EUI Working Paper ECO No. 96/10

Young Children and the Search Costs of Unemployed Females

CHRISTIAN BELZIL
and
XUELIN ZHANG

EUI WORKING PAPERS

EUROPEAN UNIVERSITY INSTITUTE

WP 330
EUR

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

EUROPEAN UNIVERSITY INSTITUTE
3 0001 0026 6915 0

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

EUROPEAN UNIVERSITY INSTITUTE, FLORENCE

ECONOMICS DEPARTMENT

EUI Working Paper ECO No. 96/10

Yong Children and the Search Costs of Unemployed Females

CHRISTIAN BELZIL
and
XUELIN ZHANG

ISTITUTO UNIVERSITARIO EUROPEO
BIBLIOTECA
WP
330
EUR

BADIA FIESOLANA, SAN DOMENICO (FI)

Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.
© The Author(s). European University Institute.

All rights reserved.
No part of this paper may be reproduced in any form
without permission of the authors.

© Christian Belzil and Xuelin Zhang
Printed in Italy in May 1996
European University Institute
Badia Fiesolana
I – 50016 San Domenico (FI)
Italy

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

Young Children and the Search Costs of Unemployed Females

Christian Belzil*
Concordia University, Department of Economics
Montreal, H3G 1M8, Canada
and the European University Institute

Xuelin Zhang
Concordia University, Montreal, Canada

Abstract

A structural model of job search with endogenous search decision is estimated from a panel of Candian women who have suffered a permanent job displacement. The model allows us to estimate child care costs parameters and to infer the effects of young children on the decision to search, on the probability of receiving an offer, on female reservation wages and on female unemployment duration. Finally, the behavioural distinction between single and lone others is also investigated.

JEL Classifications: J64, J13, J16.

Keywords: Job Search, Fertility, Child Care Costs.

E-mail: Belzil@datacomm.iue.it or Belzilc@vax2.concordia.ca

*The authors would like to thank Nicholas Kiefer, John Micklewight, Steven Machin, Lars Muus, Steinar Ström, Padma Rao-Sahib and seminar participants at Alicante, Aarhus (CLS), the European University Institute, Gothenburg and Oslo. The usual disclaimer applies.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

1 Introduction

Theoretical and empirical models of household behaviour in presence of young children have received an enormous attention in recent years. As households must devote important monetary resources and significant periods of time to child care activities, the fact that children have a significant impact on household's time allocation decisions is hardly questionable. Child care activities, as any investment decisions, are the outcome of intertemporal decision making under uncertainty and therefore require economists modeling its surrounding aspects to use stochastic dynamic models of individual behaviour.

Apart from challenging theoretical and econometric issues, the impact of young children on the labour market has enormous interest for labour market policies. Economists have investigated the impact that young children have on household consumption and household labour supply (see Browning and Meghir, 1991 for an illustration or Browning, 1992, for a survey). As in many households, the woman devotes more time to child care activities, special attention has been paid to the connections between female labor supply and the presence of young children. Although it is widely accepted that children reduce both the likelihood to participate and hours of work (for those who work), the economic interpretation of this result is rendered difficult by the fact that both family sizes and labour supply are potentially endogenous. Furthermore, similar problems arise in investigating the effects that children have on hours of work (for those who work). [1]

Other authors have chosen to investigate the indirect effects of children by measuring the earnings penalty for women who must interrupt their careers to involve in child care activities and several of them have found a negative relationship between fertility and female wages. This negative relationship has however very little to do with fertility itself but more with the duration and the incidence of the work interruptions. This branch of the literature (which dates back to Mincer and Polachek, 1974) has attracted a lot of criticisms by individuals who have questioned the robustness of the results. Surprisingly, the misspecification of female earnings functions used in previous studies has only raised interest very recently despite the fact that reported estimates were likely to suffer heterogeneity, endogeneity and self-selectivity biases. Recent work

[1] See Nakamura and Nakamura (1993) for a review of the literature.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

by Kim and Polachek (1994) and Light and Ureta (1995) have addressed the heterogeneity bias while Belzil, Sims and Hergel (1995) and Belzil and Hergel (1995) have addressed both the selectivity and the endogeneity bias issues.[2]

As the empirical literature is dominated by estimations of labour supply functions (or earnings functions) in which a children status variable is included on the right hand side, it can be criticized for disregarding female unemployment. Indeed, a large majority of the empirical literature devoted to job search and unemployment duration is applied to young males and assumes that workers, exogenously displaced, start immediately searching for a new job (see van den Berg, 1991, Eckstein and Wolpin, 1990 or Wolpin, 1987 for some examples). Although this might be a reasonable assumption for young males who become unemployed, it is not necessarily for female displaced workers. Just like labor supply decisions are likely affected by the presence of young children, both the decision to search and the search behaviour of unemployed women are likely sensitive to the presence of young children.[3] Women who have given birth (s) prior to a job separation will face child care costs which they did not face in previous spells of unemployment or when they entered the labor force. Consequently, this should affect their decision to search or not as well as their re-employment reservation wage. Furthermore, given that child care activities (as well as job search activities) are time consuming, women must also take into account that the offer probability can be substantially affected by the presence of young children.

This paper is concerned with the econometric modeling of the search behaviour of women who are displaced and must then reassess the optimality of labour force participation. Our main objective is to specify and estimate a model which can accurately describe several aspects of the sequence of choices made by unemployed women with young children. The model, developed in the next section, is constructed as a stationary search model but incorporates three important modifications; the incorporation of the decision to search or to drop out from the labour market, the inclusion of unobserved heterogeneity in the value of non-market time and observable heterogeneity in the value of

[2]Belzil, Sims and Hergel (1995) argue that, to a large extent, the negative parameter estimates obtained generally for the earnings loss due to labor market interruptions is driven by the misspecification of the earnings regression functions. Kim and Polachek (1994) and Light and Ureta (1995) also report an enormous sensitivity of their parameter estimates when methods of estimation more general than ordinary least squares are used.

[3]Swaim and Podgursky (1994) is one of very few exceptions. The authors estimate the effect of job displacement on a sample of American women using a reduced-form model of unemployment duration. However, they do not adress child care costs explicitely.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

unemployment (captured from individual variations in UI benefit and in number of children) and the explicit treatment of child care costs as search costs parameters to be estimated. The model has three states; non-participation, unemployment (search) and re-employment and it assumes that both the value of employment and the value of unemployment are directly affected by child care costs which are allowed to be state dependent. State dependence is, in our opinion, an important issue since it allows to take into account that search activities are potentially less time-consuming than full time work and that some child care costs can therefore be avoided while unemployed. This creates an asymmetry in the effects that the presence of young children have on the net value of being unemployed and the net value of accepting employment respectively. Note that the existence of subsidized child care for low wage women (as it is the case in Canada) as well as tax deductions for child care costs while employed can also explain potential asymmetries between unemployed and employed child care costs.

Athough stylized, the model is informative; it predicts that the decision to search is decreasing in child status but that, for those who decide to search, reservation wages and search spell lengths are potentially raised (or lowered) by the presence of young children if child care costs at re-employment exceed (are lower than) child care costs while unemployed. As a result, the model also admits the possibility of positive as well as negative correlation between re-employment wages and fertility.

The model is estimated with the Canadian Labour market activity Survey[4]. We use a sample of women who have experienced a permanent job displacement and who report having children aged less than 4 years old at the time of the displacement. The likelihood function is based on information on the decision to search or not to search upon displacement (we refer to this as participation data), duration data and re-employment wages.

The paper is constructed as follows. In the next section, the theoretical model is presented in details. Section 3 is devoted to the discussion of econometric issues and the presentation of the likelihood function. The data set is presented in details in Section 4 while Section 5 is devoted to the presentation of the main results. The conclusion is in Section 6.

[4]Jones and Riddell (1995) present a very detailed description of the Canadian labour Market Activity Survey.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

2 A Model of Job Search Decision and Job Search Behaviour with Child Care Costs

To illustrate the effects that young children have on the search behaviour of unemployed females, we specify a stationary search model that incorporates some features which allow us to tackle issues related to child care costs. The model is applied to female workers (full-time) who are affected by job displacement. We disregard temporary layoffs. The model is constructed around the following assumptions.

1. Expected lifetime earnings are maximized over an infinite horizon and discounted at rate $\beta = \frac{1}{1+r}$

2. Women receive at most one offer per period and the probability of receiving an offer is given by ξ. To be general enough, we consider cases where the presence of young children affect the likelihood of receiving an offer. [5]

$$\xi = \xi(K)$$

   where K denotes the number of children.

3. Unemployed women received unemployment benefit b for each period of unemployment.

4. Child care costs per time period differ according to whether a woman is unemployed (searching), not searching (not in the labour force) or re-employed. The chid care costs functions during employment and unemployment are given respectively by

$$\Gamma_e(K) = \gamma_{e0} I(K > 0) + \gamma_{e1} K$$

$$\Gamma_u(K) = \gamma_{u0} I(K > 0) + \gamma_{u1} K$$

   where I(.) denotes the indicator function and K denotes the number of young children at the time of the job displacement. The parameters γ_{e0} and γ_{u0} are interpreted as fixed costs. For those women who decide not to search, child care costs are given by

$$\Gamma_n(K) = 0$$

[5] This might be explained empirically by the fact that young children reduce women's ability to invest time in search activities. We however do not model search intensity as such.

© The Author(s). European University Institute. Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

Finally, we assume that search costs are entirely characterized by child care costs and that, for those women with no children, search is costless.

5. For those women who decide not to search, the value of non-market time (per period) is given by the following expression

$$\mu_n = \frac{1}{\tau_1} \exp(\tau_1 K)$$

where α can be interpreted as the monetary value of leisure and where $\frac{1}{\tau_1} \exp(\tau_1 K)$ can be interpreted as the monetary value of the output produced at home.[6]

6. We assume that job offers are indexed by an hourly wage rate and that, upon acceptance, a job is held forever. Wage offers are distributed with density

$$f(w) = \lambda \exp(-\lambda w)$$

Using the previous assumptions, it is straightforward to derive the value functions associated to each state. They are given by

$$V_e(w) = \frac{1}{1-\beta} (w - \Gamma_e(K)) \tag{1}$$

$$V_u = b - \Gamma_u(K) + \beta EV \tag{2}$$

$$V_n = \frac{1}{1-\beta} \left(\frac{1}{\tau_1} \exp(\tau_1 K) \right) \tag{3}$$

where $V_e(w)$ is the value of accepting employment at wage w, V_u is the value of unemployment (search) and V_n is the value of leaving the labour force to involve in household activities. Applying Bellmann's Principle of Optimality, EV, the value of following the optimal policy, is given by

$$EV = \frac{1}{1-\beta} \left[(1 - \xi\pi(w^*)) \left[w^* - \Gamma_e(K) \right] + \xi\pi(w^*) E(w - \Gamma_e(K) \mid w \geq w^*) \right]$$

[6]For a woman with no child (when K=0), the value of non market time is given by $\frac{1}{\tau_1}$ while, for those with one child, it is given by $\frac{\exp(\tau_1)}{\tau_1}$.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

and where w* denotes the reemployment reservation wage (for those women who decide to search and remain in the labour force) and $\pi(w^*)$ is the acceptance probability; that is the probability that an offer exceeds w*. Given assumption (7), EV can be expressed as

$$EV = \frac{1}{1-\beta}\left[w^* - \Gamma_e(K) + \frac{\xi}{\lambda}\exp(-\lambda w^*)\right] \tag{4}$$

which can be used to derive the equation for w* , that is

$$w^* = b + \Gamma(K) + \frac{\beta\xi}{(1-\beta)\lambda}\exp(-\lambda w^*) \tag{5}$$

where $\Gamma(K) = \Gamma_e(k) - \Gamma_u(K)$. Equation (5), usually referred to as the "optimality condition", illustrates the fact that, given the decision to search, the reservation wage (and therefore the duration of unemployment) is only affected by the difference in child care costs.[7] Equation (5) is sometimes called the "optimality condition". The necessary (and sufficient condition) to remain in the labour force and search (following displacement) is given by

$$\frac{1}{1-\beta}\left(\frac{1}{\tau_1}\exp(\tau_1 K)\right) \leq b - \Gamma_u(K) + \beta EV = \frac{1}{1-\beta}\left(w^* - \Gamma_e(K)\right) \tag{6}$$

where w* is given by (5).

The model implies that unemployed females escape unemployment (for re-employment) at rate ϑ given by

$$\vartheta = \xi.\exp(-\lambda w^*(\Gamma, \xi, \lambda, b, K)) \tag{7}$$

Using (5), it is easy to see that the reservation wage is increasing in K when $\Gamma'(K) > 0$ and increasing in the offer arrival rate ξ. That is,

[7]It is easy to show that the optimality condition (equation 5) is actually a contraction mapping of modulus $\beta(1 - \xi\pi(w^*)) < 1$. For more details, see Christensen and Kiefer (1991) or Stokey and Lucas (1989).

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

$$w_K^{*'} = \frac{\Gamma'_K(1-\beta)}{(1-\beta(1-\xi\pi(w^*))} \tag{8}$$

$$w_\xi^{*'} = \frac{\frac{\beta\pi(w^*)}{\lambda}}{1-\beta(1-\xi\pi(w^*))} \tag{9}$$

In the case where $\xi = \xi(K)$, $w_K^{*'}$ is evaluated using the product of $\xi'(K)$ and (8) which must be added to (7).[8] In the case where child care costs are perfectly symmetric across labor market states (for instance when search takes as much time as full time work) and ξ is independent from K, then $\Gamma(K) = \Gamma'(K) = 0$ and children have no impact on re-employment wages (or reservation wages) as well as on the escape rate out of unemployment. When $\Gamma(K)$ is positive (negative), children raise (lower) female reservation wages and lower (raise) the escape rate out of unemployment. If ξ depends on K, the total effect of children on reservation wages is ambiguous and will depend on the value of appropriate parameters and so will the hazard rate.

3 Estimation

In this section, we present the estimation strategy used to implement the theoretical model. Our main objective is to obtain estimates of all structural parameters of the model so that the following issues can be investigated;

- The effects of child care costs on the propensity to invest in search activities, on reservation (and re-employment) wages and on the escape rate out of unemployment.
- The effects of young children on the probability of receiving an offer and, indirectly, on reservation wages, on the escape rate out of unemployment and on the probability of dropping out of the labour force.
- The behavioral differences between married and lone mothers.

[8] Although K is typically an integer, (7) and (8) are presented for illustrative purposes. In Section 5, we simulate the effects of our parameter estimates on reservation wages and on unemployment hazards using potential values (0,1 and 2) for the class variable K.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

To avoid self-selection bias introduced if we were to sample only those women searching and therefore work with duration and wage data (such as it is typically done in the previous literature), we make use of the sample information on the willingness to search or not upon job displacement as reported in the LMAS. Our model is therefore distinct from those of van den Berg (1991), Flinn and Heckman (1982) and Wolpin (1987), among others, where the decision to search is typically ignored. To incorporate participation data in a meaningful way and take into account individual unobserved heterogeneity in the value of non market time, we allow the value of non-market time to incorporate a stochastic element. That is

$$\mu_n = \alpha + \frac{1}{\tau_1}\exp(\tau_1 K)$$

We assume that α is normally distributed;

$$\alpha \sim \text{Normal } (\mu,\sigma^2)$$

If we let $S_i = 1$ for those women who decided to search and 0 for those who dropped out and using the condition expressed in (6), the probability that a woman i will search is given by

$$P(S_i = 1) = P\left[\alpha \leq h(w_i^*)\right] = \Phi\left[\frac{h(w_i^*)}{\sigma}\right] \tag{10}$$

where

$$h(w_i^*) = w_i^* - \Gamma_e(K_i) - \frac{1}{\tau_1}\exp(\tau_1 K) \tag{11}$$

where $\Phi(.)$ denotes the standard normal cdf and where w_i^* is given by the optimality condition (5). The probability that woman i will not search is given by

$$P(S_i = 0) = P\left[\alpha > h(w_i^*)\right] = 1 - \Phi\left[\frac{h(w_i^*)}{\sigma}\right]$$

As it is the case in most economic surveys of the unemployed, some of the women reporting that they are searching are still unemployed by the end of the survey time. For those women, we only observe a censored unemployment duration. For those women who completed their unemployment spell, we observe

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

a completed duration t_i and a re-employment hourly wage w_i. Completed observations are indexed by the binary variable $c_i = 1$ while censored observations are indexed by $c_i = 0$.

Given that a woman i decides to search, the probability that she is observed reemployed at wage w_i after t_i periods or that she is still unemployed by the end of the survey time is given by

$$\left\{(1-\xi\pi(w_i^*))^{t_i-1}\xi\pi(w_i^*)\frac{\lambda\exp(-\lambda w_i)}{\pi(w_i^*)}\right\}^{c_i}\left\{(1-\xi\pi(w_i^*))^{t_i}\right\}^{1-c_i}$$

The log likelihood function for the entire sample is therefore given by

$$\begin{aligned} l(\lambda,\tau_1,\Gamma,\theta) &= \sum_{i:S_i=0}\log\left(1-\Phi\left[\frac{h(w_i^*)}{\sigma}\right]\right)+\sum_{i:S_i=1}\log\Phi\left[\frac{h(w_i^*)}{\sigma}\right] \\ &\quad \log\left\{(1-\xi\pi(w_i^*))^{t_i-1}\xi\lambda\exp(-\lambda w_i)\right\}^{c_i}\left\{(1-\xi\pi(w_i^*))^{t_i}\right\}^{1-c_i} \quad (12) \end{aligned}$$

A thorough examination of the structure of the log likelihood along with the optimality condition and the participation (search) conditions reveals that the following parameters can be identified (and estimated). These include the variance of α (σ), the parameter of the function representing female productivity at home (τ_1), the wage offer distribution parameter (λ), the difference in fixed and variable child care costs parameters $\gamma = \gamma_e - \gamma_u$, the child care costs while unemployed γ_u, and the offer probability (ξ).[9] Maximization of the log likelihood function is rendered difficult by the fact that, at each iteration , w_i^* must be evaluated conditional on the values of the structural parameters. To do so, we make use of the optimality condition (equation 5) and we define the following implicit equation

$$g(w^*) \equiv w^* - b - \Gamma(K) - \frac{\beta\xi}{(1-\beta)\lambda}\exp(-\lambda w^*) \equiv 0 \quad (13)$$

[9]We set the discount rate β to a value of 20% per year.

© The Author(s). European University Institute. Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

It is easy to see that g'(w*) ≥ 0 and g"(w*) ≤ 0. Using a Newton-Raphson procedure, the value of w* which solves this relationship can be obtained relatively easily although these calculations must be updated at each iteration needed to maximize the log likelihood function.[10]

A notable feature of the likelihood function is that, contrary to structural search models where agents are assumed to be identical and where inference is solely based on duration and wage data (such as in Christensen and Kiefer 1991, 1993), it is purely regular. That is the score for each structural parameter of the reservation wage equation (including Γ) can be equated to 0.[11] This is explained by the introduction of participation data (the decision to search or not) which allows us to obtain draws of the value of non market time on either side of the re-employment reservation wages while, in standard empirical search models where the decision to search is ignored, wages are observed only at the right of the reservation wage[12]. Furthermore, as we incorporate information on individual UI benefit level and child status for each women, the optimal reservation wage is therefore not restricted to be equal for all women (such as it is usually in empirical models based on a representative agent specifications.

4 The Canadian Labour Market Activity Survey

The sample of women analyzed in this paper is drawn from the 1986-1987 Canadian labour Market Activity Survey (LMAS). The LMAS is a longitudinal data set where the basic unit of observation is the job held by the respondent. The sample used contains only female workers who held a full time job and experienced a job displacement. The notion of displacement used in the paper includes layoffs for non-seasonal reasons, plant closure, end of a temporary job

[10]The reservation wage, at step p+1, is defined as

$$w^*_{p+1} = w^*_p - \frac{1}{g'(w^*_p)} g(w^*_p)$$

and the maximization of the likelihood function is therefore very time consuming.

[11]It is very common in optimal stopping problems that the score with respect to parameters characterizing the optimal policy is strictly positive over the parameter space. For examples of optimal stopping problems in economics, see Rust (1987) or Christensen and Kiefer (1991, 1993).

[12]Note that the usual way to solve this problem is to introduce measurement error in observed wages.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

and a dismissal by the employer. It is therefore consistent with the notion of displacement used in the empirical literature. In the LMAS, the duration of unemployment is computed from the difference between the starting week of the new job (when applicable) and the week of termination of the previous job. As documented by Jones and Riddell (1995), the exact nature of the non-employment spell is not clear. Every individual is asked to report their weekly status (whether they are searching, not searching but willing to work or simply not available to work) so the post-displacement status is actually a complex sequence of states which, in many cases, might not be consistent with a stationary search model where individuals decide (upon displacement) to search or not. However, the LMAS also report a unique state recorded from a 'filter'. This filter is based on the aggregate female unemployment rate for 1896 and 1987 and it computes a minimum number of weeks of search to be classified as unemployed and searching. Those individuals who do not have this minimum of weeks are recorded as dropping out of the labour force.

In the LMAS, hourly wages as well as hours per week are reported for all jobs sampled. This allows us to construct a measure of the level of unemployment benefit received for those who report having received UI benefit. To do so, we use the fact that, in 1986, the maximum insurable earnings were 495$ per week and the replacement ratio was 60%. On top of the information on the decision to search, upon-employment duration and accepted wages, the LMAS reports information on the number of young children so that we can identify those women who had children when displacement took place. We also observe the marital status (whether married , divorced, single or cohabitating) so that lone mothers and married mothers can be analyzed separately.

Overall, the sample is composed of young women. Around 35% of the women are under 20, 24% are between 20 and 34 and 16% between 35 and 44 years old. Women above 45 represent 15% of our original sample and will not be analyzed. The education background of the women of the sample is as follows. About 10% only have completed at most a high school degree while 32% have attended university. The majority (58%) reports having completed a post-secondary degree (technical school).Censoring is quite important in the data. Among 833 women aged below 45, 275 only had found a new job by the end of the survey. The remaining 558 women are split between those who were still searching at the end of the survey and those who report not searching after the loss of their previous job.

The tables enclosed in Appendix (Table A1 and A2) illustrate the characteristics of the women in the sample.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

5 Empirical Results

In this section, we present and interpret the main results obtained after implementing the model described in previous sections. As a first step, we implement the model on the entire sample of women aged 45 or less (the sample size is 833). In section 5.1.1, we estimate a model where heterogeneity is captured in individual variations in UI benefit and children status and where women are grouped by age classes. The parameters are therefore common to all women (within a given age group) and we refer to it as a representative agent model. Subsequently (section 5.1.2), we consider model specifications where offer probabilities are affected by children status (in order to capture the potential restrictions on search intensity for women who have young children)and where both the mean wage offer (λ) and the productivity parameter at home (τ_1) are allowed to differ according to the education classes. Secondly (in 5.2), we investigate the behavioral differences between single and married mothers .The third section (5.3) is devoted to the simulation of the effects of children on various labour market variables of interest (such as the effect on reservation wages,the escape rate out of unemployment, the drop-out probability and the acceptance probability) using structural point estimates obtained in sub-sections 5.1 and 5.2

5.1 Full Sample Analysis

The model is first estimated on the entire sample. It is originally assumed that the dynamic optimization behaviour of single and married (or cohabitating) women can be described by a representative agent model. The original sample contains 833 women who have experienced a permanent job displacement. The model has been first estimated on three separate age groups; women age 24 or less, those between 25 and 34 and women between 35-45. The results are in Table 1A. Thereafter, we consider generalizations of the model where the wage offer location parameter (λ), productivity at home (τ_1) and the offer probability (ξ) are allowed to depend on various regressors.

5.1.1 5.1.1 A Representative Agent Model

The results are found in columns 1,2 and 3 of Table 1A. The point estimate for τ_1 (.422 for those women 24 or less) indicates that the value of non market time for a woman with no child is 2.36$ per hour while it is 3.60$ for women with one

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

child and 5.46$ for a woman with two children. For those women between 25 and 34, the values of non-market time are respectively equal to 1.82$, 3.15$ and 5.47$ while, for those between 35-44, they are 4.05$, 5.18$ and 6.64$. Altogether, these estimates imply that the presence of young children raises the likelihood of dropping-out of the labor force (and not to search). However, the estimates for σ (3.09, 3.19 and 2.25) indicate that there is significant heterogeneity across women . Our estimate for ξ (the offer probability) indicates that unemployed females have between 4% and 10% chance of receiving an offer each week while the estimate for λ imply that the mean wage offer of 2.39$ per hour for women below 25 and around 3.45$ per hour for those above 25.

Interestingly, the parameter estimates capturing the effects of child status (the difference between employment and unemployment child care costs, γ_1) indicate that women below 25 and women between 25 and 34 have lower reservation wages if they have young children (the unemployment child care costs are 3.57$ and 1.22$ respectively) and are therefore consistent with the hypothesis that unemployed child care costs are higher than employment child care costs or, perhaps, that reemployment child care costs are actually disregraded by unemployed females. Although the difference seems even higher for women above 35, the very high variability implies that the null hypothesis that re-employment and unemployment child care costs are equal cannot be rejected.[13] To summarize, the results indicate that children raise propensity to withdraw as well as raise unemployed search costs and therefore decrease female reservation wages. As a consequence, the escape rate out of unemployment, $\xi.\exp(-\lambda w^*(\gamma, \lambda, \xi, \beta))$, is expected to be higher for unemployed females with young children.[14] The analysis of the hazard rate implied by thee structural parameters will however be delayed to section 5.3

[13]In the representative agent model, the reservation wage ranges from a minimum 1.86$ to a maximum of 7.37$ per hour and averages 6.27$ over all individuals. The legal minimum wage for the period in question is around 3.25$ per hour.

[14]The model has been re-estimated with fixed child care costs (γ_{u0} and γ_{e0}) as well as variable costs. However, the data could not distinguish between fixed and variable costs child status. This is likely explained by the fact that, in our sample, very few women have more than one child so fixed and variable costs are therefore hardly distinguishable. Other parameter estimates appear particularly invariant to the inclusion of fixed child care costs.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

Table 1A- Representative Agent Model

Age Group	**(24 or less)**	**(25-34)**	**(35-44)**
	Coef.	**Coef.**	**Coef.**
Parameter	**(TRatio)**	**(TRatio)**	**(Tratio)**
Unobs. heterogeneity (σ)	3.09 (0.89)	3.19 (4.12)	2.25 (3.44)
Home Productivity (τ_1)	0.423 (0.37)	0.550 (1.45)	0.247 (2.63)
Unem. childcare costs (γ_{1u})	3.570 (0.77)	1.217 (0.90)	-1.24 (0.02)
Δ childcare costs (γ_1)	-1.73 (1.84)	-2.103 (2.54)	-3.092 (0.07)
offer probability (ξ)	.099 (4.49)	.040 (2.87)	.084 (1.97)
Wage offer λ	0.419 (16.8)	0.289 (6.64)	0.291 (4.90)
Log Likelihood	-433.0	-467.5	-243.3
Sample size	345	329	159

5.1.2 5.1.2 Models with Parameterizations

In what follows, we generalize the model to incorporate parametrization of the offer probability, the parameter representing home productivity and the mean wage offer . The results are in Table 1B and 1C. We allow the offer probability to depend on child status. This might be relevant if for instance, those women with young children searching for a new job are less flexible or have less time to devote to search activities. To take this into account, we specify the offer probability as

$$\xi = \exp(-\xi_0 - \xi_1 K)$$

where both ξ_0 and ξ_1 are positive parameters.

Models such as those presented in 1A can also be criticized for ignoring the fact that females with different level of education (human capital) do not search from a same distribution. In standard regression analysis of female earnings, the number of regressors usually included is large. Given that the LMAS does not give a detailed age and a detailed level of schooling, we use the previous wage (earned at the time of the job separation). The previous wage is likely correlated with schooling, occupation and unobserved ability. As our objective is to estimate the structural parameters of the effects of young children on search costs and reservation wages, we do not give a structural interpretation of the regressors included in the mean wage offer equation but rather incorporate all relevant information which allows us to control for individual endowments

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

in human capital. For this reason, we parametrize the parameter of the offer distribution as

$$\lambda = \exp(\lambda_0 + \lambda_1 primary + \lambda_3 University + \lambda_4 previous\ wage)$$

where primary and university are dummy variables indicating the highest degree attained by a given woman. Note that the most important groups (those who have a high school degree) are the reference group.

Finally, we also allow the marginal productivity at home (τ_1) to be a function of education in order to take into account that women with more human capital are likely to be also more productive at home. We specify τ_1 as follows

$$\tau_1 = \exp(\tau_{10} + \tau_{11} primary + \tau_{13} University)$$

Two sets of results are presented. In Table 1B. In the first one (column 1), only the inverse mean wage offer is parameterized. The version presented is the one obtained when previous wage is used to control for labor market opportunities.[15] A second set of estimates, where the home marginal productivity parameter (τ_1) is allowed to depend on education and where the arrival rate (ξ) is allowed to depend on young children is found in Table 1C. The results in Table 1B indicate that, once labour market opportunities are allowed to be affected by education and previous wages, the effect of child status on reservation wages (coming from search costs) becomes much less significant than in the representative agent specification. In particular, net search costs for females between 25 and 34 appear particularly insignificant (-.75 $ with a t-ratio of 1.12). As expected, women with university training and women who earned more before separation also receive better paying job offers (except for women above 35).

The specification in Table 1C (our preferred specification) is much more general. It allows child status to affect job offers probability while education is allowed to affect home productivity as well as potential wages. We can therefore investigate two potential channels by which young children affect female reservation wages; the offer probability and search costs. The results indicate that when young children are allowed to affect search behaviour, the search costs become much smaller (.42$ for those below 25 and -.80 $ for those between 25 and

[15] A version has also been estimated only with education. We did not obtain any notable differences in signs and significance of the main parameters of interest (home productivity, search cost differences and arrival rates).

© The Author(s). European University Institute. Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

34) and virtually negligeable as the search cost parameter estimate have very high standard errors. Although search costs are also insignificant for women above 35, the estimates are substantially higher (-1.99). The parameter estimates of the effects of children on the offer probability (-.36, -.48 and -.32) point out (except for older women) that the presence of young children reduces the probability that a woman receives a job offer and, therefore, the value of search activities.[16]. As it would be predicted by human capital theory, the parameterization of the productivity in child care activities indicates that women with university background are also more productivities at home than those with less education.

Our results can therefore be summarized as follows. The representative agent model indicates that unemployment search cost are relatively more important than child care costs born at re-employment. As a result, females with no children will accept re-employment at wages typically higher than women who search in the presence of young children. However, when we allow women with more education to be more productive in the labour market as well as at home and allow children to affect the rate at which female receive wages, we find that employment and unemployment child care costs are practically equal and that female with young children have lower reservation wages simply because they receive wage offers at a lower rate; that is young children reduce the mobility of young women.

[16]We also considered the case where education affects the probability of receiving an offer but our results have indicated that education does not seem to affect significantly the probability of receiving an offer when the wage offer distribution is itself parameterized as a function of education.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

Table 1B- Model with Parameterization of the Mean Wage Offer.

Age Group	24 or less	25-34	35-44
	-1-	-2 -	-3-
Parameter	Coeff. (Tratio)	Coeff. (Tratio)	Coeff.(T-Ratio)
σ	2.876 (3.17)	4.014 (5.98)	0.822 (0.33)
τ_1	0.320 (2.18)	0.637 (5.05)	0.219 (2.81)
τ_{i0}			
$\tau_{1primary}$			
$\tau_{iuniversity}$			
γ_1	-1.118 (1.78)	-0.750 (1.12)	-3.43 (1.78)
ξ	.034 (5.04)	0.029 (3.56)	0.051 (1.86)
ξ_0			
ξ_1(K)			
λ_0	-1.029 (8.29)	-.730 (3.75)	-1.392 (4.35)
$\lambda_{primary}$	0.315 (0.22)	-0.213 (1.23)	-0.003 (0.01)
$\lambda_{university}$	-0.293 (2.59)	-0.283 (3.58)	.-.011 (0.32)
$\lambda_{prev.wage}$	-0.022 (1.56)	-0.064 (2.18)	-0.030 (0.34)
Log Likelihood	-443.4	-487.6	-223.7

Table 1C-Model with Parameterization of the Offer Probability, the Mean Wage Offer and the Home Productivity Parameter.

Age Group	24 or less	25-34	35-44
	-1-	-2-	-3-
Parameter	Coeff.(Tratio)	Coeff.(T-Ratio)	Coeff. (T-ratio)
σ	4.925 (3.50)	3.196 (3.55)	4.583 (0.80)
τ_1			
τ_{i0}	-0.965 (1.20)	-0.952 (1.87)	-1.909 (2.59)
$\tau_{1primary}$	0.332 (1.71)	-0.490 (0.89)	0.127 (0.12)
$\tau_{iuniversity}$	0.865 (0.70)	0.961 (2.19)	0.843 (3.29)
γ_1	0.422 (0.58)	-0.795 (0.88)	-1.991 (0.23)
ξ	-		
ξ_0	-2.960 (10.9)	-3.250 (10.6)	-2.927 (4.86)
-ξ_1(K)	-0.358 (1.89)	-0.484 (2.63)	-0.320 (0.48)
λ_0	-0.685 (3.87)	-0.881 (6.44)	-1.413 (6.07)
$\lambda_{primary}$	0.141 (0.72)	0.019 (0.10)	0.363 (0.30)
$\lambda_{university}$	-1.127 (1.71)	-0.251 (1.73)	-0.129 (0.66)
$\lambda_{prev.wage}$	-0.055 (2.27)	-0.038 (1.81)	.009 (0.58)
Log Likelihood	-293.4	-482.7	-181.3

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

5.2 Married and Lone Mothers

This section is devoted to the separate analysis of women who are married (including those who are cohabitating) and women who are single. This distinction is likely to be important as those women who are married (or are cohabitating) might have access to other financial support (unreported in the LMAS) than only unemployment benefit. First, we have implemented the model with parameterization of the mean wage offer distribution to a sub-sample of 483 married (co-habitating) women and a sub-sample of 350 single women. To keep a sufficiently high number of observations, we pooled all three age groups but incorporate age as a regressor in the mean wage offer function (ta save space, the parameters associated to age groups are not reported.

Overall, the results for married women are quite similar to those obtained for the full sample. We however note two important distinctions. In particular, the estimate for τ_1 (.367) imply that the value of non market time of married women is (on average) 2.72$ per hour with no child, 3.92$ in the presence of one child and 5.67$ with 2 children. The estimate for τ_1 (0.86) for single women suggest that they are less productive in absence of children (1.16 $ per hour) and equally productive with one child (2.74$ per hour) but are substantially more productive at home with two children (6.48$). It is worth noticed that the equality of unemployment search costs and employment child care costs fail to be rejected for single women as well as married women, it is particularly strongly rejected for single mothers.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

Table 2A- Married and Single Women (Parameterization of the Mean Wage Offer).

Parameter	Married Coeff. (T-ratio)	Single Coeff.(T-Ratio)
σ	3.397 (2.02)	3.258 (3.16)
τ_1	0.367 (0.96)	0.863 (6.43)
γ_{u1}	0.854 (0.60)	1.136 (0.17)
γ_1	-0.948 (1.48)	-2.46 (0.70)
ξ	0.042 (4.25)	0.014 (4.81)
λ_0	-1.179 (10.35)	-1.699 (3.02)
$\lambda_{primary}$	-.062 (0.84)	0.186 (0.20)
$\lambda_{university}$	-.015 (1.86)	-0.122 (3.64)
$\lambda_{prev.Wage}$	-.015 (.07)	-0.039 (0.70)
Log Likelihood	-572.2	-466.0

In Table 2B, we implement our most general model specification (same as Table 1C) to both single and married women. The parameter estimates (in Table 2B) also indicate some notable differences between married and single women. The structural parameters representing the effect of university training on home production indicate that married women who are more educated are also more productive in household activities. Although the corresponding parameter for single women is almost identical, it as a large standard error and is therefore insignificant. A comparison of the effects of search costs on reservation wages reveals that the difference is negative (-.50$) for married women and positive (.40$) for single women but that, in both cases, the difference is insignificant. We however note that , for married mothers (and unlike for lone mothers), the null hypothesis that offers are received independently from child status fails to be rejected. This is perphaps the most striking difference between married and single mothers. Finally, in order to test homogeneity in the search behaviour of married and single women, we have estimated a fully parameterized model on the full sample. The restricted model (along with both unrestricted models presented in Table 2B) lead to a likelihood ratio statistic of 48 , well beyond the critical value at a 1% confidence level (around 30 for a χ^2 with 15 restrictions)[17]

[17]The parameter estimates in the restricted model (quite similar to those obtained for married women) also indicated that more educated women are more productive at home and in the labor market, that women with young children receive job offers at a significantly lower rate and that search costs have no significant impact on reservation wages.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

Table 2B

Models for Single and Married Women (with Parameterization)

	Married		Single	
Parameter	Coefficient	T-Ratio	Coefficient	T-Ratio
σ	3.638	(6.41)	3.710	(2.92)
τ_{10}	-1.263	(3.92)	-1.133	(1.63)
$\tau_{1primary}$	-0.104	(0.20)	0.917	(0.20)
$\tau_{1university}$	1.200	(2.60)	1.202	(0.92)
γ_1	-0.495	(0.84)	0.401	(0.15)
ξ_0	-3.045	(11.71)	-2.452	(6.86)
ξ_1(K)	-0.603	(3.09)	-0.112	(0.03)
λ_0	-1.210	(9.24)	-0.761	(5.94)
$\lambda_{primary}$	-0.002	(0.07)	0.635	(0.69)
$\lambda_{university}$	-0.177	(1.71)	-0.890	(1.20)
$\lambda_{prev.wage}$	-0.133	(1.04)	-0.022	(1.67)
Sample	483		350	
Log Likelihood	-541.9		-422.6	

5.3 Simulating the effects of Children on Participation Decisions, Reservation wages and Re-Employment Hazards

In this section, we compute the numerical values of the effects that children have on reservation wages (and therefore mean accepted wages), on the duration of unemployment (re-employment hazards), the acceptance probability and on the probability of specializing in household (child care) activities using the maximum likelihood point estimates obtained from various model specifications. Without loss of generality, we evaluate those economic variables at the mean level of UI benefit in the particular group considered. As some specifications have introduced education as a key variable (using standard human capital arguments), we analyze women with no child and those with one young child and split each group between two groups; those with university training and those with no university training. When needed, we also fix the level of the previous wage to an average.

The model is simulated using estimates obtained from the representative agent model (Table 3A) and on the fully parameterized version (Table 3B). Simulations are presented for all three age groups in Table 3A and those between

Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.
© The Author(s). European University Institute.

25 and 34 in Table 3B. Estimates in Table 3A illustrate the impact of children quite clearly, the reservation wage can drop from 5.22 $ per hour down to 1.76$ per hour when K goes from 0 to 2 (for young women). As a consequence, the escape rate out of unemployment raises substantially with K while acceptance probabilities are also higher for females with young children. As expected, the model implies that the probability non-participation (no search) is increasing sharply with K.

The simulations for the fully parameterized model (Table 3B) indicate also a similar decrease in rerservation wages explained by children. However,as point estimates of the fully parameterized model indicated that lower reservation wages for females with young children were explained by lower offer probabilities, we observe lower hazards increasease with child status despite much larger acceptance probabilities for women with young children.

The distinction between married and single mothers is well illustrated in table 4A and 4B. From Table 4A, we see that married women with children have much lower reservation wages but escape unemployment at rate only slightly higher. In Table 4B, we observe that, as pointed out earlier, child status has virtually no impact on search behaviour of single women; both reservation wages and unemployment hazard rates are marginally affected by the presence of young children,

Table 3A- Simulations for the Full Sample (Representative Agent Model)

	16-24			25-34			35-44		
	K=0	K=1	K=2	K=0	K=1	K=2	K=0	K=1	K=2
Variable									
w^*	5.22	3.48	1.76	7.34	5.23	3.13	10.31	7.21	4.13
$\xi.\pi(w^*)$	.01	.02	.05	.005	.009	.016	.004	.01	.026
$1-\Phi\left[\frac{h(w_1^*)}{\sigma}\right]$	.18	.74	.93	.04	.18	.57	.01	.01	.01
$\pi(w^*)$	.11	.23	.48	.12	.22	.41	.05	.12	.30

Table 3B- Simulations for the Parameterized Model (25-34)

	K=0	K=1	K=0	K=1
Variable	low education	low education	high education	high education
w^*	6.08	3.79	10.44	6.48
$\xi.\pi(w^*)$	.005	.007	.003	.005
$1-\Phi\left[\frac{h(w_1^*)}{\sigma}\right]$	.28	.37	.01	.03
$\pi(w^*)$	.14	.29	.07	.20

Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository. © The Author(s). European University Institute.

Table 4A- Simulations for Married Women (25-34)

(Fully Parameterized Model)

	K=0	K=1	K=0	K=1
Variable	low education	low education	high education	high education
w*	7.62	4.62	11.30	6.63
$\xi.\pi(w^*)$	.006	.007	.004	.006
1-$\Phi\left[\frac{h(w^*)}{\sigma}\right]$	.15	.33	.01	.05
$\pi(w^*)$	.13	.28	.08	.22

Table 4B- Simulations for Single Women (25-34)

(Fully Parameterized models)

	K=0	K=1	K=0	K=1
Variable	low education	low education	high education	high education
w*	1.45	1.85	5.79	6.14
$\xi.\pi(w^*)$	.028	.020	.010	.009
1-$\Phi\left[\frac{h(w^*)}{\sigma}\right]$	.01	.01	.03	.03
$\pi(w^*)$	.33	.24	.11	.10

6 Conclusion

It is generally recognized that young children have important impact on both consumption and time allocation outcomes of households. In this paper, we have analyzed an aspect which, to our knowledge, has so far been ignored; namely the impact of young children on the job search behaviour of female displaced workers. In particular, we have examined two possible channels by which young children affect re-employment outcomes; the presence of child care costs and the possible reduction in the probability of receiving offers for those women who have young children and are therefore less effective at search activities.

Our representative agent model indicates that women with young children are more likely to drop-out from the labour force (as expected) and those who search for a job absorb substantial child care costs while unemployed and therefore accept re-employment at lower wages than those who have no children. However, the parameterized version of the model where offer probabilities are also affected by the presence of young children indicates quite clearly that child care costs are actually not incorporated in the determination of the optimal

Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.
© The Author(s). European University Institute.

reservation wage and is therefore consistent with the claim that unemployment child care costs and re-employment child care costs are approximately equal. Instead, the presence of young children has a substantial (and significant) negative impact on the probability of receiving offers and female decrease their reservation wages accordingly.

Our results also indicate some differences between married and lone mothers. Lone mothers are more productive at home and drop out in larger numbers (they are typically younger, have less experience and receive less UI benefits), but those who search are much less affected by young children than married women. Indeed, our estimates indicated that lone mothers are unemployed much shorter than married mothers.

As a result, both the representative agent model specification and the parametrized version of the model are consistent with the negative relationship between female wages and family size; a stylized fact observed in almost all western countries. This is interesting. If family size truly reduces the search effectiveness of young women and if we extend our results to job search activities while employed, then job search behaviour can undoubtedly be a major factor in the persistence of a gender wage gap. We therefore suggest that some effort should be devoted to modelling the gender wage jointly with job search activities along with other forms of human capital investment.

7 References

Belzil, Christian (1996) "Relative Efficiencies and Comparative Advantages in Job Search" **Journal of Labor Economics, 11 (1).**

Belzil, Christian, Sims, William and Hergel, Philip (1995) "Endogeneity, Self-Selectivity and the Sensistivity of Female Earnings to Non-Participation", Working paper, CLS, University of Århus.

Belzil, Christian and Hergel, Philip (1995) "Fertility and the Human Capital Loss of Non-Participation", Working paper, CLS, University of Århus.

van den Berg, Gerard (1991) "Nonstationarity in Job Search" **Review of Economic Studies**

Browning, Martin (1992) "Children and Household Economic Behaviour". **Journal of Economic Literature, Vol xxx: 1434-1475.**

Browning, Martin and Meghir, Costas (1991) "The Effects of Male and

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

Female Labor Supply on Commodity Demand".**Econometrica 59 (4): 925-951.**

Christensen, Bent Jesper and Kiefer, Nicholas (1991) "The Exact Likelihood Function for an Empirical Job Search Model" **Econometric Theory, volume 7, 464-486.**

Christensen, Bent Jesper and Kiefer, Nicholas (1993) "Statistical Analysis of an Optimal Stopping Model" Working paper, CAE, Cornell University.

Eckstein, Zvi and Wolpin, Kenneth (1990) "Estimating Equilibrium Search Model from Panel Data on Individuals" **Econometrica 58,** 783-808.

Flinn, C. and Heckman, J (1982) "New Methods for Analyzing Structural Models of Labor Force Dynamics" **Journal of Econometrics 18,** 115-168.

Jones, Steven and Riddell, Craig (1995) "The Measurement of Labor Force Dynamics with Longitudinal data: The LMAS Filter", **Journal of Labor Economics, April 1995.**

Kim, M. and Polachek, Solomon (1994) "Panel estimates of Male-Female Earnings Functions"**Journal of Human Resources (29) -2: 406-428.**

Light, Audrey and Ureta, Manuela (1995) "Early Career Work Experience and Gender wage Differential" **Journal of Labor Economics, 13 (1): 121-154.**

Nakamura, Alice and Nakamura, A. (1992) "The Econometrics of Female Labor Supply and Children, **Econometric Reviews, 11 (1): 1-71.**

Rust, John (1987) "Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher. **Econometrica 55: 999-1033.**

Stokey, Nancy and Lucas, Robert E. (1989) Recursive Methods in Economic Dynamics. Harvard University Press.

Swaim, Paul and Podgursky, Michael (1994) "Female Labor Supply Following Displacement: A Split Population Model of Labor Force Participation and Job Search" **Journal of Labor Economics, vol 12 (4): 640-656.**

Wolpin, Kenneth (1987) "Estimating a Structural Search Model: The Transition from School to Work" **Econometrica, 55, 801-817.**

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

Appendix

Table A1

Descriptive Statistics[18]

Sample	All		Married		Single	
	Mean	St. Dev.	Mean	St. dev.	Mean	St.dev.
Unemp. Dur.	23.0	16.2	24	16	22	16
Dur. Prev. Job	89	181.8	98	181.5	77	182.0
Prev. wage	6.51$	3.35	6.80	3.54	6.11	3.01
UI Ben.	1.85$	4.01	2.09$	2.35	1.51	2.19
# of Children	0.28		0.40		.12	
Acc. wage	6.62 $	4.28				
% univ. degreee	0.32		.30		.34	

Table A2

Empirical Frequencies of Non-Participation by Education/Children Classes with Number of Observations in each Cell in Parantheses.

	K=0	K=1	K≥2
Primary	.07 (79)	.13 (15)	0 (3)
Secondary	.08 (442)	.06 (91)	.08 (36)
University	.02 (250)	.09 (46)	.05 (18)

[18]**Wages and UI benefit are on a per-hour basis. All durations are in weeks.**

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

EUI WORKING PAPERS

EUI Working Papers are published and distributed by the
European University Institute, Florence

Copies can be obtained free of charge
– depending on the availability of stocks – from:

The Publications Officer
European University Institute
Badia Fiesolana
I-50016 San Domenico di Fiesole (FI)
Italy

Please use order form overleaf

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

Publications of the European University Institute

To

The Publications Officer
European University Institute
Badia Fiesolana
I-50016 San Domenico di Fiesole (FI) – Italy
Telefax No: +39/55/4685 636
E-mail: publish@datacomm.iue.it

From

Name . . . . . .
Address. . . . . .
. . . . . .
. . . . . .
. . . . . .
. . . . . .

❒ Please send me a complete list of EUI Working Papers
❒ Please send me a complete list of EUI book publications
❒ Please send me the EUI brochure Academic Year 1996/97

Please send me the following EUI Working Paper(s):

No, Author . . . . . .
Title: . . . . . .
No, Author . . . . . .
Title: . . . . . .
No, Author . . . . . .
Title: . . . . . .
No, Author . . . . . .
Title: . . . . . .

Date . . . . . .

Signature . . . . . .

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

Working Papers of the Department of Economics
Published since 1994

ECO No. 94/1
Robert WALDMANN
Cooperatives With Privately Optimal Price Indexed Debt Increase Membership When Demand Increases

ECO No. 94/2
Tilman EHRBECK/Robert WALDMANN
Can Forecasters' Motives Explain Rejection of the Rational Expectations Hypothesis?

ECO No. 94/3
Alessandra PELLONI
Public Policy in a Two Sector Model of Endogenous Growth *

ECO No. 94/4
David F. HENDRY
On the Interactions of Unit Roots and Exogeneity

ECO No. 94/5
Bernadette GOVAERTS/David F. HENDRY/Jean-François RICHARD
Encompassing in Stationary Linear Dynamic Models

ECO No. 94/6
Luigi ERMINI/Dongkoo CHANG
Testing the Joint Hypothesis of Rationality and Neutrality under Seasonal Cointegration: The Case of Korea

ECO No. 94/7
Gabriele FIORENTINI/Agustín MARAVALL
Unobserved Components in ARCH Models: An Application to Seasonal Adjustment

ECO No. 94/8
Niels HALDRUP/Mark SALMON
Polynomially Cointegrated Systems and their Representations: A Synthesis

ECO No. 94/9
Mariusz TAMBORSKI
Currency Option Pricing with Stochastic Interest Rates and Transaction Costs: A Theoretical Model

ECO No. 94/10
Mariusz TAMBORSKI
Are Standard Deviations Implied in Currency Option Prices Good Predictors of Future Exchange Rate Volatility?

ECO No. 94/11
John MICKLEWRIGHT/Gyula NAGY
How Does the Hungarian Unemployment Insurance System Really Work? *

ECO No. 94/12
Frank CRITCHLEY/Paul MARRIOTT/Mark SALMON
An Elementary Account of Amari's Expected Geometry

ECO No. 94/13
Domenico Junior MARCHETTI
Procyclical Productivity, Externalities and Labor Hoarding: A Reexamination of Evidence from U.S. Manufacturing

ECO No. 94/14
Giovanni NERO
A Structural Model of Intra-European Airline Competition

ECO No. 94/15
Stephen MARTIN
Oligopoly Limit Pricing: Strategic Substitutes, Strategic Complements

ECO No. 94/16
Ed HOPKINS
Learning and Evolution in a Heterogeneous Population

ECO No. 94/17
Berthold HERRENDORF
Seigniorage, Optimal Taxation, and Time Consistency: A Review

ECO No. 94/18
Frederic PALOMINO
Noise Trading in Small Markets *

ECO No. 94/19
Alexander SCHRADER
Vertical Foreclosure, Tax Spinning and Oil Taxation in Oligopoly

*out of print

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

ECO No. 94/20
Andrzej BANIAK/Louis PHLIPS
La Pléiade and Exchange Rate Pass-Through

ECO No. 94/21
Mark SALMON
Bounded Rationality and Learning; Procedural Learning

ECO No. 94/22
Isabelle MARET
Heterogeneity and Dynamics of Temporary Equilibria: Short-Run Versus Long-Run Stability

ECO No. 94/23
Nikolaos GFORGANTZIS
Short-Run and Long-Run Cournot Equilibria in Multiproduct Industries

ECO No. 94/24
Alexander SCHRADER
Vertical Mergers and Market Foreclosure: Comment

ECO No. 94/25
Jeroen HINLOOPEN
Subsidising Cooperative and Non-Cooperative R&D in Duopoly with Spillovers

ECO No. 94/26
Debora DI GIOACCHINO
The Evolution of Cooperation: Robustness to Mistakes and Mutation

ECO No. 94/27
Kristina KOSTIAL
The Role of the Signal-Noise Ratio in Cointegrated Systems

ECO No. 94/28
Agustín MARAVALL/Víctor GÓMEZ
Program SEATS "Signal Extraction in ARIMA Time Series" - Instructions for the User

ECO No. 94/29
Luigi ERMINI
A Discrete-Time Consumption-CAP Model under Durability of Goods, Habit Formation and Temporal Aggregation

ECO No. 94/30
Debora DI GIOACCHINO
Learning to Drink Beer by Mistake

ECO No. 94/31
Víctor GÓMEZ/Agustín MARAVALL
Program TRAMO "Time Series Regression with ARIMA Noise, Missing Observations, and Outliers" - Instructions for the User

ECO No. 94/32
Ákos VALENTINYI
How Financial Development and Inflation may Affect Growth

ECO No. 94/33
Stephen MARTIN
European Community Food Processing Industries

ECO No. 94/34
Agustín MARAVALL/Christophe PLANAS
Estimation Error and the Specification of Unobserved Component Models

ECO No. 94/35
Robbin HERRING
The "Divergent Beliefs" Hypothesis and the "Contract Zone" in Final Offer Arbitration

ECO No. 94/36
Robbin HERRING
Hiring Quality Labour

ECO No. 94/37
Angel J. UBIDE
Is there Consumption Risk Sharing in the EEC?

ECO No. 94/38
Berthold HERRENDORF
Credible Purchases of Credibility Through Exchange Rate Pegging: An Optimal Taxation Framework

ECO No. 94/39
Enrique ALBEROLA ILA
How Long Can a Honeymoon Last? Institutional and Fundamental Beliefs in the Collapse of a Target Zone

ECO No. 94/40
Robert WALDMANN
Inequality, Economic Growth and the Debt Crisis

*out of print

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

ECO No. 94/41
John MICKLEWRIGHT/
Gyula NAGY
Flows to and from Insured
Unemployment in Hungary

ECO No. 94/42
Barbara BOEHNLEIN
The Soda-ash Market in Europe:
Collusive and Competitive Equilibria
With and Without Foreign Entry

ECO No. 94/43
Hans-Theo NORMANN
Stackelberg Warfare as an Equilibrium
Choice in a Game with Reputation Effects

ECO No. 94/44
Giorgio CALZOLARI/Gabriele
FIORENTINI
Conditional Heteroskedasticity in
Nonlinear Simultaneous Equations

ECO No. 94/45
Frank CRITCHLEY/Paul MARRIOTT/
Mark SALMON
On the Differential Geometry of the Wald
Test with Nonlinear Restrictions

ECO No. 94/46
Renzo G. AVESANI/Giampiero M.
GALLO/Mark SALMON
On the Evolution of Credibility and
Flexible Exchange Rate Target Zones *

***

ECO No. 95/1
Paul PEZANIS-CHRISTOU
Experimental Results in Asymmetric
Auctions - The 'Low-Ball' Effect

ECO No. 95/2
Jeroen HINLOOPEN/Rien
WAGENVOORT
Robust Estimation: An Example

ECO No. 95/3
Giampiero M. GALLO/Barbara PACINI
Risk-related Asymmetries in Foreign
Exchange Markets

ECO No. 95/4
Santanu ROY/Rien WAGENVOORT
Risk Preference and Indirect Utility in
Portfolio Choice Problems

ECO No. 95/5
Giovanni NERO
Third Package and Noncooperative
Collusion in the European Airline
Industry *

ECO No. 95/6
Renzo G. AVESANI/Giampiero M.
GALLO/Mark SALMON
On the Nature of Commitment in Flexible
Target Zones and the Measurement of
Credibility: The 1993 ERM Crisis *

ECO No. 95/7
John MICKLEWRIGHT/Gyula NAGY
Unemployment Insurance and Incentives
in Hungary

ECO No. 95/8
Kristina KOSTIAL
The Fully Modified OLS Estimator as a
System Estimator: A Monte-Carlo
Analysis

ECO No. 95/9
Günther REHME
Redistribution, Wealth Tax Competition
and Capital Flight in Growing
Economies

ECO No. 95/10
Grayham E. MIZON
Progressive Modelling of
Macroeconomic Time Series: The LSE
Methodology *

ECO No. 95/11
Pierre CAHUC/Hubert KEMPF
Alternative Time Patterns of Decisions
and Dynamic Strategic Interactions

ECO No. 95/12
Tito BOERI
Is Job Turnover Countercyclical?

ECO No. 95/13
Luisa ZANFORLIN
Growth Effects from Trade and
Technology

ECO No. 95/14
Miguel JIMÉNEZ/Domenico
MARCHETTI, jr.
Thick-Market Externalities in U.S.
Manufacturing: A Dynamic Study with
Panel Data

*out of print

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

ECO No. 95/15
Berthold HERRENDORF
Exchange Rate Pegging, Transparency, and Imports of Credibility

ECO No. 95/16
Günther REHME
Redistribution, Income cum Investment Subsidy Tax Competition and Capital Flight in Growing Economies

ECO No. 95/17
Tito BOERI/Stefano SCARPETTA
Regional Dimensions of Unemployment in Central and Eastern Europe and Social Barriers to Restructuring

ECO No. 95/18
Bernhard WINKLER
Reputation for EMU - An Economic Defence of the Maastricht Criteria

ECO No. 95/19
Ed HOPKINS
Learning, Matching and Aggregation

ECO No. 95/20
Dorte VERNER
Can the Variables in an Extended Solow Model be Treated as Exogenous? Learning from International Comparisons Across Decades

ECO No. 95/21
Enrique ALBEROLA-ILA
Optimal Exchange Rate Targets and Macroeconomic Stabilization

ECO No. 95/22
Robert WALDMANN
Predicting the Signs of Forecast Errors *

ECO No. 95/23
Robert WALDMANN
The Infant Mortality Rate is Higher where the Rich are Richer

ECO No. 95/24
Michael J. ARTIS/Zenon G. KONTOLEMIS/Denise R. OSBORN
Classical Business Cycles for G7 and European Countries

ECO No. 95/25
Jeroen HINLOOPEN/Charles VAN MARREWIJK
On the Limits and Possibilities of the Principle of Minimum Differentiation

ECO No. 95/26
Jeroen HINLOOPEN
Cooperative R&D Versus R&D-Subsidies: Cournot and Bertrand Duopolies

ECO No. 95/27
Giampiero M. GALLO/Hubert KEMPF
Cointegration, Codependence and Economic Fluctuations

ECO No. 95/28
Anna PETTINI/Stefano NARDELLI
Progressive Taxation, Quality, and Redistribution in Kind

ECO No. 95/29
Ákos VALENTINYI
Rules of Thumb and Local Interaction *

ECO No. 95/30
Robert WALDMANN
Democracy, Demography and Growth

ECO No. 95/31
Alessandra PELLONI
Nominal Rigidities and Increasing Returns

ECO No. 95/32
Alessandra PELLONI/Robert WALDMANN
Indeterminacy and Welfare Increasing Taxes in a Growth Model with Elastic Labour Supply

ECO No. 95/33
Jeroen HINLOOPEN/Stephen MARTIN
Comment on Estimation and Interpretation of Empirical Studies in Industrial Economics

ECO No. 95/34
M.J. ARTIS/W. ZHANG
International Business Cycles and the ERM: Is there a European Business Cycle?

ECO No. 95/35
Louis PHLIPS
On the Detection of Collusion and Predation

ECO No. 95/36
Paolo GUARDA/Mark SALMON
On the Detection of Nonlinearity in Foreign Exchange Data

*out of print

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

ECO No. 95/37
Chiara MONFARDINI
Simulation-Based Encompassing for Non-Nested Models: A Monte Carlo Study of Alternative Simulated Cox Test Statistics

ECO No. 95/38
Tito BOERI
On the Job Search and Unemployment Duration

ECO No. 95/39
Massimiliano MARCELLINO
Temporal Aggregation of a VARIMAX Process

ECO No. 95/40
Massimiliano MARCELLINO
Some Consequences of Temporal Aggregation of a VARIMA Process

ECO No. 95/41
Giovanni NERO
Spatial Multiproduct Duopoly Pricing

ECO No. 95/42
Giovanni NERO
Spatial Multiproduct Pricing: Empirical Evidence on Intra-European Duopoly Airline Markets

ECO No. 95/43
Robert WALDMANN
Rational Stubbornness?

ECO No. 95/44
Tilman EHRBECK/Robert WALDMANN
Is Honesty Always the Best Policy?

ECO No. 95/45
Giampiero M. GALLO/Barbara PACINI
Time-varying/Sign-switching Risk Perception on Foreign Exchange Markets

ECO No. 95/46
Víctor GÓMEZ/Agustín MARAVALL
Programs TRAMO and SEATS
Update: December 1995

***

ECO No. 96/1
Ana Rute CARDOSO
Earnings Inequality in Portugal: High and Rising?

ECO No. 96/2
Ana Rute CARDOSO
Workers or Employers: Who is Shaping Wage Inequality?

ECO No. 96/3
David F. HENDRY/Grayham E. MIZON
The Influence of A.W.H. Phillips on Econometrics

ECO No. 96/4
Andrzej BANIAK
The Multimarket Labour-Managed Firm and the Effects of Devaluation

ECO No. 96/5
Luca ANDERLINI/Hamid SABOURIAN
The Evolution of Algorithmic Learning: A Global Stability Result

ECO No. 96/6
James DOW
Arbitrage, Hedging, and Financial Innovation

ECO No. 96/7
Marion KOHLER
Coalitions in International Monetary Policy Games

ECO No. 96/8
John MICKLEWRIGHT/ Gyula NAGY
A Follow-Up Survey of Unemployment Insurance Exhausters in Hungary

ECO No. 96/9
Alastair McAULEY/John MICKLEWRIGHT/Aline COUDOUEL
Transfers and Exchange Between Households in Central Asia

ECO No. 96/10
Christian BELZIL/Xuelin ZHANG
Young Children and the Search Costs of Unemployed Females

*out of print

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

ISTITUTO UNIVERSITARIO EUROPEO
BIBLIOTECA

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.

© The Author(s). European University Institute.
Digitised version produced by the EUI Library in 2020. Available Open Access on Cadmus, European University Institute Research Repository.