Toyboys or Supergirls ? An analysis of partners' employment outcomes when she outearns him

Hans G. Bloemen[*] and **Elena G. F. Stancanelli**[**]

July 2013[***]

Abstract

In this paper we study households in which the woman is the main earner, encompassing both dual-earners with the wife outearning the husband and couples in which the husband is not-employed. The literature in this area is very scant. Earlier studies find that the wife outearns the husband in roughly one of every four dual-earner couples in North-American countries. According to our estimates, the wife earns a higher hourly wage than the husband in one of every six French households, including couples with an inactive partner, and, moreover, this proportion is almost the same considering partners' monthly earnings. Economic models of marriage would predict that the wife's earnings-dominance be compensated by the husband being younger or possibly more attractive than the wife. Using a large dataset of couples, drawn from the French Labor Force surveys, we find that larger spousal age differences correlate positively with the occurrence of couples in which only the wife works but negatively with dual-earners in which she outearns the husband. Therefore, a marriage selection type of story may explain the occurrence of female solo-earner households while the emergency of "power couples" may provide a rationale for dual-earners in which the wife outearns the husband.

Keywords: wage inequality, gender, employment.

Classification JEL : J31, J16, J21.

[*] h.g.bloemen@vu.nl VU University Amsterdam, Department of Economics, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands, Tinbergen Institute, IZA, and Netspar.

[**] elena.stancanelli@univ-paris1.fr Paris School of Economics, CNRS, Sorbonne Economics Research Center, and IZA

[***] This research has benefited from a French National Research Agency (ANR) grant. Earlier versions of this paper were presented at the annual meeting of the Society of Labor Economists, New York, May 2008, the IAFFE annual conference, Turin, juin 2008; the European Meeting of the Econometric Society, Budapest, August 2007; the AFSE Paris, and the AIEL Naples, September 2007; and at invited seminars at University San Diego State, December 2008; University Paris 2, February 2008; University Cergy, May 2007; University Paris 1, June 2007. We thank Robert A Pollak, Catherine Sofer, Anne Winkler and all seminar participants for their comments. In particular, we thank Shoshana Grossbard and Sonia Oreffice for their valuable advice. We are also grateful to two anonymous referees for their suggestions. All errors are ours.

1 Introduction

This study investigates the occurrence of households in which the wife is the main earner, encompassing couples in which the husband is not employed as well as dual-earner couples in which the wife earns a higher hourly wage. The economic literature in this area is rare. This issue is particularly relevant because when economic resources are controlled by the wife (rather than the husband) this has often been found to have a positive impact on children's consumption and schooling (see, for example, Haddad and Kanbur, 1992, Haddad and Hoddinott, 1995, Pasqua, 2005, Rubio-Codina and Dubois, 2012). Earlier descriptive literature finds that the wife outearns the husband in roughly one of every four dual-earner households in North-American countries (Anne Winkler, 1998, Sussman and Bonnell, 2006, and Drago et al. 2004). According to our estimates, the wife earns an higher hourly wage than the husband in one of every six French couples, including couples with inactive partners, and moreover, this proportion is about the same on the basis of partners' monthly earnings.

In light of the economic literature, female-breadwinner households (in which the wife is the only worker) and dual-earner wife-outearning couples (in which she earns a higher hourly wage than he does) may come about either because of marriage selection - the wife's higher earnings may compensate for the husband's younger age or his greater physical attractiveness, like in Grossbard-Schechtman (1984, 2003, 2013a and 2013b) - or possibly, because of labour market shocks hitting the husband (added-worker effect, introduced by Mincer, 1962). Under both scenarios, we would observe that he works fewer market hours (including zero) than she does. However, recent studies also document the emergence of the so-called "power" couples, in which both partners have college education and that cluster in big cities that offer more job opportunities for both spouses (Costa and Kahn, 2000). Here, we argue that under a "power-couple" scenario, her earnings superiority would be associated with positive assortative mating (similar age and education level of partners) and possibly due to the random allocation of jobs in the local labor market. Therefore, in this study we test these theoretical predictions by investigating the correlation between the wife's earnings dominance and spouses' age differences, controlling also for partners' education and gender-

specific unemployment rates.

Because France stands out as a European country with relatively high participation rates of married women (though still lagging behind those of North-Americans), it is possible to observe enough households with the wife as the main earner and to draw some quite general conclusions. Moreover, public provision of childcare services and long schooling hours enable French women to participate in the labor market and to work relatively long hours even when children are very young (see, for example, Del Boca D. , Pasqua S. and Pronzato C. 2007 and 2009, for an overview of European women's employment patterns). Therefore, it is interesting to study female earning-dominance in France. Here we take a descriptive approach and use longitudinal French Labor Force data on a representative sample of the population of working-age couples to estimate the correlations between wife's earnings-dominance and spouses' age differences, controlling also for other covariates as well as cohort and individual specific effects. The sample for the analysis covers thirteen years and consists of about 300,000 French couples. Out of these, we observe 12,000 (about 4 per cent of the sample) couples in which the wife is the sole worker and 35,000 (about 12 per cent of the sample) dual-earner households in which the wife earns at least the same wage as her husband or more. Our econometric specification enables us to include non-participants as well as observations with missing wages in the estimation sample. We find that households in which the wife is the main earner are positively associated with her being more educated than the husband. Larger age differences between the partners characterize households in which only one partner is at work, while small age differences between partners prevail among dual-earners. Gender-specific unemployment rates are insignificantly correlated with female earnings-dominance, though they are significantly correlated with both partners' participation to market work. Therefore, a marriage selection type of story may explain the occurrence of female solo-earner households while the emergency of "power couples" may provide a rationale for dual-earners in which the wife outearns the husband.

The structure of the paper is as follows. First, we provide a review of the literature. Next the conceptual framework is presented. The econometric model is specified in the following section. The data are then described. Finally, the estimation results are discussed and conclusions are drawn in last section.

2 Literature Review

The topic of women outeraning their husband has received little attention by economists with the execption of Winkler et al. (2005) that study American dual-earner couples in which the wife outearns the husband, finding considerable persistence over time in partners' earnings differentials. Drago et al. (2004) investigated the existence and persistence of situations of female breadwinnership in Australia, concluding that when the wife's earning-dominance arises from economic factors, husbands tend to have low socio-economic status, a poor labor market position and low family commitments; when it is associated with gender equity principles of spouses, spouses characteristics are more often positive. Brennan et al. (2001) investigate the impact of earning-dominance on the quality of spouses' marital role, finding that there is no impact of changes in wives' earnings on their marital role quality, while positive changes in the earnings of men have a positive impact on the quality of their marital role. Rizavi and Sofer (2010) investigate the effect of female earning's superiority on husband's share of housework. See also the fascinating account of American women outearning their husband provided by Pappenheim and Graves (2005) and Minetor (2006). See also the recent study of Bertrand, Kamenica, and Pan (2013) that argues to the contrary that female earnings dominance has a negative effect on the wife's labor supply in the United States.

Marriage formation decisions may affect future labor supplies of spouses. Adopting a reduced form approach, which encompasses both unitary models of the household, depicted as having only one utility function, and bargaining models with a utility function for each spouse, Lundberg (1988) specifies an empirical model of simultaneous equations of spousal market hours. She argues that controlling for individual fixed effects in spouses' hours equations removes the variation in spousal hours that is due to the marriage match and therefore, enables her to estimate the elasticities of spouses hours to changes in own and spousal wage rates. Using a longitudinal sample (drawn from the financial control group of the Denver Income Maintenance experiment) of 381 American low-income households in which both husband and wife worked at some time during the four years covered by the survey, she concludes that cross-hours and cross-earnings elasticities of spouses are significant

only for couples with young children. However, while allowing for truncation of the wives' hours distribution in one of the specifications, the author ignores possible truncation in the husband's hours distribution. Besides, the model implicitly assumes that spousal hours and wage rate are exogenously determined. Therefore, while using a similar simultaneous equation approach and allowing for random effects, our empirical model is more general than Lundberg's as we also allow for non-employed husbands and try to capture the endogeneity of hours and wages (by including all non-participants and also estimating wage and hours equations simultaneously, using functional form and cross-effects of education and age to identify wages). Moreover, we also estimate the model for childless and unmarried couples, to test for the sensitivity of the estimation results to using different sample selection cuts. Also within a reduced form approach Pencavel (1998) looks at the changes in the correlation of spouses' education level and hours of work in the USA from 1940 to 1990, for a sample of couples with white wives aged 25-34. He concludes that there is evidence of increasing schooling homogamy since the 1960s, possibly due to the increasing education levels of the population and especially of women. After controlling for the wage, location and presence of children, hours of work of the husband appear to be unrelated to either partner's education level. In contrast, work hours of the wife are negatively related to both partners' education level. While this study underlines the growing importance of positive assortative mating in marriage formation, the author does not allow for age differences to explain partners' hours, in constrast with the theoretical predictions of the models of marriage of, for example, Grossbard-Schechtman (1984).

Recently, Zhenchao Qian (1998) investigates trends in marriage and cohabitation by age and education of partners from 1970 to 1990, using USA Census and Current Population Survey data, taking a descriptive approach, to conclude that in 1990 unions in which the woman was more educated than the man were more likely to occur than the opposite. This study sets a framework for studies of female earnings-dominance as indeed one would expect spousal earnings differences to match education and age differences between partners. Recently, Hitsh et al. (2010), using a rich data on online dating, conclude that positive assortative mating (sorting, in the paper's terminology) is explained by preferences, assuming that the online dating market is frictionless. In recent work, Chiappori, Iyigun and

Weiss (2009) investigate why women may overtake men in schooling considering both the marriage market and the labour market. In particular, Chiappori, Iyigun and Weiss (2008) allow individuals to match in the marriage market according to randomly assigned income endowments, allowing also for divorce and remarriage. Additional theoretical and empirical evidence on these questions is gathered by Chiappori, Oreffice and Quintano-Domeque (2012), who exploit data on spouses' measures of physical (weight scaled by height) and socio-economic attraction (hourly wages for men and education for women), drawn from the USA Panel Study of Income Dynamics Surveys from 1999 to 2007, to show that a higher wage for men or an additional year of education for women can compensate for larger weight scaled by height (BMI) in the marriage market. Similarly, Coles and Francesconi (2011) conclude that marriage between differently aged spouses reflects that one partner (the older one) is more successful than the other, for example, in terms of accumulated wealth. Choo, Seitz and Siow (2008) find that marriage market tightness affects to a large extent spouses' participation rates in market work but the effect on hours of paid or unpaid work are very small. Perhaps in contrast with the earlier literature on marriage selection, using decennial USA census data from 1960 up to 2000 and the 1979 National Longitudinal Survey of Youth cohort, Mansour and McKinnish (2013) conclude that the wife's earnings-dominance in couples in which the husband is younger is driven by her longer working hours (rather than by her higher hourly wage). However, for the French couples in our dual-earner population we find a dramatically large overlap of couples in which she outearns him on the basis of hourly wages with couples in which she outearns him according to monthly wages. While we do not observe partners' physical attractiveness, we study the correlation between the wife's earnings-dominance and age and education differences of partners.

Recent studies also document the emergence of the so-called "power" couples, in which both partners have college education and that cluster in big cities that offer more job opportunities for both spouses (Costa and Kahn, 2000). Here, we argue that under a "power-couple" scenario, her earnings superiority would be associated with positive assortative mating (similar age and education level of partners) and possibly due to the random allocation of jobs in the local labor market.

3 Conceptual Framework

Our empirical approach builds on the earlier literature. In particular, we propose to test the predictions of model of markets for marriage and labor put forward by Grossbard-Schechtman (1984, 2003, 2013a and 2013b) that extends the pioneering Becker's models of marriage and notably, his second Demand and Supply model (Becker (1973), see Grossbard (2010) for the role played by that model in Becker's theory of marriage). In Grossbard-Schechtman model of the allocation of time in markets for labor and marriage not only both markets reach an equilibrium but also each spouse is modelled as having an own individual utility function. The model further considers market work and unpaid household work, setting an opportunity cost for housework -called the "quasi-wage", which is usually not observed. In this model, spousal non-participation in market work may be explained by the spouses' marginal benefit from working being inferior to the marginal value of leisure for an inactive partner (as in a conventional labor supply model) or by the marginal benefit of working being inferior to the marginal benefit of doing house work for the benefit of the spouse. In this model, wages and quasi-wages are set at the equilibrium of both the marriage market and the labor market. This model is quite general and encompasses all types of households, including traditional male-breadwinner households, less conventional female-breadwinner households, in which only one spouse participates in market work, as well as non-corner solutions, with both spouses participating in market work. Marriage matching and spouses' allocation of time to the labor force are simultaneously determined and could reflect equilibrium conditions in various submarkets for workers in the labor force and for those who perform household production for the benefit of a spouse. This model does not exclude positive assortative mating as many interrelated marriage markets set prices for various characteristics that are valuable in marriage. However, like Becker, Grossbard-Schechtman predicts negative assortative mating by wage in couples who chose a specialized division of labor (corner solutions). It follows that female earnings-dominance within the household would be associated with the wife paying a "quasi-wage" to lesser skilled husband who would then work fewer hours than the wife (possibly zero market hours). While we

do not observe intra-household monetary transfers, we know partners' working hours, and thus we can test whether the husband works shorter or zero hours when the wife is the main earner. Moreover, Grossbard (2013b) provides a theoretical framework and derives testable predictions for situations in which only one partner participates in market work. These predictions are tested empirically (see the econometric model):

- "A woman considerably younger than her husband is more likely to be in a "male-breadwinner" marriage and less likely to be in a "female-breadwinner" one."
- The respective life-cycle position of each partners may contribute to determine labor supply outcomes. In particular, spousal age differences may affect spousal labor supply differently when spouses are "prime age" than at later stages of their life.
- Relative to cohabiting couples, married couples are more likely to be male-breadwinner.
- Relative to childless couples, couples with young children are more likely to be male-breadwinner.
- "The higher the own wage, the higher the amount of labor supplied and the more it is likely that an individual will be a sole breadwinner. Therefore, both men and women who earn higher wages are more likely to be sole breadwinners."

In particular, the first set of predictions are associated in Grossbard's model with the so-called "trophy wife" effects of youth (when the husband is older, he is more likely to be the sole earner) or of wealth (the older husband is wealthier than average and he is more likely to be the sole earner). The model also predicts that the younger wife who is less likely to work for pay in the market is more attractive than average. The "trophy wife" of Grossbard's model would translate in this study into a"trophy husband" situation in which the older wife may, for example, be wealthier than average, and the younger husband, more attractive than average.

In contrast, Grossbard's model derives no prediction concerning the effect of relative education of spouses on the labor they supply since higher education affects both wages and "quasi-wages". Under a "power" couple scenario, both partners have college education and cluster in big cities that offer more job opportunities for both spouses (Costa and Kahn, 2000). Here, we argue that under a "power-couple" scenario, her earnings superiority would

be associated with positive assortative mating (similar age and education level of partners) and possibly due to the random allocation of jobs in the local labor market.

4 The econometric model

Our empirical specification is based closely on the theoretical predictions of the model put forward by Grossbard (2013b) that derives implications for the occurrence of female-breadwinner (or wife sole earner), male-breadwinner (or male sole earner) and two-earner households. Here, we shall model the correlations between the occurrence of couples in which the wife is the main earner and a set of indicators of partners' age differences, controlling for education differences, the presence and age of children and the local labor market conditions, as well as the cohort of birth and individual specific effects. We focus on the extensive labor supply margin to avoid selection bias and thus, we specify a four-equation model of partners' employment and hourly wages, allowing for random effects and unrestricted correlations between the unobservables of the four equations. We also include in the analysis partners with missing hourly wages either because of misreporting or because of non-employment.[1] This also enables us to simulate, within the model, (potential) wage rates for individuals out of work -thus we do not need to restrict attention to households in which both partners are employed. Therefore, we distinguish the following outcomes:

1. Both partners are out of work.
2. The husband is employed and the wife is not- 'male-breadwinner' (or husband sole earner) couple.
3. The wife is employed and the husband is not- 'female-breadwinner' (or wife-sole-earner) couple.
4. Both partners are employed - dual-earners.
5. Both partners are employed and the wife's wage rate is higher than the husband's wage rate - 'wife-outearning' dual-earners.

[1] This is done when modelling their likelihood contribution. See the earlier working paper version of this study for details.

Although we are interested only in the third and the fifth outcome above, we allow for all these possibilities to avoid selection bias.[2] Let $d_{kit} = 1$ if the partner is employed, $d_{kit} = 0$ otherwise, where m stands for the male partner and f for the female partner, $i = 1, ..., N$ denotes the couple, and $t = 1, ..., T$ time. The employment probability is explained by observable individual and partner's characteristics $x_{kit}, k = m, f$, such as age and education differences of partners, marital status, presence and age of children, cohort effects, gender-specific unemployment rates and year dummies. We also include unobserved random effects $\alpha_{ki}, k = m, f$, and an idiosyncratic error, $\epsilon_{kit}, k = m, f$:

$$\begin{array}{l} d^*_{kit} = \gamma_k \prime x_{kit} + \alpha_{ki} + \epsilon_{kit}, k = m, f, t = 1, ..., T, i = 1, ..., N \\ d_{kit} = \iota(d^*_{kit} > 0) \end{array} \tag{1}$$

Similarly, hourly wage rates, w_{kit}, depend on observed characteristics n_{kit}, a random effect, ω_{ki}, and an idiosyncratic error, $u_{kit}, k = m, f$:

$$\ln w_{kit} = \eta'_j n_{kit} + \omega_{ki} + u_{kit}, \tag{2}$$

with $k = m, f, t = 1, ..., T$, and $i = 1, ..., N$.

To identify hourly wages we include work experience and cross-effects of education and experience. Using longitudinal data also helps achieving identification. However, we do not have exogenous sources of variation in hourly wages at hand (such as a policy change) and thus, we do not claim to estimate causality relations. We also include random effects in the employment and wage equations, assuming that they are identically and independently normally distributed across households. These represent unobserved individual heterogeneity,

[2] It is tempting to follow a naive approach and model the outcomes above using a multinomial logit or multinomial probit model, in which (to circumvent overlap between the latter two categories), category 4 would be redefined as dual-earners with the wife's wage lower than the husband's wage. However, under this alternative set up (used in most earlier work in this area), we would not be able to classify partners with missing wages information nor to control for the possible endogeneity of wages. This last matters because partners with higher hourly wage rates are actually more likely to be employed and may also work longer hours.

such as, for example, unobserved preferences and characteristics.[3]

$$\begin{pmatrix} \alpha_i \\ \omega_i \end{pmatrix} \equiv \begin{pmatrix} \alpha_{mi} \\ \alpha_{fi} \\ \omega_{mi} \\ \omega_{fi} \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma^2_{m,\alpha} & \sigma_{mf,\alpha} & \sigma_{m,\alpha\omega} & \sigma_{mf,\alpha\omega} \\ \sigma_{mf,\alpha} & \sigma^2_{f\alpha} & \sigma_{fm,\alpha\omega} & \sigma_{f,\alpha\omega} \\ \sigma_{m,\alpha\omega} & \sigma_{fm,\alpha\omega} & \sigma^2_{m,\omega} & \sigma_{mf,\omega} \\ \sigma_{mf,\alpha\omega} & \sigma_{f,\alpha\omega} & \sigma_{mf,\omega} & \sigma^2_{f,\omega} \end{pmatrix} \right) \tag{3}$$

Similar assumptions are made for the idiosyncratic errors:

$$\begin{pmatrix} \epsilon_{it} \\ u_{it} \end{pmatrix} \equiv \begin{pmatrix} \epsilon_{m,it} \\ \epsilon_{f,it} \\ u_{m,it} \\ u_{f,it} \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \sigma_{mf,\epsilon} & \sigma_{m,\epsilon u} & \sigma_{mf,\epsilon u} \\ \sigma_{mf,\epsilon} & 1 & \sigma_{fm,\epsilon u} & \sigma_{f,\epsilon u} \\ \sigma_{m,\epsilon u} & \sigma_{fm,\epsilon u} & \tau^2_m & \tau_{mf} \\ \sigma_{mf,\epsilon u} & \sigma_{f,\epsilon u} & \tau_{mf} & \tau^2_f \end{pmatrix} \right) \tag{4}$$

To construct the likelihood function, we specify partners' joint probability of employment and partners' hourly wage rates joint density (see Appendix A for extensive details of the specification). The model is estimated by simulated maximum likelihood. We use the estimated parameters from this model to compute a variety of post-estimation results, such as, in particular, the correlations between the covariates and the probability that wife outearns the husband.

Finally, we also specify a four simultaneous equation model of partners' hourly wage rates and hours of market work for dual-earners, ignoring selection into employment issues. However, we do not estimate monthly earnings equations as these depend both on the hourly wage rate and the choice of hours, which also depends on the hourly wage rate and thus, is endogenous. Therefore, we estimate partners' hours equations simultaneously with partners' hourly wage equations and specify a joint error structure as in (4). The hours equations we estimate are specified as follows:

$$h_{it,j} = \alpha_{1j} w_{it,m} + \alpha_{2j} w_{it,f} + \alpha_{3j} w_{it,m}/(w_{it,m} + w_{it,f}) + \alpha_{4j} w^2_{it,m} + \alpha_{5j} w^2_{it,f} + z'_{it,j}\gamma_j + \epsilon_{it,j} \tag{5}$$

for $j = m, f$.[4] We allow partners' hours to depend on own and partner's wage rate, using a quadratic specification that allows for non-linearities. We also include the ratio of the husband's wage rate to the the total hourly wages of husband and wife among the regressors

[3] Using fixed effects did not strike us as an interesting alternative. We are interested in the effects of education and age differences of partners and these do not vary much over time.

[4] We do not include random effects, since we found that within group variation in hours for men was fairly small, making the variance of the random effect tend to zero.

of the hours equations, to capture bargaining power (see, for example, Bloemen 2010, for a discussion of bargaining power in the household).

5 The data and descriptive analysis

The sample for the analysis is drawn from the French Labor Force Surveys (LFS) of years 1990 to 2002. We cannot extend our analysis to more recent years, as the LFS series was broken in 2003 to comply with the harmonization requirements of the European Union statistical offices.[5] Around 60,000 households were interviewed each year, and a third was kept in the sample for three years. This rotating feature of the survey enables us to construct a longitudinal sample of couples, each observed for at most three years as we kept in the sample also those couples that were observed for shorter than three years. Therefore, we select a sample of couples with the following characteristics:

- single people were dropped, giving a sample of 588,654 couples
- both partners were aged between 15 and 54 (214,647 older couples were thus dropped)
- neither partner was a military or in education or retired from work (9563 couples were then dropped)
- partners were not self-employed (57,803 couples were dropped).

The self-employed were dropped from the sample as no monthly earnings were recorded for them. The sample cut at age 54 is meant to exclude households subject to specific (early) retirement legislation which enabled the older unemployed to claim benefits without actively searching for jobs.[6] We include both married and unmarried couples in the sample. Records for which the partner changed over time were dropped - these were about 70 in all. The final sample consists of roughly 23,000 couples for each of the years considered, encompassing 306,571 couples.

Labor market status is self-reported. The survey collects information on current monthly earnings, measured at the time of the survey. Earnings are gross of (before) income tax but

[5] The new LFS series started in 2003. The survey is now carried out every quarter, households are followed for a year and a half, and the questionnaire is not much comparable across the old and the new LFS series unfortunately.

[6] There were five couples in all with a partner aged less than 17 and 30 couples with a partner (most of the time the woman) aged 17 years.

net of (after) employers' and employees' social security contributions. Information on usual hours of work, also asked at the time of the survey, is used to construct hourly wage rates. Wages lower than half of the minimum (hourly) wage were set to missing. No information is collected on non-labor income in the LFS surveys. Completed-education dummies increase in education level, with the omitted category being the highest education level, a university or higher degree. We construct a series of dummy variables which account for age and education differences of partners, as follows:

- an indicator for whether the wife had a higher (though below university) level of completed education than the husband (and vice-versa);
- an indicator for whether the wife had a higher (and at least equal to university) level of completed education than the husband (and vice-versa);
- an indicator for the husband (wife) being between two and five years older than the wife (husband);
- an indicator for the husband (wife) being more than five years older than the wife (husband);

The reference category for partners' education differences are those couples in which both partners have at least a university degree (both are college graduates, using standard American terminology). The age differences dummies capture larger than average spousal age differences: the mean age difference between spouses was two years with a standard deviation of around three years. Generally, it is assumed that positive assortative mating is associated with smaller age differences (however, see also Luo and Klohnen, 2005, for a discussion).

We construct cohort dummies, as follows:

- the first cohort includes partners born after 1964;
- the second cohort consists of individuals born between 1955 and 1964;
- and the reference group consists of individuals born before 1955.

Finally, we account for the number of children and the presence of children younger than three (see, for example, Del Boca, Pasqua and Pronzato, 2008, or Pasqua, 2005, for a

discussion of the effect of fertility on women's work). Almost 100% of children aged three and older are at (kindergarten) school in France (see OECD, 2000). Local labor market conditions are captured by the region of residence and size of area of residence dummies. Small cities include rural neighborhoods or urban neighborhoods with less than 20,000 inhabitants.

Table 1 shows the evolution of household types over time (see the econometric set up for these classifications). Male-breadwinner households accounted for an important but declining share of the population: they fell from 35% in 1990 to 25% in 2002. The majority of households were dual-earners: their proportion increased over the period considered by 9 percentage points, going from 58% in 1990 to 67% in 2002. The proportion of women outearning the husband increased by three percentage points over the period considered, according to the comparison of spouses' gross[7] hourly (monthly) earnings. The wife outearned the husband in about 20% (17%) of dual-earners, according to hourly (monthly) earnings.[8] In particular, about 67% (80%) of women who outearned the husband on the basis of observed hourly (monthly) earnings, also did so according to monthly (hourly) earnings. We also show the proportion of couples in which the wife outearned the husbands by, respectively, 5%, 20% and 50%, which averaged to, respectively, 17%, 10% and 4% of the dual-earner sample.

Descriptive statistics are provided in Table 2. The average age difference between partners is about two years. Men in wife-outearning (or 'unconventional') dual-earner households are on average one year younger than men in other household types. The proportion of couples in which the wife is much older (over five years older) than the husband is small, representing about 2% of conventional dual-earners, 3% of male-breadwinner (or husband-sole-earner) households, 4% of either female-breadwinner (or wife-sole-earner) households or unconventional dual-earners. The husband is on average more often older (over five years older) than the wife in both male-breadwinner (21% of these) and female-breadwinner (19% of these) households, relative to conventional (14% of these) or unconventional (11% of these) dual-earners. The proportion of couples in which the husband (the wife) is more

[7] Earnings are gross of (before) income tax but net of (after) employers' and employees' social security contributions.

[8] These figures are equal to, respectively, 12% (10%) for the population of households in the sample.

educated than the wife (the husband) is much larger among couples in which he (she) is the main earner. Therefore, larger educational differences (rather than larger age differences) characterize couples in which one of the two partners is the main earner, which is not surprising since education typically drives earnings.

As far as marital status and presence of children go, male-breadwinner couples are more often married (84% of them are so) and have more children (on average about 2 children) than female-breadwinners, 68% of whom are married and whose average number of children is 1.27 -which confirms Grossbard's predictions (see the theoretical set up) . Among dual-earners, the unconventional couples are only slightly less often married than conventional couples are (75% against 79%) and both have about the same number of kids (respectively, 1.34 and 1.30). Male-breadwinnership is also more likely to be associated with the presence of young children aged less than three years at home (23%) than female-breadwinnership (12%) or conventional (12%) and unconventional (15%) dual-earnship. Therefore, households in which the woman is the main earner (encompassing both female-breadwinners (or wife-sole-eaners) and wife-outearning dual-earners) are on average less likely to be formally married but do not have fewer children or older children at home than conventional dual-earners do.

Moreover, we find that male-breadwinner couples are much less likely to live in the region of Paris which is the biggest metropolitan area in France (14% of them do so) than female-breadwinners (21%) or conventional (18%) and unconventional (19%) dual-earners. Similar patterns obtain for the probability of living in inner Paris. Therefore, not only dual-earners (as suggested by the power-couple literature) but also female-breadwinners (or wife-sole-earner) cluster in big cities.

French nationality is much more common among dual-earners, 93 to 96 per cent of whom are French, than among male-breadwinners (87 per cent of both partners in these couples are French) or female-breadwinners couples, in which 88% of the wives and 83% of the husbands are French. Therefore, couples in which only one partner is at work may also be partly explained by labor market difficulties of the non-French partner rather than by choice.

Finally, men in conventional dual-earner households have higher average gross monthly (and hourly) earnings than male-breadwinners. In contrast, men in unconventional dual-earner households, have lower average gross monthly (and hourly) earnings than male-

breadwinners or conventional dual-earner men. Similar patterns hold for women with outearning wives earning the most and women in conventional dual-earner couples earning the least. Moreover, on average women in unconventional dual-earner couples have about the same hourly wage than men in conventional dual-earner couples but they have smaller monthly earnings, which suggests that outearning women work shorter hours than outearning men (definining 'outearning' in terms of partners' hourly wages). It follows that the total household monthly earnings (the sum of the earnings of two partners) is on average the largest for conventional dual-earner couples, followed by unconventional dual-earners and far below, by male-breadwinners and female- breadwinners -these last being the 'poorest' of all couples. This seems to contradict the prediction of Grossbard (2013b) that the earnings of male (female) breadwinner would be relatively higher than those of (comparable) dual-earners. The emergency of power couples more than the equilibrium in the marriage market may perhaps explain these intriguing patterns.

6 Results of estimation

We are interested in the occurrence of households in which the woman is the main earner. According to the economics of marriage, these households may be associated with larger age differences between the partners (see the conceptual framework). If there is (negative) marriage selection, the main earner in the household may also work longer hours (see the econometric specification). An added worker effect -which implies that she is the main earner because he is experiencing labor market difficulties - would also predict that the husband works shorter or zero hours in households in which the wife is the main earner (see Mincer, 1962). However, if her earnings dominance correlates with smaller age differences, then perhaps power couples (see Costa and Kahn, 2000) could provide an alternative framework to explain her earning dominance. Here we investigate the correlations between female earnings dominance and partners' age differences, controlling also for partners' education and gender specific unemployment rates.

The econometric model fits well the data according to the predicted probabilities (computed for each household type and averaged over time) as they are very close to the actual

probabilities.[9] Most of the explanatory variables of the hourly wage equations are statistically significant as expected. Wages correlate positively with education levels as usual.[10] In particular, wages are also positively associated with work experience (except for the lower educated for whom such correlations are insignificant or negative). The number of children correlates negatively with the employment rate and this correlation is much smaller in size for the husband than the wife, as customary. The presence of young pre-school children also correlates negatively with employment for both partners, and this correlation is much larger for women. Cohort effects are not always significant, with younger women experiencing more labor market difficulties. The own employment probability is positively associated with the own education level, the reference category being the highest education level, a university degree (see Table 3). We find that if the wife has a university degree and the husband has not, this correlates negatively with his employment probability but positively with hers. If the wife is more educated than the husband but she does not have a university degree, this correlates positively with both partners' employment probability. The reminder case in which the husband is more educated than the wife correlates negatively with both partners' employment rates. Because education affects both individual's earnings and marriage, it is difficult to interpret these findings in terms of marriage (mis-) matches, they may also reflect differential employment opportunities and earnings for individuals with different levels of education. Finally, most of the estimated correlation coefficients are significantly different from zero.[11]

Let us then turn to age differences. If either partner is more than five years older than the other, this correlates negatively with both partners' employment probabilities (see Table 3). If she is between two and five years older than him, both partners' employment probabilities fall. If the husband is between two and five years older than the wife, his employment probability falls and hers increases. These findings suggest that when spouses are closer in age, this correlates positively with their labor supply. When age differences are bigger

[9] See earlier working paper version of this study. The full results of estimation of the four equations model are also provided in an earlier working paper version of this study.

[10] Full estimates of the parameters of the wage equations can be found in an earlier working paper version of this study.

[11] Full estimates of the parameters of the covariance matrix can be found in an earlier working paper version of this study.

than 5 years, both spouses work less, making it less likely to find dual earner couples among them. Those couples in which partners have more than 5 years age difference may capture very different scenarios. In particular, couples in which the younger partner is less likely to work for pay in the market may include couples in which the older spouse is wealthier than average and the younger spouse is more attractive than average -as in the "trophy wife" case of Grossbard's models in which the older husband is wealthier than average and the younger wife is more attractive than average. However, we do not observe here neither characteristic and therefore, we can not test the validity of this prediction. Couples in which the older spouse is less likely to work may alternatively, be characterized by (unobserved) negative characteristics of both partners. For example, the younger partner may have unobserved negative characteristics that affect negatively both marriage and employment prospects and thus lead them to marry an older person (that also has similar negative characteristics that affect negatively both marriage and employment chances). In contrast, when spouses are closer in age (2 to 5 years apart), perhaps their relative physical attractiveness and employment opportunities are not that different. If the older spouse is considerably more attractive physically, perhaps the younger spouse will provide more market labor as well as more unpaid labor.

Next, we computed the marginal estimates (see Table 4), evaluated at sample means unless otherwise specified.[12] We are especially interested in the associations between partners' age differences and the likelihood of observing female earnings-dominance.[13] Large age differences between the partners correlate negatively with the probability of observing a wife-outearning dual-earner household while they are positively associated with female breadwinnership (or wife-sole-earnship). Larger age differences between the partners increase the probability of observing a couple in which only one partner participates in the labor market (either the husband or the wife). We find "trophy wife" effects of youth (when the husband is older, he is more likely to be the sole earner) and "trophy husband" effects

[12] To compute the probabilities, the values of the continuous and count covariates were set to their sample means. To compute the marginal effects of age (experience) we increased the sample mean of age (experience) by one year. Dummy variables have been set at their reference values, so the marginal effects show deviations from the reference category.

[13] For reasons of conciseness, we do not show these associations for "both-out-of work", and "dual-earners" partners. These can be found in an earlier working paper version of this study.

(when the wife is older, she is more likely to be the sole earner) in line with Grossbard's theory.

To test for Grossbard's prediction that the age difference between the two partners has different effects on their participation rates depending on the age of the husband, we also interacted partners' age differences with the following husband's age dummies: up to 35 years, 35 to 45 years, and older than 45 (see Table 5). In addition to dummies for partners' age differences of more than 5 years, we also controlled for whether the husband was more than 10 years older than the wife.[14] The results of estimation of this specification are in line with those of our main specification (see Tables 3 and 8, respectively): larger age differences between the partners are associated with a lower employment probability of both the husband and the wife, irrespective of who is the older partner between the two, but if the husband is older than 45, the five-year-older wife is not significantly likely to sole earner anylonger (there is no "trophy husband" effect for husbands aged 45 or more). Therefore, the "trophy husband" effect appears to be a function of the spouses' age difference as well as the age of the younger spouse, as predicted by Grossbard. The negative effect on partners' employment probabilities ("trophy wife" effect) is considerably larger in absolute value for couples in which the husband is more than 10 years older than the wife (and this holds true whatever the age of the husband). The "trophy wife" effect decreases as couples age: an age difference of ten or more years between spouses translates into an increase of 0.052 in the probability of a man sole earner if he is under 35 and she is under 25, but as they age the coefficient decreases to 0.37 and 0.33; a 5 year age difference increases the probability of a man being sole earner by 0.11 if he is under 35 but if he is 45 or older (and the wife is 40 or older) there is no more trophy wife effect and on the contrary he is less likely to be sole earner.

Larger education differences in favour of the wife are associated positively with female earnings-dominance, while the opposite is true when the difference is in favour of the husband,

[14] To be more specific, we distinguish here couples in which the wife is 5 years older, couples in which the husband is between 5 and 10 years older, and couples in which the husband is 10 or more years older. The default category includes all couples in which partners are less than five years apart. Couples in which the wife is more than 10 years older than the husband are very rare. Therefore, we did not create an additional dummy category for these couples. Indeed, there are more couples with a more than 10 years older husband than couples with a more than 5 years older wife.

as plausible. If both partners have less than high-school this correlates strongly and positively with the probability of observing a female or male breadwinner household, but negatively with observing dual-earner couples in which the wife is the main earner. Moreover, we find that cohabiting couples are more likely to be female-breadwinner (or wife-sole-earner), which is consistent with Grossbard's (2013b) prediction that cohabiting couples are less likely to be male-breadwinner households. Female breadwinnership is also positively associated with the husband not being French, while the opposite holds true for wife-outearning dual-earners. This again suggests that the two type of households are very different, in spite of the fact that in both the wife is the main earner. The number and presence of children correlates negatively with both types of female earnings-dominance, as predicted by Grossbard (2013b). Finally, the male unemployment rate does not correlate significantly with the probability of female earnings-dominance, thus indicating little scope for "added-worker" type of effects -if the wife's labor supply would be driven by the husband's unemployment as predicted by the so called- "added-worker" hypothesis, then the wife's employment probability should correlate significantly with the male unemployment rate in our model.

It is striking and unexpected that female-breadwinner households are quite different from wife-outearning dual-earners in spite of the fact that both types of households are strongly and positively associated with large education differences in favour of the wife. Wife-solo-earner households are generally associated with lower education levels and larger age differences of partners while dual-earners in which she outearns him correlate positively with both partners 'education. Morever, female-breadwinners are positively associated with large age differences between partners while the opposite is true for wife-outearning dual earners.

To test for the robustness of our results to different sample cuts, we re-estimated the model, respectively, for the subsample of childless couples (see Table 6) and for the subsample of married couples, dropping cohabiting couples (see Table 7), to conclude that our findings were quite robust. When restricting the sample to childless couples, the correlation between the occurrence of female breadwinnership and the husband being between 2 and 5 years older than the wife becomes insignificant (see Table 6). However, the negative correlation between female-breadwinnership and him being more than five years older than she is remains

statistically significant as in our main model. In the sample of married couples, we find a much smaller "trophy husband" effect than in Table 4 (including cohabiting couples), 0.009 versus 0.023, but the "trophy wife" effect is larger (0.023 versus 0.014). Grossbard's theory predicts that married couples are more likely to be male-sole-earner than cohabiting couples, which is in line with finding a stronger trophy wife effect and a weaker trophy husband effect for married couples.

Finally, we estimated partners' hours equations jointly with partners' gross hourly wage rate equations (see the econometric specification). We find an overall positive correlation between own hours and own wage rate for both the husband and the wife (see Table 8). The cross-wage effects are also positive, although the wife's hours correlate negatively with the wage ratio suggesting that the lower is her wage rate relative to the husband's wage, the fewer hours she works. As far as the husband goes, the higher his wage relative to hers, the lesser he works. In particular, we find that larger age differences between partners correlate negatively with the hours of the husband. Her hours correlate positively with her being older than him and negatively with him being older than her. Larger education differences between the partners correlate positively with the hours of the husband, though when she is more educated than him these correlations are much less significant. Cohabitation correlates negatively with the hours of the husband and positively with those of the wife. This is in line with the finding in the time use literature that cohabiting men do more housework than married men do and, likewise, cohabiting women do less housework than married women do (see, for example, Stancanelli and Stratton, 2013) -however, it is not what a marriage equilibrium model would predict. The number and age of children correlates insignificantly with his hours and negatively with hers, though the presence of young pre-school children is positively associated with her working hours. This is possibly due to employment selection as we have considered here only dual-earners. Therefore, we find that older women work longer hours in the market as predicted by Grossbard but not so older husband.

7 Conclusions

In this paper, we study couples in which the wife is the main earner. This issue is relevant because earlier studies found that control of economic resources by the wife often correlates positively with children's outcomes. According to the economics of marriage, the wife's earnings-dominance may compensate for the husband's younger age or possibly his greater physical attractiveness. Couples in which parters have large age differences may capture very different scenarios. In particular, the younger spouse may have negative characteristics (unobserved here) that affect negatively both their marriage and employment prospects and thus, marry an older person that also has (unobserved) negative characteristics or the older spouse may be more attractive physically or financially, -the case of the "trophy" spouse in Grossbards' models in which the younger spouse may provide less market labor and more house work. However, the occurrence of female earnings-dominance may also be related possibly, to labor market shocks hitting the husband (added-worker effect) or to the emergency of "power" couples. Under a "power-couple" scenario, her earnings superiority would be associated with positive assortative mating (similar age and education level of partners) and possibly due to the random allocation of jobs in the local labor market.

Therefore, we investigate the statistical correlations between observing households in which the wife earns a higher hourly wage than the husband and partners' age differences as well as education differences (that typically proxy positive assortative mating) and gender-specific unemployment rates (to capture added-worker type of effects). To this end, we specify a four simultaneous equation model of employment and hourly wages of partners, allowing for random individual effects. Our econometric specification enables us to include non-participants as well as observations with missing wages in the estimation sample. We use longitudinal data for France to estimate our model. Our sample includes about 300,000 French couples. Out of these, we observe 12,000 (about 4 per cent of the sample) couples in which the wife is the sole worker and 35,000 (about 12 per cent of the sample) dual-earner households in which the wife earns more than the husband.

We find surprisingly that female-breadwinner households are quite different from wife-outearning dual-earners in spite of the fact that both types of households are strongly and

positively associated with large education differences in favour of the wife. Wife-solo-earner households are generally associated with lower education levels and larger age differences of partners while dual-earners in which she outearns him correlate positively with both partners 'education. Therefore, households in which the wife is the only worker are more likely to be associated with larger age differences between the partners, in line with a "trophy husband" story in Grossbard's models. In contrast, the occurrence of wife-outearning dual-earners is positively associated with small age differences between partners, suggesting that perhaps the emergency of "power couples", college graduates dual-earners, may explain the occurrence of dual-earner households in which the wife outearns the husband.

We also find that couples in which the husband is non-French and the wife is French are more likely to be households in which the wife is the only worker, which again in line with a "trophy husband" type of story. In contrast, partners are more likely to be both French among dual-earners couples as well as among dual-earners in which the wife outearns the husband. Finally, we conclude that the wife's hours correlate positively with the wife being older than the husband and negatively with the husband being older than the wife, in line with the prediction of Grossbard. The larger the spousal age difference, the fewer hours the husband works though which is unexpected. Therefore, we conclude that a marriage selection type of story may explain the occurrence of female solo-earner households while the emergency of "power couples" may explain the occurrence of dual-earner households in which the wife outearns the husband.

References

Becker Gary (1973), "A Theory of Marriage: Part I ", Journal of Political Economy, Vol. 81, pp. 813-846.

Marianne Bertrand, Emir Kamenica, and Jessica Pan (2013), "Gender identity and relative income within households", mimeo.

Bloemen, Hans (2010), "An Empirical Model of Collective Household Labour Supply with Nonparticipation", The Economic Journal, Vol. 120, No. 543, pp. 183-214.

Börsch-Supan, A. and V. Hajivassiliou (1993), "Smooth unbiased multivariate probability simulators for maximum likelihood estimation of limited dependent variable models", Journal of Econometrics, Vol. 58, no. 3, pp.347-368.

Bureau of Labor Statistics(2004), Women in the Labor Force: a databook (report 973), Washington DC, Bureau of Labor Statistics, US Department of Labor.

Del Boca, Daniela, Pasqua, Silvia and Pronzato, Chiara (2009), "Motherhood and market work decisions in institutional context: a European perspective," Oxford Economic Papers, Oxford University Press, vol. 61 (suppl 1), pp. i147-i171.

Del Boca Daniela , Pasqua Silvia and Pronzato Chiara (2007), "An Empirical Analysis of the Effects of Social Policies on Fertility, Labour Market Participation and Earnings of European Women", in Social Policies, Labour Markets and Motherhood: a Comparative Analysis of European Countries, Daniela Del Boca and Cecile Wetzels (eds.), Cambridge University Press

Chiappori, Pierre Andre, Iyigun and Yoram Weiss (2008), "An Assignment Model with Divorce and Remarriage", IZA Discussion Papers 3892, Institute for the Study of Labor (IZA).

Chiappori, Pierre Andre, Iyigun and Yoram Weiss (2009), "Investment in Schooling and the Marriage Market", American Economic Review, vol. 99 (5), pp. 1689-1713.

Chiappori, Pierre Andre, Sonia Oreffice and Climent Quintana-Domeque (2012), "Fatter Attraction: Anthropometric and Socioeconomic Matching on the Marriage Market", Journal of Political Economy, University of Chicago Press, 120(4), pp. 659-695.

Coles, Melvyn G. and Francesconi, Marco (2011), "On the Emergence of Toyboys: The Timing of Marriage with Aging and Uncertain Careers", International Economic Review, Vol. 52, Issue 3, pp. 825-853.

Costa, Dora and Kahn, Mathew E. (2000), "Power Couples: Changes in The Locational Choice of the College Educated, 1940-1990", The Quarterly Journal of Economics, Vol. 115 (4), pp. 1287-1315.

Choo, Eugene, Shannon Seitz and Aloysius Siow (20O8), "Marriage Matching, risk sharing and spousal labor supplies", University of Toronto WP 332.

Dubois, Pierre and Rubio-Codina, Marta (2009), "Child Care Provision: Semiparametric Evidence from a Randomized Experiment in Mexico" CEPR Discussion Papers 7203.

Drago, R., Black, D. and Wooden, M. (2005), "Female breadwinner families: their existence, persistence and sources", Journal of Sociology, Vol. 41, No.4, pp. 343-362.

Grossbard-Shechtman, Amyra (1984), "A Theory of Allocation of Time in Markets for Labour and Marriage", The Economic Journal, Vol. 94, pp. 863-882.

Grossbard-Shechtman, Shoshana (1993). "On the Economics of Marriage - A Theory of Marriage, Labor and Divorce", Boulder, CO: Westview Press, 1993.

Grossbard-Shechtman, Shoshana (2003), "A Consumer Theory with Competitive Markets for Work in Marriage", Journal of Socio-Economics, Vol. 31(6): 609-645, 2003.

Grossbard Shoshana, (2010), "How 'Chicagoan' are Gary Becker's Economic Models of Marriage?", Journal of the History of Economic Thought, 32(3):377-395, September.

Grossbard Shoshana, (2013a), "On the Economics of Marriage", Second edition, forthcoming, Springer.

Grossbard Shoshana, (2013b), "Hedonic Marriage Markets and the Prevalence of Male-Breadwinner Households", published in 'Family Economics: How the Household Impacts Markets and Economic Growth', edited by Esther Redmount, ABC-CLIO, forthcoming.

Haddad, Laurence, J. and Hoddinott, J. (1995), "Does Female Income Share Influence Household Expenditure? Evidence from Cote d'Ivoire", Oxford Bulletin of Economics and Statistics, vol. 57 (1), pp. 77-96.

Haddad, Laurence and Kanbur, Ravi. (1992), "Intrahousehold inequality and the theory of targeting", European Economic Review, vol 36 (2-3), pp. 372-378.

Hitsch G. J., A. Hortacsu, and D. Ariely (2010, "Matching and Sorting in Online Dating", American Economic Review, vol. 100 (1), pp. 130-163.

Juhn, C. and Murphy, K. M. (1997), "Wage Inequality and Family Labor Supply", Journal of Labor Economics, vol 15(1), pp.72-97.

Lundberg, Shelly (1988), "Labour Supply of Husbands and Wives: A Simultaneous Equations Approach", The Review of Economics and Statistics, Vol 70(2), pp.224-235.

Lundberg, Shelly and Robert A. Pollak (1993), "Separate-Spheres Bargaining and the Marriage Market," Journal of Political Economy, Vol 101, pp.988-1010.

Luo, S. and Klohnen, E (2005), "Assortative Mating and Marital Quality in Newlyweds", Journal of Personality and Social Psychology, 2005, v88, no2.

Mansour, Hani and Terra McKinnish (2013), "Who Marries Differently-Aged Spouses? Earnings, Ability and Appearance", Review of Economics and Statistics, forthcoming.

Mincer Jacob (1962), "Labor Force Participation of Married Women: A Study of Labor Supply", Princeton University Press.

Minetor, R. (2006), "Breadwinner wives and the men they marry: how to have a successful marriage while out-earning your husband", New Horizon Press Publisher.

OECD (2001), Employment Outlook,"Balancing Work and Family Life: Helping Parents into Paid Employment", Chapter 4, , June 2001, OECD, pp. 129-162.

Pappenheim, Henriette And Graves, Ginnie (2005), "Bringing home the bacon: making marriage work when she makes more money", Harper Collins publishers, New York.

Pasqua, Silvia (2005), "Gender Bias in Parental Investments in Children's Education: A Theoretical Analysis," Review of Economics of the Household, Springer, vol. 3(3), pages 291-314, 09.

Pencavel, John (1998), "Assortative Mating by Schooling and the Work Behavior of Wives and Husbands", American Economic Review, Vol. 88, No. 2, pp. 326-329.

Rizavi S. et Sofer C. (2010), "Household Division of Labor : Is There Any Escape From Traditional Gender Roles ?", Cahierts de la MSE 2010.09.

Stancanelli, Elena and Stratton, Leslie (2013), "Her Time, His Time, or the Maid's Time: An Analysis of the Demand for Domestic Work", Economica, forthcoming.

Qian, Zhenchao (1998), "Changes in Assortative Mating: The Impact of Age and Education, 1970-1990", Demography, 35(3), pp.279-292.

Sussman, D. and Bonnell S. (2006), "Ces femmes qui sont le principal soutien de famille", Statistique Canada, Perspective, No. 75-001-XIF, pp.10-18.

Winkler, Anne E., McBride, T., and Andrews, C., (2005), "Wives Who Outearn Their Husbands: A Transitory Or Persistent Phenomenon", Demography, Vol. 42, No. 4, pp. 525-535.

Winkler, Anne E. (1998), "Earnings of husbands and wives in dual-earner families", Monthly Labor Review, Vol. 121, No. 4, April, pp. 42-48.

A Likelihood contributions

The model equations (1) and (2) and the distributional assumptions (3) and (4) are used to construct the likelihood contributions for the different types of observations.

Consider a household i with both spouses employed in year t, $(d_{mit} = 1, d_{fit} = 1)$, and where wages, respectively, w_{mit} and w_{fit}, are observed for both spouses. Unobserved characteristics are denoted by $(\alpha_i, \omega_i)'$. We first construct the probability that both spouses are employed, conditional on the unobservables $(\alpha_i, \omega_i)'$

We define the covariance matrix of the idiosyncratic errors (4) as:

$$\begin{pmatrix} \Sigma_\epsilon & \Sigma_{\epsilon u}\prime \\ \Sigma_{\epsilon u} & \Sigma_u \end{pmatrix} \equiv \begin{pmatrix} 1 & \sigma_{mf,\epsilon} & \sigma_{m,\epsilon u} & \sigma_{mf,\epsilon u} \\ \sigma_{mf,\epsilon} & 1 & \sigma_{fm,\epsilon u} & \sigma_{f,\epsilon u} \\ \sigma_{m,\epsilon u} & \sigma_{fm,\epsilon u} & \tau_m^2 & \tau_{mf} \\ \sigma_{mf,\epsilon u} & \sigma_{f,\epsilon u} & \tau_{mf} & \tau_f^2 \end{pmatrix} \tag{6}$$

We assume that the density distribution of the idiosyncratic errors of the employment equation, $\epsilon_{mit} = (\epsilon_{mit}, \epsilon_{fit})'$, conditional on the errors $u_{it} = (u_{mit}, u_{fit})'$ of the wage equation, is normal:

$$\epsilon_{it}|u_{it} \sim N(\Sigma'_{\epsilon u}\Sigma_u^{-1}u_{it}, \Sigma_\epsilon - \Sigma'_{\epsilon u}\Sigma_u^{-1}\Sigma_{\epsilon u}) \tag{7}$$

$$\Sigma_{\epsilon|u} := \Sigma_\epsilon - \Sigma'_{\epsilon u}\Sigma_u^{-1}\Sigma_{\epsilon u} := \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{pmatrix} \text{ and } \begin{pmatrix} \mu_1(u_{it}) \\ \mu_2(u_{it}) \end{pmatrix} = \Sigma'_{\epsilon u}\Sigma_u^{-1}u_{it} \tag{8}$$

We write $P(d_{m,it} = 1, d_{f,it} = 1|w_{m,it}, w_{f,it}, \alpha_i, \omega_i)$.

The employment probability of spouse k (see equation (1)) is as follows:

$$d_{kit} = 1 \text{ if } d^*_{kit} = \gamma'_k x_{kit} + \alpha_{ki} + \epsilon_{kit} > 0 \text{ or } \epsilon_{kit} > -\gamma'_k x_{kit} - \alpha_{ki} \tag{9}$$

Given (9), (7) and (8), we can write:

$$P(d_{m,it} = 1, d_{f,it} = 1|w_{m,it}, w_{f,it}, \alpha_i, \omega_i) =$$

$$\int_{-(x'_{fit}\gamma_f + \mu_2(u_{it}) + \alpha_{fi})/\sigma_2}^{\infty} \Phi\left(\frac{x'_{mit}\gamma_m + \alpha_{mi} + \mu_1(u_{it}) + \frac{\sigma_{12}}{\sigma_2}\nu}{\sqrt{\sigma_1^2 - \frac{\sigma_{12}^2}{\sigma_2^2}}} \right) \frac{1}{\sqrt{2\pi}} \exp\left\{ -\frac{1}{2}\nu^2 \right\} d\nu \tag{10}$$

with

$$u_{kit} = \ln w_{kit} - \eta'_k n_{kit} - \omega_{ki}, k = m, f$$

The joint density of wages, conditional on $(\alpha_i, \omega_i)'$ is then:

$$f(w_{mit}, w_{fit}|\omega_i, \alpha_i) = \frac{1}{w_{mit}, w_{fit} 2\pi |\Sigma_u|^{1/2}} \exp\{-\frac{1}{2}(\ln w_{it} - \eta' n_{it} - \omega_i)' \Sigma_u^{-1} (\ln w_{it} - \eta' n_{it} - \omega_i)\} \tag{11}$$

with $\eta' n_{it} \equiv (\eta'_m n_{mit}, \eta'_f n_{fit})'$ and $\ln w_{it} \equiv (\ln w_{mit}, \ln w_{fit})'$. Finally, let $l_{it}(\alpha_i, \omega_i)$ be the joint probability density of this household with $(d_{mit} = 1, d_{fit} = 1, w_{mit}, w_{fit})$:

$$l_{it}(\alpha_i, \omega_i) = P(d_{mit} = 1, d_{fit} = 1|w_{mit}, w_{fit}, \alpha_i, \omega_i) \times f(w_{mit}, w_{fit}|\omega_i, \alpha_i) \tag{12}$$

Second, we consider households in which we observe the employment status of the spouses, but not the wage rate (for either one or both spouses). This occurs if either monthly earnings or usual hours of work are missing. The wage rate is also set to missing if it is less than half of the mimimum wage (see the data section). Take first the case of dual-earners, $(d_{mit} = 1, d_{fit} = 1, w_{fit})$, where we do not observe the husband's wage rate. From (4) we know the joint distribution of the idiosyncratic errors of the employment equation and the error of the wife's wage equation:

$$\begin{pmatrix} \epsilon_{m,it} \\ \epsilon_{f,it} \\ u_{f,it} \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \sigma_{mf,\epsilon} & \sigma_{mf,\epsilon u} \\ \sigma_{mf,\epsilon} & 1 & \sigma_{f,\epsilon u} \\ \sigma_{mf,\epsilon u} & \sigma_{f,\epsilon u} & \tau_f^2 \end{pmatrix} \right) \tag{13}$$

The conditional density of ϵ_{it} on u_{fit} is normal

$$\begin{pmatrix} \epsilon_{mit} \\ \epsilon_{fit} \end{pmatrix} |u_{fit} \sim N\left(\begin{pmatrix} \mu_1(u_{it}) \\ \mu_2(u_{it}) \end{pmatrix}, \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{pmatrix} \right) \tag{14}$$

with

$$\begin{aligned} \mu_1(u_{it}) &= \tfrac{\sigma_{mf,\epsilon u}}{\tau_f^2} u_{fit} \\ \mu_2(u_{it}) &= \tfrac{\sigma_{f,\epsilon u}}{\tau_f^2} u_{fit} \\ \sigma_1^2 &= 1 - \tfrac{\sigma_{mf,\epsilon u}^2}{\tau_f^2} \\ \sigma_{12} &= \sigma_{mf,\epsilon u} - \tfrac{\sigma_{mf,\epsilon u}\sigma_{f,\epsilon u}}{\tau_f^2} \\ \sigma_2^2 &= 1 - \tfrac{\sigma_{f,\epsilon u}^2}{\tau_f^2} \end{aligned} \tag{15}$$

We can then compute $P(d_{mit} = 1, d_{fit} = 1|w_{fit}, \alpha_i, \omega_i)$ as in expression (10), but applying the conditional means and variances specified in the block (15). The complete likelihood contribution, $l(\alpha_{it}, \omega_{it})'$ for this household in year t, is obtained by multiplying this probability by the marginal density of the wife's wage, conditional on the unobservables.

Similarly, we can construct the likelihood contribution of dual-earner households where the wife's wage is missing. The relevant conditional means and variances are:

$$\begin{aligned}
\mu_1(u_{it}) &= \tfrac{\sigma_{m,\epsilon u}}{\tau_m^2} u_{mit} \\
\mu_2(u_{it}) &= \tfrac{\sigma_{fm,\epsilon u}}{\tau_m^2} u_{fit} \\
\sigma_1^2 &= 1 - \tfrac{\sigma_{m,\epsilon u}^2}{\tau_m^2} \\
\sigma_{12} &= \sigma_{mf,\epsilon u} - \tfrac{\sigma_{fm,\epsilon u}\sigma_{m,\epsilon u}}{\tau_m^2} \\
\sigma_2^2 &= 1 - \tfrac{\sigma_{fm,\epsilon u}^2}{\tau_m^2}
\end{aligned} \tag{16}$$

For dual-earner households with missing wages for both spouses, we write:

$$P(d_{m,it} = 1, d_{f,it} = 1 | \alpha_i, \omega_i) =$$

$$\int_{-(x'_{fit}\gamma_f + \alpha_{fi})}^{\infty} \Phi\left(\frac{x'_{mit}\gamma_m + \alpha_{mi} + \sigma_{mf,\epsilon}\nu}{\sqrt{1 - \sigma_{mf,\epsilon}^2}} \right) \frac{1}{\sqrt{2\pi}} \exp\left\{ -\frac{1}{2}\nu^2 \right\} d\nu \tag{17}$$

Third, we construct the likelihood contribution of wife-sole-earner households when we observe the wage:

$$P(d_{m,it} = 0, d_{f,it} = 1 | w_{f,it}, \alpha_i, \omega_i) =$$

$$\int_{-(x'_{fit}\gamma_f + \mu_2(u_{it}) + \alpha_{fi})/\sigma_2}^{\infty} \left[1 - \Phi\left(\frac{x'_{mit}\gamma_m + \alpha_{mi} + \mu_1(u_{it}) + \frac{\sigma_{12}}{\sigma_2}\nu}{\sqrt{\sigma_1^2 - \frac{\sigma_{12}^2}{\sigma_2^2}}} \right) \right] \frac{1}{\sqrt{2\pi}} \exp\left\{ -\frac{1}{2}\nu^2 \right\} d\nu \tag{18}$$

with the conditional means and variances defined as in block (15). The likelihood contribution for this household in year t, conditional on the random effects, $l_{it}(\alpha_i, \omega_i)$, is obtained by multiplying this probability by the marginal distribution of the wife's wage.

If information on the wife's wage, w_{fit}, is missing, we write

$$P(d_{m,it} = 0, d_{f,it} = 1 | \alpha_i) =$$

$$\int_{-(x'_{fit}\gamma_f + \alpha_{fi})}^{\infty} \left[1 - \Phi\left(\frac{x'_{mit}\gamma_m + \alpha_{mi} + \sigma_{mf,\epsilon}\nu}{\sqrt{1 - \sigma_{mf,\epsilon}^2}} \right) \right] \frac{1}{\sqrt{2\pi}} \exp\left\{ -\frac{1}{2}\nu^2 \right\} d\nu \tag{19}$$

Fourth, the likelihood contribution of a male-breadwinner household with observed wages can be written as:

$$P(d_{m,it} = 1, d_{f,it} = 0 | w_{m,it}, \alpha_i, \omega_i) =$$

$$\int_{-\infty}^{-(x'_{fit}\gamma_f+\mu_2(u_{it})+\alpha_{fi})/\sigma_2} \Phi\left(\frac{x'_{mit}\gamma_m+\alpha_{mi}+\mu_1(u_{it})+\frac{\sigma_{12}}{\sigma_2}\nu}{\sqrt{\sigma_1^2-\frac{\sigma_{12}^2}{\sigma_2^2}}}\right)\frac{1}{\sqrt{2\pi}}\exp\left\{-\frac{1}{2}\nu^2\right\}d\nu \qquad (20)$$

where the conditional means and variances are defined by (16). The likelihood contribution, $l_{it}(\alpha_i,\omega_i)$ for this household in year t, conditional on random effects, is obtained by multiplying this probability by the marginal distribution of the husband's wage.

If the husband's wage is not observed, the likelihood contribution is:

$$P(d_{m,it}=1,d_{f,it}=0|\alpha_i)=$$

$$\int_{-\infty}^{-(x'_{fit}\gamma_f+\alpha_{fi})} \Phi\left(\frac{x'_{mit}\gamma_m+\alpha_{mi}+\sigma_{mf,\epsilon}\nu}{\sqrt{1-\sigma_{mf,\epsilon}^2}}\right)\frac{1}{\sqrt{2\pi}}\exp\left\{-\frac{1}{2}\nu^2\right\}d\nu \qquad (21)$$

Finally, we look at the case of spouses who are both out of work. Their likelihood contribution is determined as follows:

$$P(d_{m,it}=0,d_{f,it}=0|\alpha_i)=$$

$$\int_{-\infty}^{-(x'_{fit}\gamma_f+\alpha_{fi})} \left[1-\Phi\left(\frac{x'_{mit}\gamma_m+\alpha_{mi}+\sigma_{mf,\epsilon}\nu}{\sqrt{1-\sigma_{mf,\epsilon}^2}}\right)\right]\frac{1}{\sqrt{2\pi}}\exp\left\{-\frac{1}{2}\nu^2\right\}d\nu \qquad (22)$$

Having constructed the likelihood contributions for different types of households in a given year, conditional on the random effects (α_i,ω_i), $l_{it}(\alpha_i,\omega_i)$, we now see how these change when the household is observed for more than one year. Households stay in the sample for at most three years. If either spouse does not answer the survey, the household is dropped from the sample. If one of the spouses changes over time, then the household is also dropped (see the data section for more details). Take a household i that is observed from year T_{i1} to year T_{i2}. Its likelihood contribution, conditional on random effects, is

$$l_i(\alpha_i,\omega_i)=\prod_{t=T_{i1}}^{T_{i2}} l_{it}(\alpha_i,\omega_i) \qquad (23)$$

Finally, we complete the likelihood function by integrating over the random effects. Let $f(\alpha_i,\omega_i)$ denote the joint normal density of the random effects (see expression (3)). The complete likelihood contribution for household i is then:

$$l_i=\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} l_i(\alpha_i,\omega_i)f(\alpha_i,\omega_i)d\alpha_i d\omega_i \qquad (24)$$

where both α_i and ω_i have dimension 2. It follows that the computation of the likelihood contributions requires up to five-dimensional integration, depending on the type of household observed. We use the method of simulated maximum likelihood (SML) to estimate the model, replacing integration by simulation (see Börsch-Supan and Hajivassiliou, 1993). We use 20 replications for each observation to simulate the integrals.

Table 1: Household types according to employment and earnings of partners, 1990-2002.

Years	a) Male bread.	b) Fem. bread.	c) Dual earn.	d) Both out-of-w.	e) Wf>Wm(*)	f) wf>wm(**)	g wf>1.05wm	h wf>1.20wm	k wf>1.50wm
1990	0.35	0.03	0.58	0.04	0.15	0.18	0.15	0.08	0.03
1991	0.33	0.03	0.60	0.04	0.14	0.17	0.14	0.08	0.03
1992	0.32	0.03	0.60	0.04	0.15	0.18	0.16	0.09	0.03
1993	0.31	0.05	0.59	0.05	0.17	0.20	0.17	0.10	0.04
1994	0.31	0.05	0.59	0.05	0.18	0.22	0.18	0.11	0.04
1995	0.30	0.04	0.61	0.04	0.18	0.22	0.19	0.11	0.05
1996	0.30	0.04	0.61	0.04	0.16	0.18	0.16	0.09	0.04
1997	0.30	0.04	0.61	0.04	0.17	0.21	0.17	0.11	0.04
1998	0.29	0.04	0.62	0.04	0.16	0.20	0.17	0.10	0.04
1999	0.28	0.04	0.63	0.04	0.16	0.19	0.16	0.09	0.04
2000	0.27	0.04	0.64	0.04	0.18	0.21	0.18	0.10	0.04
2001	0.26	0.03	0.66	0.04	0.18	0.21	0.17	0.11	0.04
2002	0.25	0.04	0.67	0.04	0.18	0.21	0.18	0.11	0.04
90-02	0.30	0.04	0.62	0.04	0.17	0.20	0.17	0.10	0.04

These are unweighted sample figures. Male (female) breadwinners are defined as couples in which only the husband(wife)is at work. The total sample includes 306571 couples.

(*) W stands for monthly earnings. (**) w is the hourly wage. The statistics Wf>Wm (or wf>wm) relate to the occurrence of this household type out of the full sample of couples.

For each line, a) + b) + c) + d) sums to one.

Table 2: Descriptive Statistics

Variable	wm≥wf		wm<wf		Male bread.		Female bread.	
	Mean	St Dev	Mean	St Dev	Mean	St Dev	Mean	Std Dev
F Age	37.10	8.18	36.79	7.97	36.76	8.28	37.1	8.7
M Age	39.24	8.15	38.17	8.16	39.29	8.15	39.49	8.98
M is >5 years older	0.14	0.35	0.11	0.31	0.19	0.39	0.21	0.4
F is >5 years older	0.02	0.15	0.04	0.19	0.03	0.16	0.04	0.2
F Primary Education	0.26	0.44	0.13	0.34	0.43	0.49	0.34	0.47
F Intermediary Education	0.09	0.29	0.07	0.26	0.09	0.29	0.09	0.28
F Intermediary Technical Ed.	0.31	0.46	0.24	0.43	0.26	0.44	0.26	0.44
F High education	0.15	0.36	0.17	0.38	0.1	0.31	0.12	0.33
F Short University degree	0.12	0.32	0.23	0.42	0.06	0.24	0.11	0.32
M Primary Education	0.24	0.42	0.24	0.43	0.34	0.47	0.39	0.49
M Intermediary Education	0.07	0.25	0.07	0.25	0.06	0.24	0.07	0.25
M Intermediary Technical Ed.	0.38	0.49	0.39	0.49	0.35	0.48	0.32	0.47
M High education	0.12	0.32	0.12	0.32	0.09	0.29	0.09	0.29
M Short University degree	0.10	0.30	0.10	0.29	0.06	0.25	0.06	0.24
F educ $>$ M educ (F no univ)	0.24	0.43	0.40	0.49	0.19	0.39	0.3	0.46
F educ $>$ M educ (F univ)	0.02	0.16	0.08	0.28	0.01	0.12	0.05	0.21
M educ $>$ F educ (M no univ)	0.27	0.44	0.13	0.34	0.3	0.46	0.21	0.41
M educ $>$ F educ (M univ)	0.06	0.23	0.03	0.16	0.06	0.24	0.04	0.19
Married	0.79	0.41	0.75	0.43	0.84	0.37	0.68	0.46
Number of children	1.34	1.02	1.30	1.01	1.97	1.34	1.27	1.16
Children, age <3	0.12	0.32	0.15	0.36	0.23	0.42	0.12	0.32
Ile de France	0.18	0.39	0.19	0.39	0.14	0.35	0.21	0.41
Paris	0.15	0.36	0.16	0.37	0.12	0.32	0.19	0.39
F French nationality	0.94	0.24	0.96	0.20	0.87	0.34	0.88	0.33
M French nationality	0.93	0.25	0.94	0.24	0.87	0.34	0.83	0.37
F cohort born after 1964	0.29	0.45	0.31	0.46	0.3	0.46	0.3	0.46
M cohort born after 1964	0.22	0.41	0.26	0.44	0.2	0.4	0.24	0.42
F cohort born 1955-1964	0.38	0.49	0.39	0.49	0.38	0.48	0.35	0.48
M cohort born 1955-1964	0.36	0.48	0.38	0.49	0.37	0.48	0.32	0.47
F Monthly gross W, Euros	955	566	1386	1422			975	1423
M Monthly gross W, Euros	1585	1256	1251	543	1494	1383		
F Hourly gross W, Euros	6.45	3.29	9.75	10.16			6.87	9.44
M Hourly gross W, Euros	9.46	8.71	7.18	2.97	8.33	9.06		
Total gross monthly , F+M	3011	1931	2637	1673	1493	1383	975	1422

These are unweighted figures, averaged over the thirteen-year period 1990-2002.

Current wages are averaged only over positive values. They are measured in Euro.

Table 3. Simultaneous equation model. Selected results. Employment Equations.

variable	Husbands		Wives	
	Coefficient estimate	Standard error	Coefficient estimate	Standard error
Ln age	6.83**	0.50	9.56**	0.44
Square of ln age	-0.97**	0.07	-1.29**	0.06
Primary Education	-0.79**	0.02	-1.37**	0.01
Intermediary Education	-0.45**	0.02	-0.79**	0.02
Intermediary Technical Ed.	-0.35**	0.02	-0.69**	0.01
High education	-0.18**	0.02	-0.33**	0.02
Short University degree	-0.06**	0.02	0.16**	0.02
She no univ. > education than him	0.20**	0.01	0.10**	0.01
She univ. > education than him	-0.02**	0.02	0.55**	0.02
He no univ. > education than her	-0.11**	0.01	-0.04**	0.01
He univ. > education than her	-0.09**	0.02	-0.62**	0.01
Cohabiting couple	-0.37**	0.01	0.01**	0.01
Number of children	-0.004**	0.002	-0.29**	0.00
Any children under 3	-0.05**	0.01	-0.58**	0.01
French nationality	0.47**	0.01	0.29**	0.01
Small community	0.14**	0.01	0.03**	0.01
Wife older by >5 years	-0.28**	0.02	-0.20**	0.02
Wife older by [5,2) years	-0.12**	0.01	-0.09**	0.01
Husband older by (2,5] years	-0.02**	0.01	0.002**	0.007
husband older by > 5 years	-0.21**	0.01	-0.15**	0.01
Unemployment rate men	0.01**	0.04	0.15**	0.04
Unemployment rate women	-0.11**	0.05	-0.17**	0.05
Cohort born after 1964	-0.04**	0.02	-0.20**	0.02
Cohort born 1955-1964	0.01**	0.01	0.01**	0.01

** = significant at the 5% level
* = significant at the 10% level
Constant and year dummies not shown.

Table 4: Selected estimates. Marginal effects on the probability of household types
Sample of all couples

	Wife sole earner	Male bread-winner	dual-earn. wife earns more
Education effects (reference group: both university level)			
Both primary education	0.049**	0.179**	-0.145**
He primary, she university	0.122**	-0.079**	0.378**
He university, she primary	-0.021**	0.366**	-0.313**
Age and cohort effects (age + 1 year, reference cohort: born 1955 or earlier)			
Age of wife	0.0001**	-0.0008**	0.0001**
Age of husband	0.0005**	-0.0002**	-0.0002**
Wife older by >5 years	0.023**	0.020**	-0.013**
Wife older by [5,2) years	0.009**	0.010**	-0.005**
Husband older by (2,5] years	0.002**	-0.0007	-0.0007**
husband older by > 5 years	0.017**	0.014**	-0.009**
Husband's cohort post-1964	0.003**	-0.001**	-0.001**
Husband's cohort 1955-1964	-0.001	0.0003	0.0004
Wife's cohort post-1964	-0.002**	0.028**	-0.003**
Wife's cohort 1955-1964	0.0001	-0.001	0.0001**
Family characteristics (# children+1, reference: married, no children under 3)			
Cohabiting couple	0.037**	-0.012**	-0.014**
Number of children	-0.003**	0.042**	-0.005**
Any children under 3	-0.003**	0.088**	-0.012**
Nationality and community (reference: non-French)			
French nationality husband	-0.025**	0.008**	0.010**
French nationality wife	0.003**	-0.035**	0.003**
Unemployment rates (+ 1 percentage point)			
Unemployment rate men	0.0003	-0.019**	0.002
Unemployment rate women	0.007*	0.020**	-0.006**

** = significant at the 5% level
* = significant at the 10% level
Marginal effects are computed with reference to deviations from sample means.

Table 5: Selected estimates. Marginal effects on the probability of household types
Sample of all couples. More flexible age difference specification.

	Wife sole earner	Male bread-winner	dual-earn. wife earns more
Education effects (reference group: both university level)			
Both primary education	0.053**	0.171**	-0.143**
He primary, she university	0.126**	-0.075**	0.381**
He university, she primary	-0.020**	0.355**	-0.314**
Age and cohort effects (age + 1 year, reference cohort: born 1955 or earlier)			
Age of wife	0.00004**	-0.0005**	0.00004**
Age of husband	0.0002*	-0.0001*	-0.0001*
Wife older by >5 years, Age husb. < 35	0.026**	0.008**	-0.012**
Husband older by (5,10] years, Age husb. < 35	0.017**	0.011**	-0.008**
husband older by 10 years, Age husb. < 35	0.049**	0.052**	-0.031**
Wife older by >5 years, Age husb. $\in (35, 45]$	0.021**	0.008*	-0.010**
Husband older by (5,10] years, Age husb. $\in (35, 45]$	0.013**	0.008**	-0.007**
husband older by 10 years, Age husb. $\in (35, 45]$	0.032**	0.037**	-0.020**
Wife older by >5 years, Age husband ≥ 45	0.011	0.041**	-0.011**
Husband older by (5,10] years, Age husband ≥ 45	0.022**	-0.015**	-0.007**
husband older by 10 years, Age husband ≥ 45	0.033**	0.033**	-0.019**
Husband's cohort post-1964	0.003	-0.001	-0.001
Husband's cohort 1955-1964	0.0001	-0.00003	-0.00004
Wife's cohort post-1964	-0.002**	0.023*	-0.002**
Wife's cohort 1955-1964	-0.00001	0.0002	-0.00002
Family characteristics (# children+1, reference: married, no children under 3)			
Cohabiting couple	0.037**	-0.011**	-0.014**
Number of children	-0.002**	0.041**	-0.004**
Any children under 3	-0.003**	0.083**	-0.011**
Nationality and community (reference: non-French)			
French nationality husband	-0.026**	0.007**	0.010**
French nationality wife	0.003**	-0.032**	0.003**
Unemployment rates (+ 1 percentage point)			
Unemployment rate men	0.003	-0.033**	0.003*
Unemployment rate women	0.004	0.041**	-0.007**

** = significant at the 5% level
* = significant at the 10% level
Marginal effects are computed with reference to deviations from sample means.

Table 6: Selected estimates. Marginal effects on the probability of household types
Childless couples sample

	Wife sole earner	Male bread-winner	dual-earn. wife earns more
Education effects (reference group: both university level)			
Both primary education	0.073**	0.132**	-0.139**
He primary, she university	0.132**	-0.057**	0.320**
He university, she primary	-0.024**	0.297**	-0.330**
Age and cohort effects (age + 1 year, reference cohort: born 1955 or earlier)			
Age of wife	-0.00004	0.0003	-0.00005
Age of husband	0.0010**	-0.0002**	-0.0003**
Wife older by >5 years	0.039**	0.009**	-0.019**
Wife older by [5,2) years	0.012**	0.005	-0.006**
Husband older by (2,5] years	-0.001	-0.0007	0.000
husband older by > 5 years	0.017*	0.019**	-0.011**
Husband's cohort post-1964	0.0033	-0.001	-0.0012
Husband's cohort 1955-1964	0.0059**	-0.002*	-0.0021*
Wife's cohort post-1964	0.0001**	-0.0005	0.0001
Wife's cohort 1955-1964	-0.001**	0.012**	-0.002**
Family characteristics (# children+1, reference: married, no children under 3)			
Cohabiting couple	0.035**	-0.026**	-0.009**
Nationality and community (reference: non-French)			
French nationality husband	-0.040**	0.011**	0.0139**
French nationality wife	0.006**	-0.051**	0.006**
Unemployment rates (+ 1 percentage point)			
Unemployment rate men	0.011	-0.024**	0.0001
Unemployment rate women	-0.009	0.048**	-0.006

** = significant at the 5% level
* = significant at the 10% level
Marginal effects are computed with reference to deviations from sample means.

Table 7: Selected estimates. Marginal effects on the probability of household types
Sample of married couples.

	Wife sole earner	Male bread-winner	dual-earn. wife earns more
Both primary education	0.029**	0.202**	-0.136**
He primary, she university	0.080**	-0.092**	0.423**
He university, she primary	-0.009**	0.377**	-0.317**
Age and cohort effects (age + 1 year, reference cohort: born 1955 or earlier)			
Age of wife	-0.000002	0.0001	-0.00001
Age of husband	0.0004**	-0.0001**	-0.0002**
Wife older by >5 years	0.009**	0.046**	-0.013**
Wife older by [5,2) years	0.005**	0.013**	-0.005**
Husband older by (2,5] years	-0.0002	-0.0018	0.0003
husband older by > 5 years	0.004**	0.023**	-0.006**
Husband's cohort post-1964	0.0020*	-0.001*	-0.0013*
Husband's cohort 1955-1964	-0.00004	0.00001	0.00003
Wife's cohort post-1964	-0.0015**	0.0522**	-0.0063**
Wife's cohort 1955-1964	-0.0004**	0.013**	-0.001**
Family characteristics (# children+1, reference: married, no children under 3)			
Number of children	-0.002**	0.049**	-0.006**
Any children under 3	-0.002**	0.097**	-0.014**
Nationality and community (reference: non-French)			
French nationality husband	-0.010**	0.003**	0.0069**
French nationality wife	0.001**	-0.049**	0.005**
Unemployment rates (+ 1 percentage point)			
Unemployment rate men	-0.010**	-0.002	0.0075**
Unemployment rate women	0.032**	-0.008	-0.021**

** = significant at the 5% level
* = significant at the 10% level
Marginal effects are computed with reference to deviations from sample means.

Table 8: Model of simultaneous equations for partners' hours and hourly wage equations: Selected estimates. Hours equations.

variable	Husband's hours		Wife's hours	
	Coefficient estimate	Standard error	Coefficient estimate	Standard error
wage rate husband	0.33**	0.01**	0.53**	0.01**
wage rate wife	-0.07**	0.01**	-0.07**	0.02**
wage rate husb. squared/10	-0.014**	0.0003**	-0.019**	0.001**
wage rate wife squared/10	0.001**	0.0003**	-0.011**	0.001**
His wage rate/ (M+F wage rates)	-20.51**	1.24**	-66.00**	1.92**
marginal effect wage husband (total)	0.083		0.23	
marginal effect wage wife (total)	0.048		0.18	
Ln age	2.79	2.62	34.90**	3.18
Square of ln age	-0.76**	0.36	-5.15**	0.45
Primary Education	1.23**	0.13	1.25**	0.21
Intermediary Education	0.78**	0.11	1.49**	0.18
Intermediary Technical Ed.	0.89**	0.11	1.59**	0.17
High education	0.34**	0.09	0.78**	0.15
Short University degree	-0.63**	0.07	-0.28**	0.13
She no univ. > education than him	0.08*	0.05	0.42**	0.06
She univ. > education than him	-0.02	0.08	-1.34**	0.14
He no univ. > education than her	0.23**	0.05	-0.14**	0.06
He univ. > education than her	0.15**	0.07	-1.25**	0.13
Cohabiting couple	-0.57**	0.04	0.29**	0.06
Number of children	0.02	0.02	-1.46**	0.02
Any children under 3	-0.04	0.05	0.15**	0.07
French nationality	1.32**	0.06	1.57**	0.07
Small community	-0.22**	0.03	-0.58**	0.04
Wife older by >5 years	-0.53**	0.08	0.81**	0.13
Wife older by [5,2) years	-0.14**	0.06	0.27**	0.09
Husband older by (2,5] years	-0.13**	0.03	-0.13**	0.04
husband older by > 5 years	-0.14**	0.05	-0.46**	0.06
Unemployment rate men	1.91**	0.23	1.93**	0.31
Unemployment rate women	-2.97**	0.28	-3.79**	0.38
Cohort born after 1964	-0.08	0.09	-0.11	0.12
Cohort born 1955-1964	-0.15**	0.06	-0.02	0.07

** = significant at the 5% level
* = significant at the 10% level
Constant and year dummies not shown.