that indicates whether the subject has left unemployment or not in that month. This is the same binary dependent variable that we used in all of the other empirical specifications. Moreover, we add the Mills ratio as explanatory variable. The results are in Table 10. The coefficient of the spousal income in the second stage remains significant and in the range of the coefficients resulting from the other specifications.

Table 10: Heckman Selection Model

	1st Stage	2nd Stage
	Dep. Var.: Married or cohabiting and unemployed	Dep. Var.: Employment
Spousal log(hourly wage)	0.061**	-0.160***
	(0.031)	(0.024)
log(Unemployment benefits)	0.121***	-0.076***
	(0.023)	(0.022)
Age	-0.012***	-0.011***
	(0.001)	(0.001)
Schooling		
Graduate	0.085	0.144***
	(0.061)	(0.061)
Undergraduate	0.087*	0.413***
	(0.053)	(0.049)
High school	0.337***	-0.035
	(0.034)	(0.032)
Basic technical training	-0.097***	0.125***
	(0.025)	(0.028)
Junior high school	0.039	0.201***
	(0.043)	(0.042)
Number of children		
1 Child	0.225***	-0.185***
	(0.027)	(0.026)
2 Children	-0.165***	0.090***
	(0.027)	(0.023)
3 and more children	-0.439***	0.195***
	(0.039)	(0.035)
Region of residence:		
Region of residence: North	-0.150***	-0.179***
	(0.024)	(0.017)
Region of residence: South	-0.321***	-0.093***
	(0.034)	(0.031)
French nationality	0.193***	0.116***
	(0.039)	(0.044)
Owner of real estate	0.191***	0.045**
	(0.022)	(0.044)
Inflow after employment	1.513***	0.327***
	(0.023)	(0.038)
Occupation before last unemployment spell:		
Lower manager	-0.039	0.310***
	(0.050)	(0.040)
Intermediary occupations	-0.493***	-0.293***
	(0.038)	(0.044)
Salaried worker	-0.339***	0.036*
	(0.025)	(0.021)
Employment status before last unemployment spell:		
Government employment	0.229***	-0.086***
	(0.033)	(0.025)
Registered to the ANPE	1.821***	-0.388***
	(0.030)	(0.041)
Regional unemployment rate	0.044***	-0.020***
	(0.005)	(0.005)
Willing to work[1]	-0.286***	
	(0.041)	
Not willing to work	-0.336***	
	(0.023)	
Inverse Mills Ratio		-0.719***
		(0.047)
Duration-interval-specific dummy variables	YES	YES
Log likelihood	-3450198.3	-13104.33

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in the 1st stage, and bootstrap standard errors in the 2nd stage.

[1] The reference category for the exclusion variable (SOUH) is "Already been working".

D Variables

Each agent is identified by the variables AIRE, IMLOC, NOI, and S (gender).

Spousal hourly wage: monthly earnings are computed from the variables SALRED and (SALFR + PRIMFR*(1/12)) when SALRED is not available. The amounts are deflated using the consumer price deflator available at the web site of the INSEE[17]. Weekly hours worked are imputed from DUHAB, and replaced by the average weekly hours worked by men and women if DUHAB is not available but the reported wage is positive. We only considered hourly wages that are at least three quarters of the minimum legal hourly wage of the considered year. See Table (3) for details on the minimum legal hourly wage, or *salaire minimum interprofessionnel de croissance (SMIC)*.

Unemployment benefits: this is computed from the variable MFRALC. The amounts are deflated using the consumer price deflator available at the web site of the INSEE[18].

Age: the variable is AG. We consider its value at the last interview.

Years of education: the variable is DDIPL.

No. of children: the variables are ENF3, ENF6, ENF18.

Region of residence: the variable RG is split in three more variables that we named North, Center, and South. The north of France includes the following regions: Picardie, Haute-Normandie, Nord-Pas de Calais, Champagne-Ardennes, Lorraine, Alsace, Ile-de-France, Basse-Normandie. Center includes: Pays de la Loire, Bretagne, Centre, Bourgogne, Franche-Comté, Poitou-Charentes, Limousin, Rhône-Alpes, Auvergne. South includes: Languedoc-Roussillon, Provence-Cte d'Azur-Corse, Aquitaine, Midi-Pyrénées.

French nationality: the variable is N.

Owner of real estate: the variable is SO.

Inflow after permanent employment, temporary employment, school or military: the variable is FI recorded at the month which precedes the unemployment spell.

Occupation: the variable is DCSA.

[17] http : //www.insee.fr/fr/themes/conjoncture/historique$_i$pc.asp
[18] http : //www.insee.fr/fr/themes/conjoncture/historique$_i$pc.asp

Employment status: the variable is STA.

Regional unemployment rate: data available at the INSEE website.[19]

Registered to the ANPE: the variable is ANPE (*Agence nationale pour l'emploi*).

Social origin of the father in-law: the variable is CSPP that reports the type of occupation in which the father has been employed.

Population weight: the variable is EXTRI that reports sample weights.

Willingness to work: the variable is SOUHAITE.

E Proof of Proposition 1

(i) Consider the case in which the unemployed worker is the wife. From the definition of the reservation wage function, when the quit option is not exercised, $\phi^f(w_m)$ has to satisfy equation (15) with $j = f$. We conjecture that under risk neutrality the quit option is never exercised. Then, we can disregard the second term in the max operator in (13). Substituting (11) and (13) into (15), and using the fact that workers are risk neutral, the equation characterizing $\phi^f(w_m)$ becomes

$$\phi^f(w_m) = b_f + \frac{\alpha_f}{r} \int_{\phi^f(w_m)}^{\overline{w}_f} \left[w_f - \phi^f(w_m)\right] dG(w_f), \tag{18}$$

which does not depend on w_m, and satisfies our conjecture. It follows that, when the unemployed husband receives and accepts a wage offer w_m, the reservation wage of the wife does not change. Hence, she will not exercise the quit option.

(ii) Now, consider the case in which the unemployed worker is the husband. When the quit option is not exercised, $\phi^m(w_f)$ has to satisfy equation (15) with $j = m$. We conjecture again that under risk neutrality the quit option is never exercised. Then, we can disregard the second term in the max operator in (14). Substituting (11) and (14) into (15), and using the fact that workers are risk

[19] See http : //www.insee.fr/fr/themes/tableau.asp?reg$_i$d = 99ref$_i$d = CMRSOS03311

neutral, the equation characterizing $\phi^m(w_f)$ becomes

$$\phi^m(w_f) = b_m - s(w_f - b_m) + \frac{\alpha_m}{r}\int_{\phi^m(w_f)}^{\overline{w}_m} [w_m - \phi^m(w_f)]\, dG(w_m), \tag{19}$$

which depends on w_f via $s(\cdot)$. Taking the derivative of both sides, the effect of w_f on ϕ^m is the following:

$$\frac{\partial \phi^m(w_f)}{\partial w_f} = -\frac{\partial s/\partial w_f}{\left\{1 + \frac{\alpha_m}{r}[1 - G(\phi^m)]\right\}} < 0 \tag{20}$$

by the assumption that $s'(\cdot) > 0$. It follows that the reservation wage of the unemployed husband is decreasing in his wife's wage. When the unemployed wife receives and accepts a wage offer w_f, he will never exercise his quit option, because his reservation wage will decrease.

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