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Family Job Search and Wealth: The Added Worker Effect Revisited*

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Abstract

We develop and estimate a model of family job search and wealth accumulation. Individuals' job finding and job separations depend on their partners' job turnover and wages as well as common wealth. We fit this model to data from the Survey of Income and Program Participation (SIPP). This dataset reveals a very asymmetric labor market for household members, who share that their job finding is stimulated by their partners' job separation, particularly during economic downturns. We uncover a job search-theoretic basis for this added worker effect and find that this effect is stronger with more children in the household. We also show that excluding wealth and savings from the analysis and estimation leads to underestimating the interdependency between household members. Our analysis shows that the policy goal of supporting job search by increasing unemployment transfers is partially offset by a partner's lower unemployment and wages.

Keywords: job search, asset accumulation, household economics, consumption, unemployment, estimation of dynamic structural models.

JEL Classification: C33, E21, E24, J64.

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1 Introduction

Married couples are the largest group within the U.S. labor force,[1] yet most employment analyses and policy designs are undertaken under the individual-agent framework. When multiple workers within the household are considered, the economic analysis focuses on the choice of hours that they work in a frictionless labor market.[2] In recent years, a few studies have extended this analysis to household labor decisions in the presence of search frictions that drive job offer uncertainty and job turnover.

In this paper, we analyze two-agent job search in connection with savings decisions. We propose a model in which common wealth and an agent's wages allow the other agent to be more selective and search longer for a job. Consequently, employment transitions and wage outcomes depend crucially on wealth and on the partner's employment status and wages. We find a search-theoretic basis for the "added worker effect": when an agent faces a job separation, the partner's reservation wage declines and his or her job finding rate increases substantially. This occurs especially in economic downturns, when the job loss increases for one agent are compensated by the spouse's increased labor market activity. By the same mechanism, raising unemployment transfers increases workers' unemployment and wages but decreases their spouses' unemployment and wages. A policy implication of our analysis is that the desired effect of unemployment transfers is partly undone by the spouse's behavior in the labor market.

We show the importance of wealth and savings in family job search, which has not been considered by earlier work on this type of model. If wealth is not included explicitly in a family job search model and, accordingly, is omitted in the corresponding estimation, the interconnection between individual job search processes will be underestimated. Moreover, this omission leads to neglecting the added worker effect and to miscalculating the policy effect of increasing unemployment transfers.

Our approach stems from the literature on job search with wealth accumulation[3]

[1] According to the Bureau of Labor Statistics (BLS) individuals whose declared marital status is "married, spouse present" represent around 77% of the civilian labor force (BLS 2016, Table 5).

[2] This framework, basically under the collective approach (see Blundell et al. 2007), studies the division of labor and of labor income within the household. One of its main conclusions is that the spouse's wage matters for an individual's labor supply but only through its impact on the income sharing rule set within the household, that is, through an income effect. Blundell and Macurdy (1999) and Browning, Chiappori, and Weiss (2014) include reviews of the literature on family economics. The labor supply approach of the household has been particularly important to understand the household reaction to tax schemes and social programs.

[3] Our approach grows out from Mortensen (1977) and Burdett and Mortensen (1998) and includes

and from the recent research on household job search. We allow for a twofold interaction whereby each household member's reservation wage depends on the partner's labor market status and wages as well as on wealth. Previous work on family job search[4] has analyzed family job search related to common health insurance (Dey and Flinn 2008), long-term welfare inequality (Flabbi and Mabli 2010), equilibrium effects (Ek and Holmlund 2010), and household members' job turnover (Guler, Guvenen, and Violante 2012). None of these studies has considered the effect of savings on family job search.

In our model, both employed and unemployed agents receive job offers arriving randomly from a known wage offer distribution. Employed agents face the risk of being laid off from their current job. Labor market environments of the household members are unconnected; however, wealth and consumption are common to the household, which links the household members' employment decisions. Thus, the employed partner's income supports the other family member's selectivity in accepting a job. But, at the same time, if the partner becomes unemployed, an agent cannot afford to be so selective, and he or she has to accept lower wage offers, which generates the added worker effect.

The underlying mechanism of this effect is similar to Guler, Guvenen, and Violante's (2012) "breadwinner's cycle" in that it relies in the dependence between household members' reservation wages. These authors remark the employed agent's separation from his or her job resulting from the unemployed partner finding a job. The "added worker" effect also involves a switch of breadwinner roles, but it rather remarks the unemployed agent's job finding resulting from the employed partner separating from his or her job.

Using data from the Survey of Income Program Participation (SIPP), which contains a detailed work history of individuals in the U.S. from 1996 until 2010 including their employment transitions, wages, and wealth, we find evidence for both of these mechanisms. Yet, given the strong labor market attachment of men and the high job turnover of women, these interactions are not indicative of a cycle in which roles constantly switch. This noteworthy asymmetry is reflected in that, in around 21% of the

wealth accumulation as in Danforth (1979), Acemoglu and Shimer (1999), Costain (1999), Rendon (2006), Lentz (2009), and Lise (2013).

[4]The job search literature also includes work by Gemici (2011), who proposes and estimates a model of household migration that results in family ties hindering mobility and wage growth. Though different in their purpose, the analysis of search by committee proposed by Albrecht, Anderson and Vroman (2010) can be also considered as part of the literature on job search by more than one agent.

sample, the husband is employed and the wife is unemployed, while in only 4% of the sample the wife is employed and the husband is unemployed. Additionally, the job finding rate for the husband is around 14% with a job separation rate of around 1%, while the wife's job finding rate is around 4% and her job separation rate is around 2%. However, in our data for both partners, unemployment and wages increase in the spouse's wages; we do not find a "gender asymmetry", as Lentz and Tranæs (2005), Lentz (2009), and Marcassa (2013), who find that while the unemployment duration of the wife (and, therefore, her reservation wage) is increasing in the husband's wage, the unemployment duration of the husband is decreasing in the wife's wage.

We estimate this model structurally by a simulated method of moments (SMM). The model fits reasonably well with the data on wealth, wages, employment, and employment transitions. With the recovered behavioral parameters, we evaluate the dynamics of employment, employment transitions, wages, and wealth accumulation under three counterfactual scenarios: i) an economic downturn for one household member, ii) a relaxation of borrowing constraints, and iii) higher unemployment transfers. We accomplish these scenarios by modifying the underlying parameters that we estimated previously: higher layoff rates, looser borrowing constraints, and higher unemployment transfers. The first regime change aims to assess the "added worker effect," the second regime change determines the effect of borrowing constraint on the household labor allocation, and the third regime change evaluates the policy of increasing unemployment transfers.

All of these regime changes show important household effects that would not be present in an individual-agent framework. The first regime change reveals that once a household member is hit by an adverse labor market shock the partner decreases substantially his/her unemployment rate, which corroborates the "added worker effect" (see, for example, Stephens 2002). The underlying mechanism for this effect is that once the partner separates from his or her job, the spouse's reservation wage declines, thereby speeding up the partner's transition from unemployment to employment. The second regime change shows that when the household faces looser borrowing constraints the labor market activity of the wife increases, accomplishing thereby more equal conditions within household members. The third regime change shows that increases in unemployment transfers generate the well-known labor market effect in the direct beneficiary, namely that unemployment rates and accepted wages increase. The effect on the partner is, however, the opposite: unemployment rates and wages decrease. Increasing unemployment transfers increases the beneficiary's reser-

vation wage while simultaneously decreasing the partner's reservation wage which, again, accelerates his or her job finding. The desired policy effect of unemployment transfers established by models of individual agents, increasing wages at the expense of more unemployment, is thus partially undone when the receivers are household members who are active in the labor market.

To understand the importance of wealth and savings in family job search, we fit a model that excludes wealth and savings to a restricted sample of only employment and wage data. This omission implies underestimating the coefficient of risk aversion, the only parameter that creates interdependence between individual actions within a household. This would lead to a misunderstanding on how married workers react to their spouses' job loss and increased unemployment transfers.

Finally, we also show that the "added worker effect" increases based on the number of children in the household. If a worker experiences job loss, the spouse's job finding increases more the more children there are in the household. However, with more children the opposite effect of increasing unemployment transfers on household members' unemployment disappears for the wife; that is, if the husband receives the unemployment transfers, the wife's unemployment rate increases. The likely reason for this result is that the increase in the husband's income while unemployed implies that the wife is spending more time with the children, which the model reflects in her higher valuation of leisure.

The remainder of the paper is organized as follows. In Section 2, we explain the model and its main implications; in Section 3, we describe the data and the selection criteria used to construct the sample; in Section 4, we detail the estimation method and identification; in Section 5, we present the estimation results and assess the model's fit to the data; in Section 6, we analyze counterfactual scenarios; in Section 7, we evaluate the effects of omitting wealth and savings in family job search; in Section 8, we discuss the effects of the number of children on family job search; and in Section 9, we summarize our main conclusions. In the Appendix we provide details on the numerical solution to the model.

2 Model

Consider a household of two members, husband and wife,[5] that derives utility of consumption and leisure. They maximize expected lifetime utility by choosing a common level of consumption and acceptable wage offers that determine their individual employment status as employed or unemployed. Labor markets for these household members are separated and independent from each other. If household members are unemployed, each of them receives transfers b_i and a wage offer with probability λ_i from a wage offer distribution F_i, $i = 1, 2$. If they are employed, they can be either laid off and become unemployed with probability θ_i or receive a job offer with probability π_i. If agents accept an offer, they work for the new employer; otherwise, they remain in their current employment status. Agents can always quit their job to become unemployed. If an agent is unemployed, the household enjoys an agent-specific utility from leisure ϑ_i, and if both are unemployed they enjoy an extra utility ϑ_3, which reflects the complementarity between partners' leisure time spent together.

In each period, given individuals' employment status, wages and current common wealth A, the household decides on a level of consumption, which determines a level of wealth for the next period A'. The rate of return for saving and borrowing is the same and constant r, while the subjective discount factor is $\beta \in (0, 1)$. There is no restriction for savings, but borrowing is limited by a fraction $s \in [0, 1]$ of the natural borrowing limit, defined as the present value of the lowest possible secured income: $B = -s\frac{1+r}{r}(b_1 + b_2)$. Here s measures the tightness of borrowing constraints, and the limit case $s = 1$ occurs when there are no borrowing constraints.

The household's problem is contained in four value functions, which depend on wealth holdings, employment status, and wages of its members. The value function when both members are unemployed is the following:

$$
\begin{aligned}
V(A,0,0) = \max_{A' \geq B} \Bigg\{ & U\left(A + b_1 + b_2 - \frac{A'}{1+r}\right) + \vartheta_1 + \vartheta_2 + \vartheta_3 \\
& + \beta \Bigg[\lambda_1 \lambda_2 \int \int \max\left[V\left(A', x_1, x_2\right), V\left(A', x_1, 0\right), V\left(A', 0, x_2\right), V\left(A', 0, 0\right)\right] dF_2(x_2) dF_1(x_1) \\
& + \lambda_1 (1 - \lambda_2) \int \max[V\left(A', x_1, 0\right), V\left(A', 0, 0\right)] dF_1(x_1) \\
& + (1 - \lambda_1) \lambda_2 \int \max[V\left(A', 0, x_2\right), V\left(A', 0, 0\right)] dF_2(x_2) + (1 - \lambda_1)(1 - \lambda_2) V\left(A', 0, 0\right) \Bigg] \Bigg\}.
\end{aligned}
$$

[5] To facilitate the exposition of the model and further relate it to the data, we describe our two-agent job search model as consisting of husband and wife, but this framework is applicable to any household composed of two individuals.

When the husband is employed and the wife is unemployed, the value function is:

$$
\begin{aligned}
V(A,w_1,0) = \max_{A'\geq B}\Bigg\{ & U\left(A+w_1+b_2-\frac{A'}{1+r}\right)+\vartheta_1 \\
& +\beta\Bigg[\pi_1\lambda_2\int\int \max\left[V\left(A',x_1,x_2\right),V\left(A',w_1,x_2\right),V\left(A',x_1,0\right),\right. \\
& \qquad \left. V\left(A',w_1,0\right),V\left(A',0,x_2\right),V\left(A',0,0\right)\right]dF_2(x_2)dF_1(x_1) \\
& +\pi_1(1-\lambda_2)\int \max\left[V\left(A',x_1,0\right),V\left(A',w_1,0\right),V\left(A',0,0\right)\right]dF_1(x_1) \\
& +(1-\pi_1-\theta_1)\lambda_2\int \max\left[V\left(A',w_1,x_2\right),V\left(A',w_1,0\right),V\left(A',0,x_2\right),V\left(A',0,0\right)\right]dF_2(x_2) \\
& +(1-\pi_1-\theta_1)(1-\lambda_2)\max\left[V\left(A',w_1,0\right),V\left(A',0,0\right)\right] \\
& +\theta_1\lambda_2\int \max\left[V\left(A',0,x_2\right),V\left(A',0,0\right)\right]dF_2(x_2)\ +\theta_1(1-\lambda_2)V\left(A',0,0\right)\Big]\Bigg\}.
\end{aligned}
$$

A similar expression corresponds to $V(A,0,w_2)$, the value function when the husband is unemployed and the wife is employed. And, finally, the value function when both members are employed has the following expression:

$$
\begin{aligned}
V(A,w_1,w_2) = \max_{A'\geq B}\Bigg\{ & U\left(A+w_1+w_2-\frac{A'}{1+r}\right) \\
& +\beta\Bigg[\pi_1\pi_2\iint \max\left[V\left(A',x_1,x_2\right),V\left(A',w_1,x_2\right),V\left(A',x_1,w_2\right),\right. \\
& \qquad V\left(A',w_1,w_2\right),V\left(A',x_1,0\right),V\left(A',w_1,0\right),V\left(A',0,x_2\right), \\
& \qquad \left. V\left(A',0,w_2\right),V\left(A',0,0\right)\right]dF_2(x_2)\,dF_1(x_1) \\
& +\pi_1(1-\pi_2-\theta_2)\int \max\left[V\left(A',x_1,w_2\right),V\left(A',w_1,w_2\right),\right. \\
& \qquad \left. V\left(A',0,w_2\right),V\left(A',x_1,0\right),V\left(A',w_1,0\right),V\left(A',0,0\right)\right]dF_1(x_1) \\
& +\pi_1\theta_2\int \max\left[V\left(A',x_1,0\right),V\left(A',w_1,0\right),V\left(A',0,0\right)\right]dF_1(x_1) \\
& +(1-\pi_1-\theta_1)\pi_2\int \max\left[V\left(A',w_1,x_2\right),V\left(A',w_1,w_2\right),\right. \\
& \qquad \left. V\left(A',w_1,0\right),V\left(A',0,x_2\right),V\left(A',0,w_2\right),V\left(A',0,0\right)\right]dF_2(x_2) \\
& +(1-\pi_1-\theta_1)(1-\pi_2-\theta_2)\max\left[V(A',w_1,w_2),V\left(A',w_1,0\right),\right. \\
& \qquad \left. V\left(A',0,w_2\right),V\left(A',0,0\right)\right] \\
& +(1-\pi_1-\theta_1)\theta_2\max\left[V\left(A',w_1,0\right),V\left(A',0,0\right)\right] \\
& +\theta_1\pi_2\int \max\left[V\left(A',0,x_2\right),V\left(A',0,w_2\right),V\left(A',0,0\right)\right]dF_2(x_2) \\
& +\theta_1(1-\pi_2-\theta_2)\max\left[V\left(A',0,w_2\right),V\left(A',0,0\right)\right]\ +\theta_1\theta_2V\left(A',0,0\right)\Big]\Bigg\}.
\end{aligned}
$$

A policy rule for wealth accumulation solves each of these four equations; we concisely express them by $A' = A'(A, w_1, w_2)$. Reservation wages emerge from comparing value functions for each possible employment status with each other. We define reservation wages as a function of wealth and the spouse's wage:

$$\begin{aligned} w_1^*(A, w_2) &= \{w_1 | \max[V(A, w_1, w_2), V(A, w_1, 0)] = \max[V(A, 0, w_2), V(A, 0, 0)]\}, \\ w_2^*(A, w_1) &= \{w_2 | \max[V(A, w_1, w_2), V(A, 0, w_2)] = \max[V(A, w_1, 0), V(A, 0, 0)]\}. \end{aligned}$$

Each agent's reservation wage is defined as a function of the partner's *acceptable* wage. For any wage below the partner's reservation wage, as the partner is unemployed, an agent's reservation wage is expressed as $w_1^*(A, 0)$ and $w_2^*(A, 0)$. We also define the following reservation wages:

$$w_1^{**}(A), w_2^{**}(A) = \{w_1, w_2 | V(A, w_1, w_2) = V(A, w_1, 0) = V(A, 0, w_2)\}.$$

This reservation wage set defines the lowest wage combination for both individuals to be employed, which we call *joint-employment reservation wage*. There is no joint employment at wage combinations in which at least one wage w_i is below its corresponding reservation wage w_i^{**}. However, above this wage set joint employment does not need to occur, being possible that only one partner is employed.

As this model does not admit a closed-form solution, we solve it numerically, for which we assume a specific functional form for the utility function, a constant relative risk aversion (CRRA) type, where γ is the coefficient of risk-aversion: $U(C) = \frac{C^{1-\gamma}-1}{1-\gamma}$ (if $\gamma \neq 1$, and $U(C) = \ln(C)$, if $\gamma = 1$). The wage offer distribution is a truncated lognormal $F_i(x)$: $\ln w \sim N(\mu, \sigma^2 | \underline{w}, \overline{w}); 0 < \underline{w} < \overline{w} < \infty,\ i = 1, 2$. We allow wealth to be continuous while we discretize wages. Accordingly, we use the Euler equation and an interpolation algorithm to solve for wealth next period, and we integrate the value functions over wages by a weighted summation. The dynamic problem is solved recursively, iterating the value function until convergence is attained. In the Appendix, we provide a detailed explanation of the numerical solution to the model. The following discussion is based on solving the model assuming the same labor markets for both household members, same arrival rates, wage offer distributions, unemployment transfers, and zero leisure values.

[Figure 1 here]

Figure 1 shows the two reservation wages as a function of the spouse's wage, where the husband is indexed by 1 and the wife by 2. The wife's reservation wage is a horizontal line that becomes an increasing curve as the husband's wage increases. The husband's reservation wage is a vertical line that becomes an increasing curve as the wife's wage increases. These crossing reservation wages divide this space into four areas, each corresponding to the four joint employment statuses. The area of joint unemployment, uu, is a rectangle, while the areas for one unemployed and one employed household member, eu and ue, is the area under the curves, a convex set. However, interestingly, the area of joint employment, ee, is a nonconvex set. Notice also that there is a ceiling on acceptable wages for both partners who are employed: if the wage of one partner is very high, then the other household member will not work. This shape implies that a household with both employed members can experience voluntary quits to unemployment, if one household member receives a high wage offer. Only when both household members are employed at wages that are higher than the highest possible reservation wage $w_i^*(A, \overline{w}), \forall i$, there are no voluntary job separations at a given wealth level.

These results are consistent with Guler, Guvenen, and Violante (2010) in what they have called "the "breadwinner's cycle," with the following differences. In models of job search and wealth accumulation, as opposed to classic job search models, quits are possible even in individual-agent setups: over time once acceptable wages are overtaken by reservation wages that increased with wealth accumulation (Rendon 2006). Thus, individuals who managed to increase their wealth position separate voluntarily from their current job to search for better jobs while unemployed. In our model, this effect is present as well but at the couple level: as the household accumulates wealth, the rectangular area uu and both areas ue and eu of Figure 1 expand over the graph implying that some wage offers and current wages are no longer acceptable. Another important difference with Guler, Guvenen, and Violante's model is that in our framework joint employment is not an absorbing state; agents can still be dismissed or quit to unemployment. Accordingly, quits from employment to unemployment not only switch who is the breadwinner from ue to eu or from eu to ue but also from ee to eu and from ee to ue. In the figure, when the couple is in the area ee and the husband is employed at wage $\widehat{w}_1$, if the wife receives a high wage offer w_2, then she accepts it, and because $\widehat{w}_1 < w_1^*(A, w_2)$ he quits. Breadwinner switches can thus go on even when both household members are employed, until both wages are at least $w_i^*(A, \overline{w}), \forall i$.

As we will see in the next section on data, we find evidence that suggests that job finding triggers job separations and role switching within the household. However, asymmetric labor markets by gender, characterized by a strong labor market attachment for men with a high turnover for women, more than indicating a cycle of constant switching between breadwinners point out episodes of role switching, mostly triggered by job separation than by job finding of one spouse. When an employed household member faces a job separation, the unemployed partner experiences a drop in his or her reservation wage and is more likely to accept wage offers. Job separations of one agent encourage thus job finding of the partner. Hence, this analysis provides a search-theoretic explanation for the well-known "added worker effect."

[Figure 2 here]

Figure 2 shows that reservation wages are increasing in wealth. This result coincides with Danforth's (1979) result for a model of an individual job searcher for which employment is a terminal state. In our context of household job search, the joint-employment reservation wage is also increasing in wealth, and, moreover, it converges to the reservation wage. Switching directly between employment statuses ue and eu occurs mostly at low levels of wealth. As wealth accumulation takes place, there is less room for a rotation of breadwinners within the household. Consequently, the internal disparity of wage income within the household is decreasing in wealth.

[Figure 3 here]

Figure 3 exhibits the husband's reservation wages as a function of both the wife's reservation wage and wealth as level curves. Because there are wage and wealth combinations for which the wife is not employed, we also show the wife's reservation wage functions of Figure 2. We show four levels, L, of the husband's reservation wage, which are increasing both in wealth and the wife's wage, so that they exhibit a decreasing shape and are relatively flat. That is, for the husband's reservation wage to remain constant an increase of one dollar's worth in the wife's wage has to be compensated by a decrease in wealth of more than one dollar. In the area between the wife's reservation wage $w_2^*(A,0)$ and the joint-employment reservation wage $w_2^{**}(A)$, the husband's reservation wage increases only in the wife's wage but not in wealth.[6]

[6]Notice that in Figure 1 an expansion of wealth will not variate substantially the increasing reservation wage curve $w_2^*(A,0)$ in the segment between the upper-right corner of the rectangle uu and the point $(w_1^{**}(A),\ w_2^{**}(A))$.

In the area under the wife's reservation wage, $w_2^*(A,0)$, the husband's reservation wage only increases in wealth at a wife's given wage and is unreactive to the wife's wages in that location, as these wages are unacceptable.

[Figure 4 here]

Figure 4 illustrates the joint employment effect of an increase in the husband's unemployment transfers. The husband's increased reservation wage produces a reallocation of joint employment statuses in three ways. First, there is a reallocation from joint employment to the husband being unemployed and the wife being employed (ee to ue). Second, there is a household role switch from the husband being employed and the wife unemployed to the husband being unemployed to the wife being employed (eu to ue). Third, a reallocation from the husband being employed and the wife unemployed to both spouses being unemployed (eu to uu). In these three reallocations, the husband separates from his job, but the wife's employment status is unchanged in two, whereas in one reallocation she transitions from unemployment to employment. Hence, an increase in a husband's unemployment transfers increases his unemployment rate while it tends to decrease her unemployment rate. This effect will be important when we assess the policy implications of our model in Section 6.

Summarizing, in this model both common wealth and the partner's wages allow individuals to be more selective and search longer for a suitable job. If an employed agent separates from his or her job, the unemployed partner cannot afford to be so selective and will be more likely to accept job offers and become employed. The model allows, thus, for an "added worker effect." It also produces the well-known effect of unemployment transfers on the receiving household member, higher unemployment, and higher wages; yet at the same time it produces an opposite effect on the spouse, namely, lower unemployment and lower wages.

3 Data and descriptive statistics

We are fitting our model to a sample of couples coming from SIPP. This data set contains information on socio-demographic characteristics and labor market variables, such as income; labor force and public programs participation, including child care; wealth; utilization and cost of health care; disability; school enrollment;and taxes. SIPP was constructed primarily to measure the effectiveness of existing federal, state,

and local programs. As it collects information on several variables at the household level, this survey is unique in allowing us to construct a household labor market history.

SIPP's design is based on a continuous series of national panels, with a sample size of approximately 36,700 interviewed households. We are using the 4-year 1996 panel, which covers the period 1996–1999, a period of relative economic stability. The survey is based on monthly interviewing and uses a 4-month recall period, with approximately the same number of interviews being conducted in each month of the 4-month period for each wave. Hence, we have three observations per year during the 1996–1999 span, that is, 12 waves.

As we are interested only in households with two members present, we select one-family households of married couples where both spouses are present and meet certain requirements regarding age and education. We restrict our sample to those aged between 26 and 50, who are high school graduates, not currently enrolled in school, not self-employed or ever retired, not disabled, not contingent workers, not receiving any kind of welfare benefits or social program, not owners of any kind of business, and not in the armed forces. We exclude from the sample couples who have two children or more; our sample consists only of couples that do not have children or who have only one child. These selection criteria restrict our sample to 32,485 observations on 1,050 married couples.[7]

We categorize any individual in the sample as either employed or unemployed.[8] In order to determine the labor status in each of the 12 waves included in the sample, we use the monthly labor status information offered. If that information is not available, we compute monthly wages from the regular hourly wage and the number of hours they work per week.

We use total wealth information reported by SIPP and exclude couples that lack wealth data. All wages and wealth observations are in dollars of 1982–1984. Nominal values in SIPP are deflated using the Consumer Price Index reported by the BLS.[9]

[Table 1 here]

[7] This stringent sample selection is usual in structural estimations. It is particularly similar to Dey and Flinn (2008) , who also use SIPP and restrict their sample to 1,267 married couples.

[8] In the absence of good information on search intensity, we are not able to distinguish between being out of the labor force and unemployment, a distinction that is relevant especially for women Like Dey and Flinn (2008) , we use unemployment synonimously with nonemployment.

[9] See Table 24 in the Historical Consumer Price Index for All Urban Consumers (CPI-U): U. S. city average, all items-Continued (1982–1984=100, unless otherwise noted).

Table 1 shows employment status, wages, and wealth by the employment status of the spouse. It illustrates a noteworthy asymmetry between the employment statuses of the household members.[10] In 21% of the sample, the husband is employed and the wife is unemployed, compared to only around 4% in which the husband is unemployed and the wife is employed. On the other hand, the most frequent employment status is that both are employed, which occurs in around 74% of the observations, while joint unemployment is very infrequent, with only 0.5% of the observations. That is, in 95% of the observations the husband is employed compared with 78% of the observations in which the wife is employed. Within the household, the husband is clearly better established as an employed worker than the wife.

For both household members, the unemployment rate is clearly much higher, twice as much, when the spouse is employed than when he or she is unemployed. For the husband, the unemployment rate is around 2.5% when his wife is unemployed and becomes 5.6% when she is employed. The same happens for the wife, at much higher levels. The wife's unemployment rate is around 10.8% when her husband is unemployed and becomes 21.7% when he is employed.

On the contrary, wages are higher when the spouse is unemployed than if he or she is employed. Husbands' monthly wages are on average \$1,996 when his wife is not working, and \$1,685 when she is working. Wives' average monthly wages are \$1,243 when her husband is not working and \$1,182 when he is working. That is, husband's wages are fairly sensitive to the wife's employment status whereas wife's wages are pretty unreactive to the husband's employment status. A consequence of this asymmetry is that the gender wage gap for these married couples is larger when the spouse is unemployed than when he or she is employed.

Wealth data are very noisy, yet there are some clear differences by household employment status. Wealth is the highest with joint unemployment, which suggests that higher wealth allows couples to hold on to unemployment and wait for better wage offers to arrive. When only one household member works, there is also a clear asymmetry in wealth, depending on who is working. Wealth is higher when only the husband works than when only the wife works. Moreover, when only the wife works, wealth level is the lowest, whereas when only the husband works, the wealth level is as high as when both work. These associations between wealth and joint employment status suggest that wealth accumulation is mainly dependent on the husband working

[10] In these tables, we also report predicted statistics, which we will discuss in detail in Section 5 when we assess model fit.

than on the wife working, another asymmetry within the household.

[Table 2 here]

Table 2 reports unemployment rates and average wages of each household member by the spouse's wage segment and when the spouse is unemployed. The general pattern is very clear: unemployment rates and average wages tend to be higher when the partner's wages are higher. At this level of aggregation, we do not find a "gender asymmetry" as found by Lentz and Tranæs (2005), Lentz (2009), and Marcassa (2013) that would imply that the wife's unemployment and wages are decreasing in the husband's wage. We observe, however, nonmonotonicities in several segments. It is also noteworthy that the unemployment rate when the partner is employed is higher than when the partner is unemployed, even in the lower wage segment, which does not happen for average wages. Average wages when the partner is unemployed are lower than when the partner is employed at the lowest wage segment.

[Table 3 here]

In Table 3 we report the household employment transitions as a percentage of all transitions. The main flows happen within the same joint employment status. Flows from joint unemployment are persistent and very small, as joint status is not very frequent. So is the case with the transition from only the husband being unemployed. Most of the off-diagonal single transitions represent less than 0.5% of all transitions. One transition that exceeds 1% happens when the husband stays unemployed and the wife separates from her job or, equivalently, from joint employment to only the wife being unemployed. As these employment transitions are generally small, the data for wage and wealth variations occurring within these employment transitions contain very few observations.

[Table 4 here]

Table 4 presents employment transitions between joint employment statuses conditional on the current status. We see that the exit from joint unemployment depends mainly on only the husband finding a job, which happens in 19% of the transitions compared with 3% for only the wife finding a job and 3% for both finding a job. If

one of the household members is unemployed and the other is employed, the main off-diagonal transition is to joint employment, that is, that the unemployed partner finds a job while the employed partner remains unemployed. However, there is a large quantitative difference in these transitions: if only the wife works, the probability of transitioning to joint employment is around 13%. But if only the husband works, the probability of transitioning to joint employment is only around 4%. If both work, the most likely event next to staying in the current status is that the wife loses her job, which occurs in around 2% of the transitions.

[Table 5 here]

Table 5 shows individual employment transitions, job finding, and job separations, both total and by the spouse's employment transitions. This table illustrates how one spouse's transitions are influenced by the transition of the partner. The husband's job finding is the highest when the unemployed wife finds a job. Job finding is also high, much higher than the unconditional job finding rate, when the employed wife separates from her job. For the wife, job finding is the highest when the employed husband separates from his job and is next highest when the unemployed husband finds a job. More active job finding is thus strongly influenced by job separations and by job finding by the partner.

On the other hand, for both partners job separations are more intense with the partner's job separation rather than with the partner job finding. Accordingly, the coincidence of job separations between household members is more important than job separations triggered by the partner's job finding. For both household members, job finding and job separations are more active when the spouse experiences an employment status change, job finding or job separation. The wife is more likely both to find a job and to separate from her current job when the husband separates from his job. The husband is more likely to find a job when the wife finds one and is more likely to separate from his job when the wife separates from hers. Altogether, this evidence supports that job finding is triggered by job separations, especially for wives, the "added worker effect," and that job separations are triggered by job finding as remarked by Guler, Guvenen, and Violante's (2012).

This table also shows wage and wealth variations for the transition from employment to employment, the most frequent transition, depending on the spouse's employment transition. Very clearly, wage increases for each spouse are higher if the

partner separates from his or her current job. The wage variation in the husband's wage is an increase of $656 if the wife separates and only of $46 if the wife keeps her job. The wage variation in the wife's wage is an increase of $149 if the husband separates and only of $24 if the husband keeps his job. The husband's wage increase is particularly higher than the wife's increase. Thus, both job finding and wage increases mostly happen when the partner separates from his or her job, which corroborates the "added worker effect."

Variations on the household's wealth caused by the spouse's employment transitions are smaller when the husband stays employed than when the wife stays employed. When the husband keeps his job, there is a relatively stable wealth accumulation, which does not depend substantially on the wife's employment transitions. Moreover, wealth increases when the husband keeps his job are the highest when the wife separates from her job. When the wife stays employed, household wealth fluctuations depend strongly on the husband's job turnover. These fluctuations decrease when the husband changes his employment status, particularly when the husband separates from his job, an important drop of around $1,738. Thus, household members' employment transitions influence wealth accumulation very asymmetrically. Wealth accumulation increases the most when the husband keeps his job and the wife loses hers, while wealth deccumulation increases the most when the wife keeps her job and the husband separates from his.

In sum, these trends suggest a clear asymmetry between husband and wife's employment status, and support that there is an "added worker effect": when one household member separates from employment, it is more likely that the partner becomes employed and wage increases are higher. On its turn, wealth accumulation is mainly dependent on the husband's employment stability.

4 Estimation

By SMM, we recover the parameters of the theoretical model. From the month that we first observe wealth onward, we use the policy rules that solve the dynamic programming problem and random numbers for the stochastic components e.g., job offers, layoffs, and wage offers, to generate simulated data. We compute some selected moments that are then matched to actual moments. At each iteration of the parameter computation, we construct a measure of distance between the observed and the simulated moments. This criterion function is then minimized by the parameter

estimates of the theoretical model.

We fix the rate of discount at 0.9957 and the interest rate at 0.0041, which are the monthly values that match annual values of 0.95 and 0.05, respectively. The parameters to estimate are then $\Theta = \left\{\Theta^1, \Theta^2, \gamma, s, \vartheta^3\right\}$, with $\Theta^i = \{b^i,\ \lambda^i,\ \pi^i,\ \theta^i, \mu^i, \sigma^i, \vartheta^i\}, i = 1, 2$. The moments used in this estimation are the following: joint employment status, wage means and standard deviations by joint employment status, wealth holdings by joint employment status, joint employment transitions, means and standard deviations of wage variations by joint employment transitions, and means and standard deviations of wealth variations by joint employment transitions. Most of these moments are reported in Tables 1 through 6.

These moments are selected to allow identification of the behavioral parameters of the model. The parameters of the standard search model Θ^i are identified from the reservation wage rule by the observed transitions, accepted wages, and wealth level (Flinn and Heckman 1982). Fixing the interest rate r and the discount factor β enables identification of arrival rates and layoff rates by the employment transitions, job finding, and job separations. The observed accepted wages identify the parameters of the wage offer distributions as well as the transfers while unemployed. Since we do not keep track of employers, the arrival rate while employed is identified by wage variations. The other parameters that are specific to a utility-maximizing job search model with wealth accumulation, γ and s, are pinned down by the observed evolution of wealth by employment status and wages. Wealth data also allow identification of the leisure values ϑ separately from unemployment transfers, which in risk-neutral job search is identical to the value of leisure. Unlike nonpecuniary leisure values, higher unemployment transfers affect directly observed wealth accumulation over employment transitions.

The SMM procedure is based on a weighted measure of distance between sample and simulated moments as a function of a parameter set:

$$S(\Theta) = \Delta m' W^{-1} \Delta m,$$

where $\Delta m = (m_a - m_p)$ is the distance between sample and simulated moments and W is a weighting matrix. As in Dey and Flinn (2008), the matrix W is a diagonal matrix consisting of the standard deviation of each empirical moment m_a, obtained by bootstrap methods, from 10,000 random resamples of the data. The estimated behavioral parameters are thus $\widehat{\Theta} = \arg\min S(\Theta)$. We minimize this function by means

of the Powell algorithm, as in Press et al. (1992), who use direction set methods in their optimization algorithm.[11] Asymptotic standard errors are calculated by the gradient estimator, which requires first derivatives. We compute them numerically using a polynomial that requires five function evaluations, obtained by proportionally variating the parameter values around their estimated value. This polynomial smooths the criterion function, whose surface has discontinuous areas. The parameters' asymptotic standard errors are then the square root of the main diagonal of this matrix.

5 Results

The estimates and their corresponding asymptotic standard errors are reported in Table 6.

[Table 6 here]

The estimated labor market parameters reflect the asymmetry in individual labor markets. Arrival rates are much higher and layoff rates are much lower for the husband than for the wife. As we used monthly data in the estimation, the reported rates are also monthly. The corresponding annual rates for the arrival rate while unemployed are 0.9267 for the husband and 0.5093 for the wife, and 0.6246 and 0.0424, respectively, for the arrival rate when employed. The annualized layoff rate is 0.0595 for the husband and 0.0753 for the wife. Notice that these rates are in line with the employment transitions reported in Table 5. Job finding is certainly lower than the arrival rate when unemployed, as some job offers are not accepted. By contrast, job separation is higher than the layoff rate, as some transitions from employment to unemployment are not produced by dismissals. We do not have the reason for leaving a job to verify this mechanism in this data; however, as explained in Section 2, utility-maximizing search models do have the feature of producing voluntary quits, moreover so in this environment of household job search in which an individual's employment status is

[11] This algorithm first calculates function values for the whole parameter space and then searches for the optimal parameter direction in the next iteration for function minimization. Underlying the computation of this optimal direction there is an implicit model of the derivative structure of the objective function. Once a new set of parameters is obtained, the algorithm goes back to calculate a new function value f_t, and the process is repeated until a convergence criterion is satisfied, namely that the percentage variation of this value falls below a certain value: $2\left|f_t - f_{t-1}\right| / \left(\left|f_t\right| + \left|f_{t-1}\right|\right) \leq 10^{-10}$.

highly dependent on the partner's status. Accepted offers that made an individual leave unemployment may no longer be acceptable in the next periods, as household wealth accumulates and the spouse accesses better paid jobs.

Wage offers are also higher for the husband than for the wife. The log mean wage offer is slightly higher for the husband, but the dispersion of the wife's wage offer distribution is much higher than the husband's. These wage offer distributions are associated with higher unemployment transfers for the husband than for the wife, which are almost zero. This means that these unemployment transfers basically only exist for the husband, while the wife's main support when unemployed is only her husband's wages. In models of individual agents these unemployment transfers are mainly non-labor income and the partner's income. In our framework, we are accounting explicitly for both nonlabor income that comes from wealth and for the partner's income, which we endogenize as accepted wages resulting from the joint job search process. Because of the design of the sample, consisting only of couples who do not participate in any government programs, these unemployment transfers do not contain income that comes from unemployment insurance. Thus, these unemployment transfers may consist of extensive family transfers, such as transfers from parents to household members.[12] Notice also that these higher unemployment transfers imply a higher truncation point for the wage offer distribution of the husband, which is consistent with his higher wages, despite the higher dispersion of his wife's wage offer distribution.

The value of leisure is positive for both individuals but higher for the wife than for the husband, which captures the household's higher incentive for the wife not to work. However, when both are unemployed the common leisure parameter has a negative sign with a relatively high value, which implies that there is disutility from joint unemployment.

The coefficient of constant relative risk aversion is estimated at 1.45, which is in line with previous estimates of utility-maximizing job search models. The tightness of the borrowing constraint reveals that households can only borrow around 8% of their natural borrowing limit.

These estimates reproduce the observed trends in joint and conditional individual employment transitions, wages and wealth by employment status, and wealth variations by employment transitions, as we can see in Tables 1 through 6.

[12] As discussed previously, these parameters are mainly identified by accepted wages and employment transitions. In further research, these results can be corroborated by incorporating data of observed income in unemployed spells of each household member.

The estimated model is able to replicate very closely the household employment status, individual employment status, and accepted wages by employment status of the spouse, as reported in Table 2. Wealth is, however, estimated less accurately, most likely because of the very noisy wealth data. Standard deviations of wealth by employment status are large relative to their corresponding means. The model does reproduce these large variations but certainly with less precision in replicating average wealth. Predicted average wealth is closer to actual average wealth when both partners are unemployed or both are employed. Predicted average wealth holdings when one of the partners is employed and the other is unemployed are pretty far from actual values. Yet, as in the data, average wealth is higher when the husband is working and the wife is unemployed than when the wife is working and the husband is unemployed. Consequently, in the actual and predicted values wealth accumulation depends more on the husband working than on the wife working.

Table 2 shows actual and predicted individual unemployment rate and average wage-by-wage segment of the spouse. Both are relatively well replicated, except for the highest wage segment. Yet, the general increasing trend of both variables is well captured by the estimated model: higher individual wages are associated with higher unemployment rates and average wages of the spouse. We find that these trends hold both for husband and wife, suggesting thus that both reservation wages are increasing in the spouse's wage.

Predicted household employment transitions, as shown in Tables 3 and 4, also exhibit a close proximity. This replication is particularly important because many of these numerous household employment transitions have very low values. Accordingly, in the next tables, we concentrate on the wage and wealth variations for the most relevant transitions.

Table 5 presents individual employment transitions and wage and wealth variations conditional on the spouse's employment transitions. The replication of these moments is pretty good, particularly for employment and wage variations for the most frequent spouse's employment transitions. But, once again, the replication is less accurate for the very dispersed wealth data. It is particularly difficult to mimic drops in wealth for the wife's employment transitions. As in the actual transitions, in all cases unconditional variations are very close to the variations conditional on the spouse staying employed, the most frequent employment transition. An important feature of these predicted transitions is that for both household members job finding is highest when the partner faces job separations. By contrast, predicted job sepa-

rations for husbands are the highest when wives find jobs, while for wives, as in the data, they are the highest when husbands separate from their jobs. As in the actual transitions, both job finding and job separations for a household member tend to be higher when their partners experience employment status changes.

In addition to assessing the fit for the moments used in the estimation, we analyze the hazard rates for the four household employment statuses. We did not include this hazard information in the estimation, yet the model also fits well these data reasonably well.

[Figure 5 here]

Figure 5 shows the actual and predicted hazard rates of the four joint employment statuses. In the four graphs, the actual data fluctuate around the predicted hazard over time in months. All exhibit a peak around the fifth month of being in the current joint employment status, which the model is not reproducing. Yet the general level is correctly captured by the estimated model.

[Table 7 here]

In Table 7, we report the proportion of the last joint employment status for each hazard rate. Joint unemployment is mainly receiving the flow from the husband separating from his job when the wife is not working. This status receives 68% of its flow from only the husband being employed. The employment status of only one partner working is fed mainly by joint employment, that is, by job separations of one partner: from joint employment comes 94% of the flow to only the wife working and 89% of the flow to only the husband working. Joint employment comes mostly from only the husband being employed, 58%, and second from only the wife being employed, 41%. The model is able to replicate these flows relatively closely.

[Figure 6 here]

Finally, Figure 6 reports the proportion of exits from the current joint employment status. The model also replicates these exits pretty well in levels, but it does not capture all the proportion fluctuations over time. The main destination for a joint unemployment spell is to only the husband working, followed by only the wife working.

For only one partner working, the main destination is joint employment. However, the second destination differs by who the working spouse is. For only the wife working, the second destination is that only the husband works. An employment separation of the wife in this status is associated with the unemployed husband immediately finding a job, which conforms to the "added worker effect." For only the husband working, the second destination is joint unemployment, which implies that the husband's job separation is not associated with the wife's immediate incorporation to work. After a spell of joint employment, the main destination is that only one agent separates from her job, mainly the wife.

The model delivers thus a fairly good replication of the observed data, particularly for employment and wages. This good replication is extensive to several conditional moments by the spouse's employment transitions both joint and conditional, in particular, the connection between household members' job finding and job separation. The model replicates well the large dispersion of the wealth data and their trend to depend mainly on the husband's labor market activity.

6 Regime changes

After recovering the underlying parameters of the model and assessing their success in replicating the data, we perform three regime changes: worsening each household member's labor markets, relaxing borrowing constraints, and increasing unemployment transfers. The first change aims to assess the effect of an asymmetric downturn on a worker's labor market outcomes and, more precisely, evaluate whether the spouse increases his or her labor market activity once the partner becomes unemployed i.e., the "added worker effect". This change is attained by increasing layoff rates by 1 percent. The second change consists of increasing the debt limit by doubling the tightness of the borrowing constraint. Thereby we evaluate the effect of access to credit in family job search. The third regime change is increasing unemployment transfers of each spouse by \$100 at a time and then increasing both transfers by \$50 at the same time. We assess these changes by recomputing all moments from the same starting point in time but with the new regime. We are comparing two different economies rather than comparing an economy before and after a policy change.

[Table 8 here]

In Table 8, we report the effects of these regime changes on several selected observables. Worsening a spouse's labor market increases his or her unemployment but decreases it for the partner. This can be seen in the first two columns for joint employment status. When there is a downturn for the husband by a higher layoff rate, there is an increase of both joint unemployment and unemployment only for the husband, associated with a decrease of joint employment and unemployment only for the wife. This evidently translates into a higher total unemployment for the husband but less evidently into a lower unemployment for the wife. The same happens when the downturn is experienced in the wife's labor market because of a lower arrival rate: joint unemployment and unemployment only for the wife increase but joint employment and unemployment only for the husband decrease. Hence, the unemployment rate for the wife increases, while the unemployment rate for the husband declines. There is a clear "added worker effect": an agent becomes more active in the labor market when labor market conditions worsen for the partner. Underlying these changes in outcomes are the household members' reservation wage variations. An economic downturn increases an agent's unemployment and thereby undermines the support for the partner's reservation wage, who becomes more likely to accept a job. On their turn, average wages of both spouses and common wealth holdings tend to decrease when the husband's or the wife's layoff rate increase.

The second regime change, increasing the debt limit, decreases both household members unemployment rates, with a greater impact on the wife's unemployment rate. The wife transitions from not working when the husband works to working while the husband keeps his job. That is, relaxing borrowing constraints implies mainly an increase in joint employment and a reduction in the wife's unemployment rate, which brings more equality in labor market activity into the household. This regime change has negligible wage effects, and, as expected, it results in a decline in wealth holdings.

The third regime change is reported in the last three columns of Table 8. Increases in unemployment transfers increase unemployment and wages of the beneficiary spouse but decreases unemployment and wages of the spouse who does not receive them. That is, increasing unemployment transfers have the usual effect in the labor market of an individual but have the opposite effect on his or her partner (i.e., its cross-effect is negative). This is consistent with the mechanism explained in Section 2. Splitting individual unemployment transfers in half and increasing both spouses' unemployment transfers has similar effects as increasing only the husband's

unemployment transfers but quantitatively more weakly. The husband's unemployment increases and the wife's unemployment decreases, but in lower amounts, with both partners's wages declining. Increasing unemployment transfers also make wealth holdings fall, on the one hand because the higher income permanently undermines the need for a buffer stock for future unemployment spells and on the other hand because it increases the debt limit.

These regime changes corroborate, thus, i) the increased job finding of a worker as a response to the spouse's increased job separation (i.e., the "added worker effect"), ii) that more access to credit results essentially in higher joint employment in the household, and iii) that increasing a worker's unemployment transfers lowers the spouse's unemployment rate.

7 Family job search without wealth and savings

How important are wealth and savings to understand family job search? To answer this question, we reestimate our model excluding wealth and savings both in the model and in the data, that is, assuming that all household income is consumed at every period, as in Dey and Flinn (2008), Flabbi and Mabli (2010), Ek and Holmlund (2010), and Guler, Guvenen, and Violante (2012). This is the exercise performed by Blundell et al. (2016) in their analysis of female labor supply. The results of this estimation are presented in Table 9.

[Table 9 here]

This exercise has a similar effect as excluding a relevant variable in any other estimation: it implies a biased estimation of the remaining parameters. In our model, the omission of savings reduces the estimated coefficient of risk aversion, which accounts for the labor market interdependence between household members. This parameter declines in half, from 1.447 to 0.718. This result is in line with earlier structural estimations of this parameter in the absence of wealth data, which also find lower estimates. Dey and Flinn (2008), using full-time data, part-time data, and employer-provided health insurance data from the 1996-1999 panel of SIPP estimate this coefficient at a low value: 0.474. Flabbi and Mabli (2010) use full-time and part-time data from the 2001-2003 panel of SIPP and estimate this coefficient at a higher value, 0.9744.

This omission also blurs the identification of the leisure parameters, as it is not possible to distinguish between monetary flows and nonpecuniary incentives to stay unemployed. Despite the nonlinear utility function, without using indicators of hours of work there is no possible distinction between the value of leisure and unemployment monetary transfers in a model without savings. Accordingly, we exclude the leisure parameters from the estimation with the consequence that the estimated unemployment transfers increase substantially. However, other parameters of the model (e.g., wage offer distributions and the arrival rates) do not present large variations, as they are well identified from the observed employment transitions and wages.

[Table 10 here]

Table 10 shows the main predicted statistics for employment status and wages. This constrained model exhibits a similar fit of employment status statistics but a less accurate account of conditional wages, especially for wives, which presents less dependence on the husband's employment status than in the unconstrained model and in the data. This may happen because, unlike in the unconstrained estimated model where wives practically do not receive unemployment transfers, in the constrained model wives receive higher unemployment transfers, which results in less dependency on their husbands' wages.

[Table 11 here]

Table 11 presents the effects of regime changes in the constrained model. Certainly, there are no effects of wealth accumulation and access to credit on labor market outcomes. Yet, it is possible to assess the effect of an economic downturn and of increasing unemployment transfers. A downturn affects both spouses more evenly, increasing their unemployment rate so that there is no "added worker effect" as in the unconstrained model in which the unemployment rate of the spouse declines. On its turn, increasing unemployment transfers mainly increases the wife's unemployment rate, regardless of which household member is the beneficiary. The cross-effect, however, is still negative when the beneficiary is the wife; that is, the husband's unemployment rate declines. Consequently, omitting wealth and savings conducts to neglecting the "added worker effect" and the opposite effect of increasing unemployment transfers for individual household members. This omission can thus result in serious miscalculations of the effects of unemployment policy.

Thus, wealth data, even if they present a large dispersion, contribute to a correct estimation of the labor market parameters of a family job search model. Omitting wealth in an estimation implies that the estimated coefficient of risk aversion will biased downward, which will understate the interdependence between household members' job search. Moreover, wealth data enable the identification of leisure parameters, whose omission implies an upward bias in the estimated unemployment transfers, which will distort the assessment of unemployment policies by neglecting the "added worker effect" and the negative cross-effect of increasing unemployment transfers.

8 Family job search with more children

What is the effect on family job search of having more children? We can answer this question reestimating our model using a sample of similar characteristics to the one we use in this paper, but with two or more children. This sample contains 34,989 observations on 1,058 married couples.

[Table 12 here]

Table 12 provides the main actual and predicted statistics of this sample. Very clearly, unemployment rates are higher and wages and wealth levels are generally lower than in the sample with at most one child. But most importantly, differences in unemployment rates and wages by the spouse's employment status are much less pronounced than in the sample with one child or none. This suggests that the presence of more children erodes the interdependency of the individual job search processes within the household. And, as it happens in our main sample, the dispersion of wealth is very high.

[Table 13 here]

In Table 13 we report the estimated parameters that generate the predicted statistics of Table 12. Compared to the estimated parameters for the sample of no more than one child, in this sample the coefficient of risk aversion is lower, the husband's unemployment transfers are higher, his value of leisure is lower, and the wife's value of leisure is higher, and the negative common value of leisure is much higher in absolute

value. This is in line with the reduced influence of the spouse's employment status as already mentioned. The tightness of the borrowing constraint is the same as in the previous sample, but labor market parameters are clearly different. The logwage offer distribution exhibits higher means and standard deviations for both spouses; however, arrival rates for the wife are worse than in the previous sample: both arrival rates, when unemployed and employed, are lower while the layoff rate is higher. For the husband, the arrival rate is lower when unemployed but higher when employed, while his layoff rate is lower. That is, the husband's labor market is generally better than in the previous sample, but his higher unemployment transfers suggest that he is also more selective in accepting wage offers. For the wife, both the labor market, worse than in the previous sample, and her higher value of leisure explain her higher unemployment rates.

[Table 14 here]

In Table 14, we repeat the three regime changes for the sample of two or more children. Increasing layoff rates has a weaker effect on increasing unemployment of a worker but a higher effect on reducing the partner's unemployment than in the previous sample. This is suggestive that the "added worker effect" increases with the number of children. Job loss of one partner has to be compensated by job finding of the partner. Relaxing borrowing constraints reduces household wealth holdings as in the previous sample but has an opposite effect on household employment. Unlike in the previous sample, with two or more children relaxing borrowing constraints reduces joint employment and joint unemployment, thereby increasing unemployment rates for both spouses but mainly for the wife. With a higher value of leisure for the wife, more access to credit allows the couple to consume more leisure, possibly spending more time with their children. The third regime change, increasing unemployment transfers, has a higher effect on increasing unemployment rates of the beneficiary spouse, however, with a clear asymmetry. If the husband is the beneficiary, both unemployment rates increase, but if the wife is the beneficiary, her unemployment rates increase and the husband's declines. Splitting the increase in these transfers in half between spouses implies increases in unemployment rates for both, a higher impact than the increase in the sample with at most one child. This regime change suggests that the opposite reaction of the spouse to increasing unemployment transfers in the couple with two or more children only exist if the wife is the beneficiary. If the

husband receives the increased unemployment transfers, the wife will also increase her unemployment rate, most likely to spend time with the children, captured in her higher value of leisure.

This analysis suggests that with more children in the household the "added worker effect" is stronger. However, with more children the opposite effect of increased unemployment transfers on individual unemployment is more asymmetric within the household. As the wife has a higher value of leisure, reflective of her taking care of the children, increased husband's unemployment transfers act as a disincentive for her to seek employment. However, the opposite effect still exists for the husband: if the wife is the individual beneficiary of increased unemployment transfers, the husband's job finding increases, which reverses the usually desired effect of this policy.

9 Conclusions

In this paper, we have developed and estimated a model of family job search and wealth accumulation. Earlier research on family job search did not consider households' savings decisions. We have shown that omitting wealth and savings from an analysis implies an underestimation of the household risk aversion, hence understating the interdependence between household members' employment transitions and wages.

We have documented that increasing job separations, particularly during economic downturns, triggers increased job finding by his or her partner, which constitutes the "added worker effect." We have proposed a search-theoretic mechanism for this effect: increased job separations of one agent undermines the unemployed partner's job selectivity and thus decreases the partner's reservation wage. Consequently, the partner is more likely to accept job offers and thus accelerates his or her transition from unemployment to employment.

A policy implication of this analysis is that increasing unemployment transfers has the classical effect of increasing unemployment and wages but at the same time decreases his or her partner's unemployment and wages, implying that its cross-effect is negative. Effects of unemployment transfers that are valid in an individual-agent job search framework are partly undone by the partner's behavior in a two-agent job search context. Given that the desired effect of unemployment insurance is to support job search and thereby improve the quality of the resulting wage match for the whole labor force, this purpose may not be accomplished efficiently for married

couples. An optimal unemployment insurance has to be reassessed, departing from the individual-agent setup to consider the household as an economic decision unit.

Our results also establish that both the "added worker effect" and the negative cross-effect of unemployment transfers disappear and thus would be overlooked if wealth data are excluded in the model and the estimation.

We also have shown that more children in the household strengthens the "added worker effect." Moreover, increasing the number of children implies a positive effect of the husband's unemployment transfers on the wife's unemployment rate. However, the presence of more children in the household does not change that increasing the wife's unemployment transfers decreases the husband's unemployment rate.

In the present paper, we have centered our attention on employment transitions and wage variations. We have made the case that wealth data are important even if the purpose of the analysis is restricted to these labor market features. However, the inclusion of wealth data opens the doors to analyzing other important issues, such as consumption smoothing in the presence of uncertain household incomes and limited access to credit. Our model also has implications for these issues. In our model, a household combines wealth holdings and individuals' job acceptance decisions to maintain a stable level of consumption over time. We have left the analysis of these issues for future research.

A limitation of our analysis is the assumption that existing observed couples and their number of children are exogenous. A valuable extension of the current framework would be to analyze how our results change when couple formation and dissolution as well as fertility decisions are allowed. This extension would also imply departing from the unitary job search model to allow for a collective framework that considers bargaining and cooperation within the household.

When better data become available, another important improvement would be to distinguish between unemployment and being out of the labor force. A further and challenging extension would be an equilibrium framework that improves the assessment of regime changes by considering firms' reactions to increased reservation wages caused by increased unemployment benefits.

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Appendix: Numerical solution of the model

Continuous and discrete variables

In the numerical solution of the model, wealth is a continuous variable, only discretized to support the computation of any value on its domain, while wages are discretized. Table A1 gives further details of this discretization.

Table A1. Discretization of Variables

	Wealth	Wages
Original Variable	A	w
Discretized Variable	$A[i]$	$w[j]$
Gridpoints	$i = 1, ..., N_A$	$j = 1, ..., N_w$
Gridpoint Location	Left	Middle
Number of Gridpoints	$N_A = 101$	$N_w = 101$
Number of Intervals	$N_A - 1$	N_w
Lower Bound	$\underline{A} = -s\frac{(1+r)(b_1+b_2)}{r}$	$\underline{w} = 700$
Upper Bound	$\overline{A} = 500\,000$	$\overline{w} = 10\,000$
Gridsize	$\Delta_A = \frac{\overline{A}-\underline{A}}{N_A-1}$	$\Delta_w = \frac{\ln \overline{w}-\ln \overline{w}}{N_w}$

The lower bound on wealth is set at a fraction of the natural borrowing limit, so that a household can borrow up to some fraction of the present discounted value of their lowest possible income. We also define $w[0] = b_1$ and $w[0] = b_2$.

Wage offer distribution

For each discretized wage, $j = 1, N_w$, and for each agent, $l = 1, 2$, we compute discrete probabilities integrating the wage interval defined by the grid:

$$g(j,l) = \frac{\Phi\left(\frac{\ln w_j + \Delta_w/2 - \mu_l}{\sigma_l}\right) - \Phi\left(\frac{\ln w_j - \Delta_w/2 - \mu_l}{\sigma_l}\right)}{\Phi\left(\frac{\ln \overline{w} - \mu_l}{\sigma_l}\right) - \Phi\left(\frac{\ln \underline{w} - \mu_l}{\sigma_l}\right)}.$$

Value function, policy rules, and expected value function

These are approximated by:

$$\begin{aligned} V(A_t, w_1, w_2) &= V[i,j,k], \\ A_{t+1}(A_t, w_1, w_2) &= A[i,j,k], \\ EV(A_{t+1}, w_1, w_2) &= EV\left[i', j, k\right]. \end{aligned}$$

Solution to the dynamic problem

The following steps are done for each i, j, and k:

1. Initialization. We initialize the value function at the deterministic value of consuming all wealth and income forever with the instantaneous value of leisure, which admits an explicit expression:

$$V[i,j,k] = c_1 \frac{\left(A[i] + \left(1 + \frac{1}{r}\right)(w[j] + w[k])\right)^{1-\gamma}}{1-\gamma} - \frac{1}{1-\gamma}\frac{1}{1-\beta} + \vartheta[j,k],$$

where $c_1 = \left(1 - \beta^{\frac{1}{\gamma}}(1+r)^{\frac{1-\gamma}{\gamma}}\right)^{-\gamma}$, and $\vartheta[j,k] = \vartheta_1 I(j=0) + \vartheta_2 I(k=0) + \vartheta_3 I(j=0) I(k=0)$.

2. Integration. For each combination i', j, k integrate over all admissible values of j and k. For instance, for $V\left[i', 0, 0\right]$ we calculate the following three summations:

$$\begin{aligned}
EV_{11}\left[i', 0, 0\right] &= \sum_{j=1}^{N_w}\sum_{k=1}^{N_w}\max\left[V\left[i', j, k\right], V\left[i', j, 0\right], V\left[i', 0, k\right], V\left[i', 0, 0\right]\right] g\left(j, 1\right) g\left(k, 2\right), \\
EV_{10}\left[i', 0, 0\right] &= \sum_{j=1}^{N_w}\max\left[V\left[i', j, 0\right], V\left[i', 0, 0\right]\right] g\left(j, 1\right), \\
EV_{01}\left[i', 0, 0\right] &= \sum_{k=1}^{N_w}\max\left[V\left[i', 0, k\right], V\left[i', 0, 0\right]\right] g\left(k, 2\right).
\end{aligned}$$

With them we build the integral

$$\begin{aligned}
EV\left[i', 0, 0\right] &= \lambda_1\lambda_2 EV_{11}\left[i', 0, 0\right] + \lambda_1\left(1-\lambda_2\right) EV_{10}\left[i', 0, 0\right] \\
&\quad + \left(1-\lambda_1\right)\lambda_2 EV_{01}\left[i', 0, 0\right] + \left(1-\lambda_1\right)\left(1-\lambda_2\right) V\left[i', 0, 0\right].
\end{aligned}$$

We repeat this process for the expected value functions of the other three joint employment status.

3. Differentiation. Compute the derivative of this object over wealth using a cubic interpolation:

$$\begin{aligned}
EV_A\left[i', j, k\right] &= \frac{-EV\left[i'+2, j, k\right] + 4EV\left[i'+1, j, k\right] - 3EV\left[i', j, k\right]}{A\left[i'+2\right] - A\left[i'\right]},\ if\ i' = 1; \\
&= \frac{EV\left[i'+1, j, k\right] - EV\left[i'-1, j, k\right]}{A\left[i'+1\right] - A\left[i'-1\right]},\ if\ N_A > i' > 1; \\
&= \frac{3EV\left[i', j, k\right] - 4EV\left[i'-1, j, k\right] + EV\left[i'-2, j, k\right]}{A\left[i'\right] - A\left[i'-2\right]},\ if\ i' = N_A.
\end{aligned}$$

4. Policy rule inversion. We use the endogenous gridpoints method as in Carroll (2006). For each i', j and k, optimal consumption $C\left[i', j, k\right]$is found:

$$C\left[i', j, k\right] = \left(\beta\left(1+r\right) EV_A\left[i', j, k\right]\right)^{-\frac{1}{\gamma}}.$$

5. Smoothing. Conditional on j, k, regress $C\left[i', j, k\right]$ on $A(i')$. Whenever there are nonmonotonicities in $C\left[i', j, k\right]$ over $A(i')$, use predicted consumption instead of actual consumption:

$$\widehat{C}\left[i', j, k\right] = \widehat{b}_0 + \widehat{b}_1 A\left[i'\right] + \widehat{b}_2\left[A\left[i'\right]\right]^2.$$

6. Inverse solution. Find wealth at time t as a function of i' and j, k, denoted by $\widetilde{A}$, for each j, k:

$$\widetilde{A}\left[i', j, k\right] = \widehat{C}\left[i', j, k\right] - w\left[j\right] - w\left[k\right] - \frac{A\left[i'\right]}{1+r}.$$

7. Conditional solution. Reposition current liquid wealth $\widetilde{A}$ to find the solution.

Interior solution. For each i locate $i\prime$ such that $\widetilde{A}\left[i', j, k\right]) < A\left[i\right] < \widetilde{A}\left[i'+1, j, k\right]$,

then compute the linear interpolations

$$\begin{aligned} A'[i,j,k] &= aA\left[(i'\right] + (1-a)\,A\left[i'+1\right], \\ EV^* &= aEV\left[i',j,k\right] + (1-a)\,EV\left[i'+1,j,k\right], \end{aligned}$$

where $a = \frac{A(i)-\widetilde{A}(i',j,k)}{\widetilde{A}(i'+,j,k)-\widetilde{A}(i',j,k)}$.

Corner solutions. If $A(i) < \widetilde{A}(1,j,k)$, then let $i^* = 1$; if $A(i) > \widetilde{A}(N_A,i,k)$, then $i^* = N_A$:

$$\begin{aligned} A'[i,j,k] &= A[i^*] \\ EV^* &= EV[i^*,j,k]. \end{aligned}$$

8. Then compute the value function using

$$\begin{aligned} C^*[i,j,k] &= A[i] + w[j] + w[k] - \frac{A'[i,j,k]}{1+r}, \\ V[i,j,k] &= U(C^*[i,j,k]) - \vartheta[j,k] + \beta EV^* + \vartheta[j,k]. \end{aligned}$$

9. Evaluate convergence. If $\|V' - V\| < \varepsilon$, stop; otherwise go back to step 2, and repeat the process.

Table 1. Employment, Wages, and Wealth by Household Employment Status

	Spouse			
	Actual		Predicted	
Variable	Unemployed	Employed	Unemployed	Employed
Joint Employment Status				
Husband				
Unemployed	0.53	4.38	0.52	3.92
Employed	20.66	74.43	21.11	74.45
Unemployment Rate				
Husband	2.51	5.56	2.40	5.00
Wife	10.82	21.73	11.69	22.09
Wages				
Husband	1966	1685	2091	1574
	(1558)	(931)	(1659)	(775)
Wife	1243	1182	1318	1208
	(897)	(629)	(717)	(592)
Wealth if Husband				
Unemployed	52036	37567	64930	75628
	(81831)	(61071)	(83525)	(88202)
Employed	45254	46786	83794	51575
	(75842)	(63635)	(107287)	(57673)

Table 2. Unemployment Rate and Average Wage by Spouse's Wage Segment

	Unemployment Rate (%)				Average Wage ($)			
	Husband		Wife		Husband		Wife	
Spouse is	Actual	Predicted	Actual	Predicted	Actual	Predicted	Actual	Predicted
Unemployed	2.51	2.40	10.82	11.69	1967	2091	1243	1318
Wage segment:								
[700, 1475)	5.42	4.72	20.44	18.66	1648	1494	1117	1094
[1475, 2250)	6.68	5.49	21.11	20.14	2048	1827	1359	1297
[2250, 3025)	5.17	6.17	34.04	25.75	2473	1908	1513	1482
[3025, 3800)	5.88	5.82	50.72	38.70	1693	1776	1264	1366
[3800, 10000]	36.36	15.08	63.80	58.33	2692	1920	1564	1383

Table 3. Household Employment Transitions, as a Percentage of All Transitions

	Actual						Predicted				
t	uu	ue	eu	ee	Total	t	uu	ue	eu	ee	Total
$t-1$						$t-1$					
uu	0.36	0.01	0.09	0.01	0.48	UU	0.37	0.02	0.09	0.00	0.49
ue	0.02	3.59	0.01	0.54	4.17	UE	0.02	3.14	0.02	0.52	3.70
eu	0.09	0.02	18.76	0.76	19.64	EU	0.10	0.02	19.18	0.91	20.21
ee	0.06	0.75	1.80	73.11	75.71	EE	0.03	0.70	1.84	73.04	75.61
Total	0.53	4.38	20.66	74.43	100.00	Total	0.51	3.89	21.13	74.47	100.00

Table 4. Household Employment Transitions, Conditional on Current Household Employment Status

	Actual						Predicted				
t	uu	ue	eu	ee	Total	t	uu	ue	eu	ee	Total
$t-1$						$t-1$					
uu	75.00	2.78	19.44	2.78	100.00	UU	75.17	4.77	19.33	0.73	100.00
ue	0.43	86.28	0.32	12.97	100.00	UE	0.55	84.99	0.49	13.96	100.00
eu	0.48	0.11	95.52	3.89	100.00	EU	0.48	0.11	94.91	4.50	100.00
ee	0.08	0.98	2.37	96.57	100.00	EE	0.04	0.93	2.43	96.60	100.00

Table 5. Employment Transitions, Wage, and Wealth Variations by Spouse's Employment Transitions (standard deviations in smaller fonts)

Transition		Actual					Predicted				
		Total	By Spouse's Transitions				Total	By Spouse's Transitions			
			u→u	u→e	e→u	e→e		u→u	u→e	e→u	e→e
Employment Transitions (%)											
Husband:	u→e	14.04	20.59	50.00	42.86	13.07	15.07	20.45	13.31	47.15	14.11
	e→u	0.96	0.50	2.84	3.13	1.01	0.89	0.50	2.39	1.56	0.95
Wife:	u→e	3.98	3.57	12.50	19.23	3.91	4.59	5.97	3.65	18.71	4.53
	e→u	2.37	0.49	2.42	7.22	2.40	2.41	0.65	3.41	4.00	2.46
Wage variations in E→E ($)											
Husband		48	-2	72	656	46	47	1	2	782	41
		595	618	481	1409	593	250	23	27	1482	265
Wife		24	5	-38	149	24	21	0	1	174	21
		395	427	633	460	395	168	32	37	474	168
Wealth variations in E→E ($)											
Husband		640	586	755	773	650	1284	750	578	3018	1389
		8685	5625	3338	4010	8890	2929	3176	2983	2946	2912
Wife		605	443	-1142	-1738	650	1360	631	589	2168	1389
		8872	3428	11374	6746	8890	2911	3226	3109	3009	2912

Table 6. Parameter Values and Asymptotic Standard Errors

Parameter	$\widehat{\Theta}$	Estimate			
		Husband		Wife	
Individual:					
Arrival Rate Unemployed	λ	0.1957	(0.0064)	0.0576	(0.0015)
Arrival Rate Employed	π	0.0784	(0.0025)	0.0036	(0.0002)
Layoff Rate	θ	0.0051	(0.0005)	0.0065	(0.0003)
Mean Logwages	μ	4.5703	(0.2060)	4.5579	(0.1915)
Standard Deviation of Logwages	σ	0.8586	(0.0450)	1.2596	(0.0448)
Unemployment Transfers	b	196.64	(10.2201)	0.06	(0.0043)
Leisure	ϑ	0.0088	(0.0003)	0.0108	(0.0003)
Common:					
Relative Risk Aversion	γ		1.4472	(0.0086)	
Borrowing Constraint	s		0.0782	(0.0009)	
Leisure	ϑ_3		-0.0133	(0.0010)	

Table 7. Previous Employment Status by Employment Status Spell in Percentage (each column adds up to 100%)

Previous Employment Status	Employment Status Spell							
	Actual				Predicted			
	uu	ue	eu	ee	uu	ue	eu	ee
uu		2.34	9.91	1.02		3.11	4.81	0.25
ue	12.90		1.42	41.02	13.96		0.93	36.12
eu	67.74	3.91		57.97	66.07	2.98		63.63
ee	19.35	93.75	88.68		19.97	93.91	94.26	

Table 8. Effects on Employment, Wages and Wealth of Three Regime Changes: i. An Economic Downturn, ii. Relaxing Borrowing Constraints, and iii. Increasing Unemployment Transfers

Variable	Economic Downturn		Increase	Unemployment Transfers		
	Husband $+\theta_1$	Wife $+\theta_2$	Debt Limit $+s$	Husband $+b_1$	Wife $+b_2$	Both $+b_1, +b_2$
Joint Employment Status (%)						
uu	0.69	0.18	0.00	0.83	0.02	0.38
ue	3.52	-0.42	-0.08	0.96	-0.23	0.27
eu	-1.61	5.73	-0.15	-1.17	1.45	-0.13
ee	-2.58	-5.47	0.25	-0.59	-1.23	-0.50
Unemployment Rate* (%)						
Husband	4.38	-0.18	-0.12	1.19	-0.20	0.36
Wife	-0.75	5.92	-0.18	-0.83	1.47	0.02
Wages* ($)						
Husband	-46	-1	0	5	-20	-7
Wife	-10	0	0	-6	9	-1
Wealth** ($)	-340	-317	-1288	-3279	-4272	-3650

* if the spouse is employed. ** if both are employed.

Table 9. Parameter Values and Asymptotic Standard Errors
Family Job Search Without Wealth

Parameter	$\widehat{\Theta}$	Estimate			
		Husband		Wife	
Individual:					
Arrival Rate Unemployed	λ	0.1850	(0.0000)	0.0404	(0.0001)
Arrival Rate Employed	π	0.0864	(0.0011)	0.0017	(0.0000)
Layoff Rate	θ	0.0035	(0.0000)	0.0110	(0.0001)
Mean Logwages	μ	4.5198	(0.1329)	4.5932	(0.0052)
Standard Deviation of Logwages	σ	0.8583	(0.0480)	1.3801	(0.0015)
Unemployment Transfers	b	359.72	(0.3682)	317.50	(0.3241)
Common:					
Relative Risk Aversion	γ		0.7180	(0.0002)	

Table 10. Employment and Wages by Spouse's Employment Status
Family Job Search Without Wealth

Variable	Spouse	
	Unemployed	Employed
Joint Employment Status (%)		
Husband		
Unemployed	0.53	4.32
Employed	20.84	74.31
Unemployment Rate (%)		
Husband	2.49	5.50
Wife	10.97	21.90
Wages ($)		
Husband	1843	1678
	(1459)	(912)
Wife	1157	1192
	(561)	(616)

Table 11. Effects on Employment and Wages of two regime changes:
i. An Economic Downturn, ii. Increasing Unemployment Transfers
Family Job Search Without Wealth

Variable	Economic Downturn		Unemployment Transfers		
	Husband $+\theta_1$	Wife $+\theta_2$	Husband $+b_1$	Wife $+b_2$	Both $+b_1, +b_2$
Joint Employment Status (%)					
uu	0.90	0.21	2.09	0.36	1.45
ue	2.68	-0.17	0.02	-0.87	-0.29
eu	0.81	6.48	0.74	12.61	4.43
ee	-4.37	-6.50	-2.84	-12.08	-5.57
Unemployment Rate* (%)					
Husband	3.60	0.27	0.23	-0.24	0.04
Wife	1.74	6.82	1.29	13.06	4.98
Wages ($)					
Husband	-62	3	34	16	8
Wife	12	6	24	162	62

* if the spouse is employed.

Table 12. Employment, Wages and Wealth by Household Employment Status
Two or More Children

	Spouse			
	Actual		Predicted	
Variable	Unemployed	Employed	Unemployed	Employed
Joint Employment Status (%)				
Husband				
Unemployed	1.23	2.66	1.23	2.69
Employed	31.67	64.44	31.53	64.55
Unemployment Rate (%)				
Husband	3.73	3.97	3.76	4.00
Wife	31.55	32.95	31.43	32.81
Wages ($)				
Husband	1867	1697	1836	1579
	(1317)	(891)	(1142)	(701)
Wife	1190	1116	1198	1153
	(637)	(734)	(716)	(671)
Wealth if Husband ($)				
Unemployed	30346	27424	37200	52956
	(80297)	(59420)	(66177)	(65352)
Employed	37104	40169	60664	48734
	(63872)	(52751)	(84734)	(54716)

Table 13. Parameter Values and Asymptotic Standard Errors
Two or More Children

Parameter	$\widehat{\Theta}$	Estimate			
		Husband		Wife	
Individual:					
Arrival Rate Unemployed	λ	0.1855	(0.0062)	0.0466	(0.0023)
Arrival Rate Employed	π	0.0820	(0.0012)	0.0000	(0.0000)
Layoff Rate	θ	0.0047	(0.0002)	0.0159	(0.0011)
Mean Logwages	μ	5.0839	(0.0364)	4.9787	(0.1389)
Standard Deviation of Logwages	σ	0.8781	(0.0209)	1.2660	(0.0120)
Unemployment Transfers	b	309.66	(8.1683)	0.01	(0.0015)
Leisure	ϑ	0.0074	(0.0003)	0.0129	(0.0004)
Common:					
Relative Risk Aversion	γ		1.3972	(0.0045)	
Borrowing Constraint	s		0.0782	(0.0049)	
Leisure	ϑ_3		-0.0615	(0.0047)	

Table 14. Effects on Employment, Wages and Wealth of three regime changes:
i. An Economic Downturn, ii. Relaxing Borrowing Constraints, and
iii. Increasing Unemployment Transfers. Two or More Children

Variable	Economic Downturn		Increase	Unemployment Transfers		
	Husband	Wife	Debt Limit	Husband	Wife	Both
	$+\theta_1$	$+\theta_2$	$+s$	$+b_1$	$+b_2$	$+b_1, +b_2$
Joint Employment Status (%)						
uu	1.22	-0.16	-0.28	0.56	-0.27	0.09
ue	2.93	-0.51	0.02	1.93	-0.15	0.64
eu	-2.41	5.27	0.45	-0.67	1.98	0.68
ee	-1.72	-4.57	-0.17	-1.81	-1.54	-1.39
Unemployment Rate* (%)						
Husband	4.20	-0.50	0.04	2.86	-0.13	1.00
Wife	-1.14	5.21	0.38	0.16	1.90	0.96
Wages* ($)						
Husband	-45	-5	0	36	-6	12
Wife	-11	6	1	4	20	12
Wealth** ($)	876	-271	-1212	-1313	-3576	-2762

* if the spouse is employed. ** if both are employed.

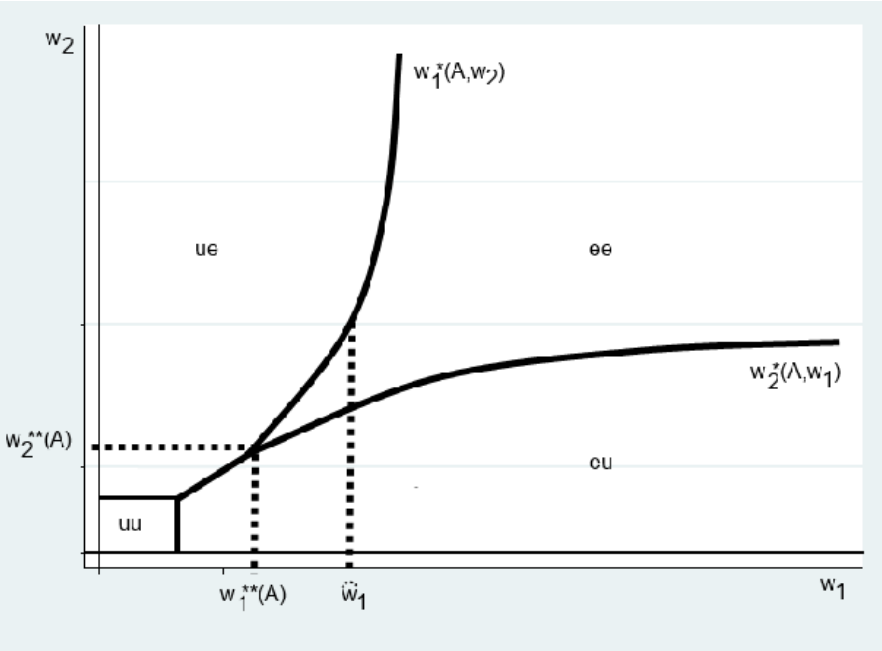

Figure 1. Joint employment status by wages of husband and wife, conditional on wealth level A

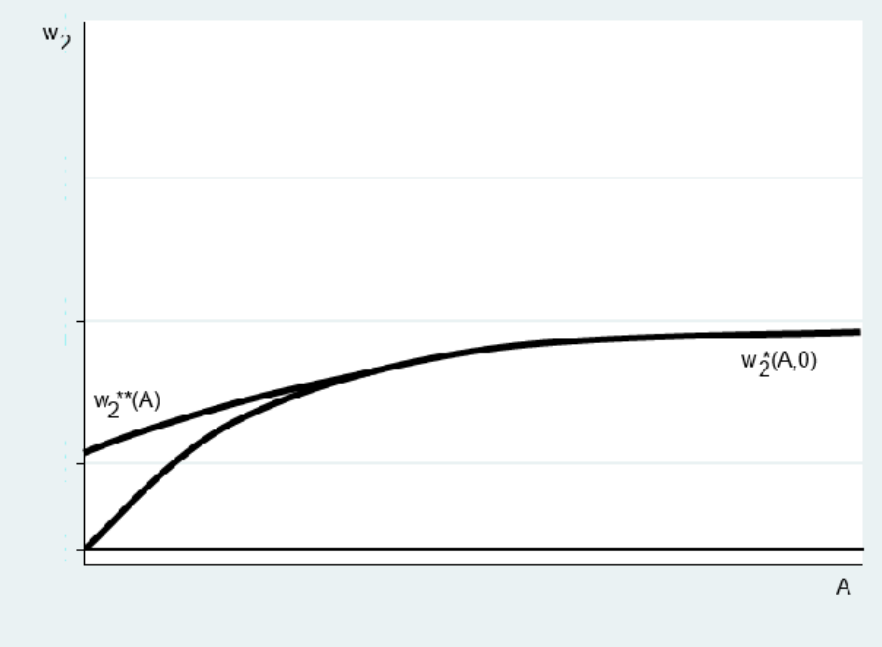

Figure 2. Reservation wages of the wife when the husband is unemployed as a function of wealth

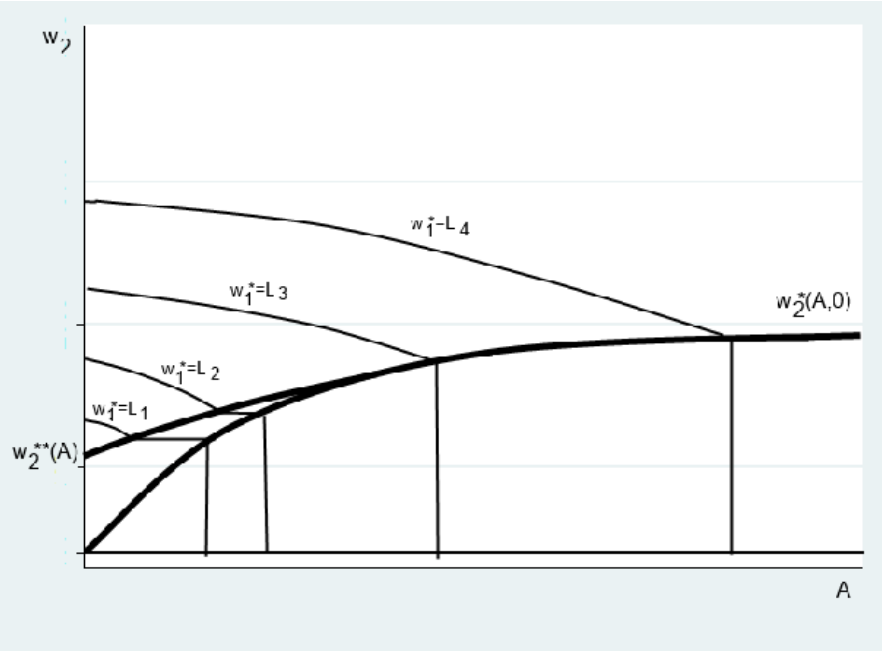

Figure 3. Four reservation wage levels of the husband
as a function of wealth and wages of the wife

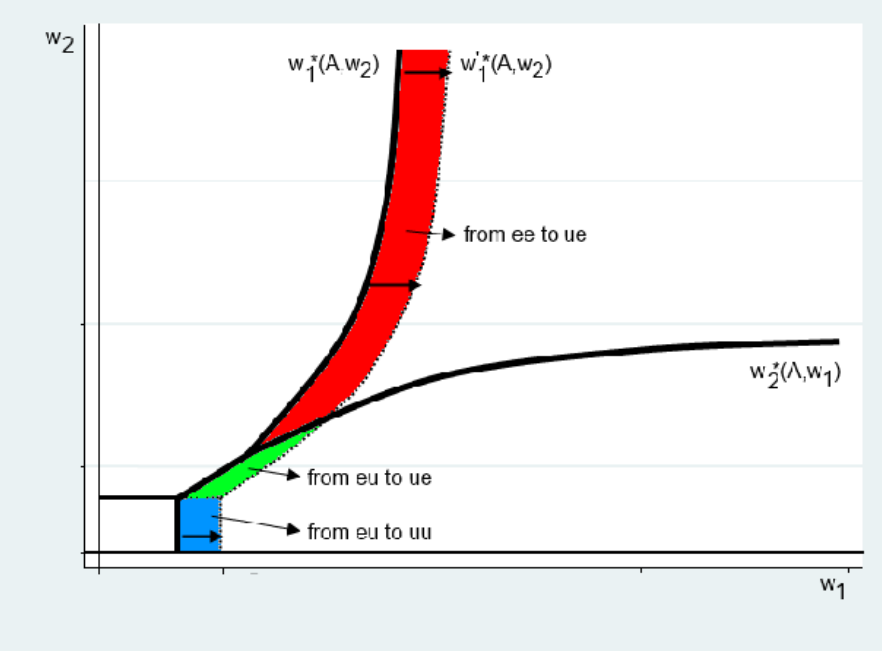

Figure 4. Change in joint employment status from increasing husband's
unemployment transfers b_1

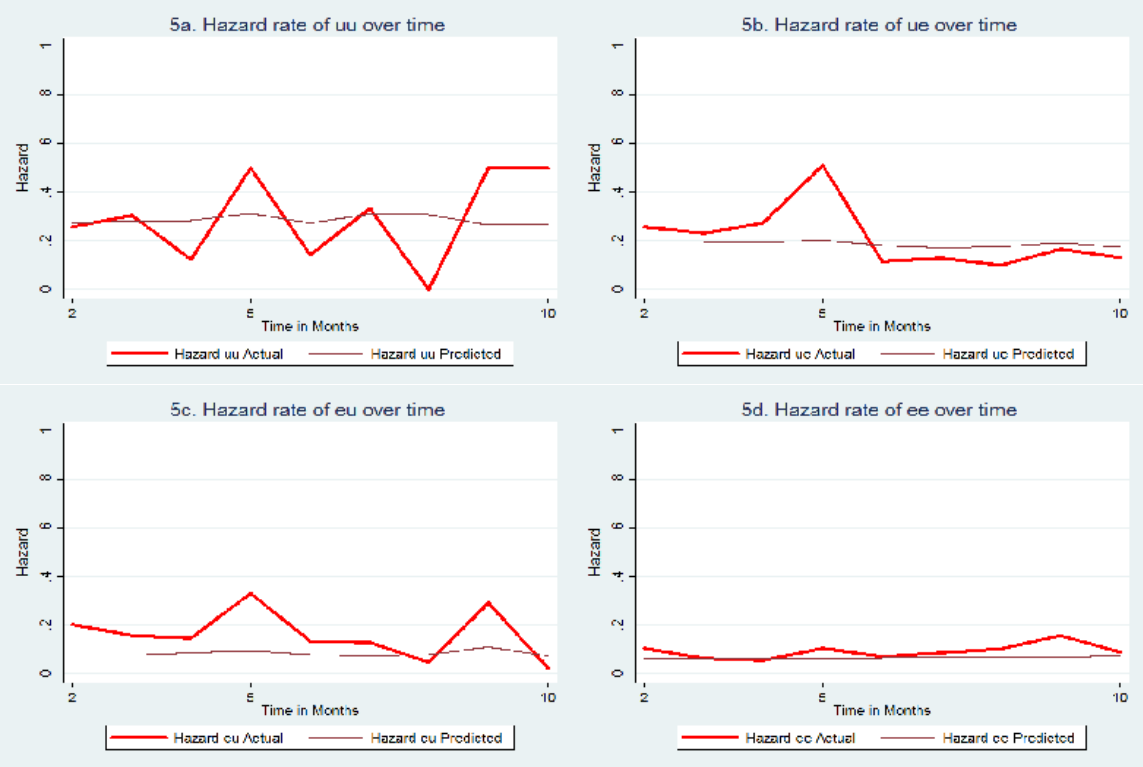

Figure 5. Hazard rate by joint employment status

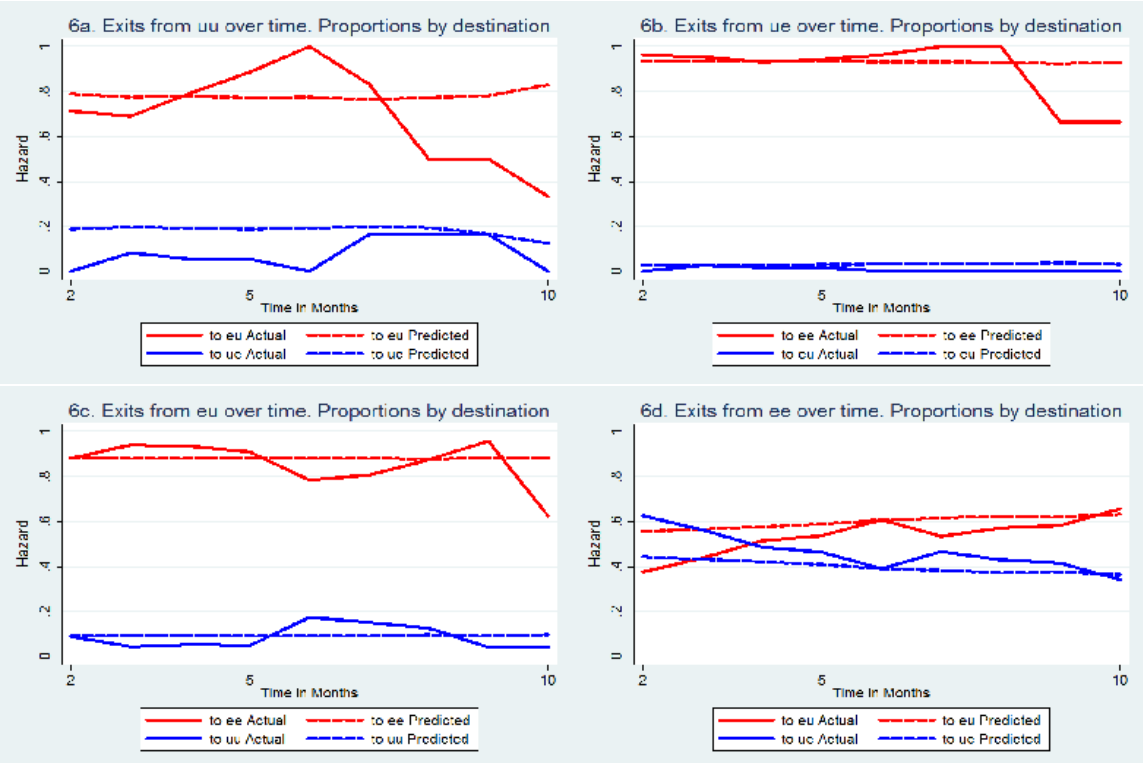

Figure 6. Proportion of transitions from a given joint employment status