



# Macroeconomic shocks and the probability of being employed<sup>☆</sup>

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## ABSTRACT

Macroeconomic theories take polar views on the importance of choice versus chance. At the micro level, it seems realistic to assume that both dimensions play a role for individual employment outcomes, although it might be difficult to separate these two effects. Nevertheless the choice and chance dimension are seldom treated symmetrically in models that use micro data. We estimate a logistic model of the probability of being employed among married or cohabitating women that are in the labor force. Besides variables that measure individual characteristics (choice), we allow a full set of indicator variables for observation periods that represent potential effects of aggregate shocks (chance) on job probabilities. To reduce the number of redundant indicator variables automatic model selection is used, and we assess the economic interpretation of the statistically significant indicator variables with reference to a theoretical framework that allows for friction in the Norwegian labor market. In addition, we also estimate models that use female and male unemployment rates as 'sufficient' variables for the chance element in individual employment outcomes. Data are for Norway for the period 1988q2–2008q4.

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## 1. Introduction

In a situation with real wage flexibility and no frictions in the labor market, individuals' probabilities for work and unemployment may be expected to be unaffected by macroeconomic shocks that are common to a large number of workers. However, it is realistic to assume that real world labor markets are characterized by many frictions, and the relevant question is therefore whether individuals are able to adapt in ways that offset the effects of aggregate shocks on their work prospects. If the probabilities for unemployment and work for a large number of workers are affected by aggregate shocks and fluctuations (frictions), the role for countercyclical macroeconomic policies is stronger than if friction effects are empirically irrelevant. Thus, this question is relevant for policy designs.

In macroeconomic theory, the standard real business cycle (RBC) model and the search theoretical model represent polar views on the issue about labor market frictions and about the importance of chance versus choice, see [Krusell et al. \(2010\)](#). In the frictionless models in the tradition of [Kydland and Prescott \(1982\)](#), changes in

employment are explained by individual choice. In macroeconomic search models of the [Mortensen and Pissarides \(1994, 2011\)](#) type, the emphasis is on chance rather than on choice, in the sense that changes in employment reflect changes in the probability of receiving a job offer.

In an econometric model of the probability of being employed given that the agent is in the labor force it is unattractive to impose the dichotomy between chance and choice a priori, since it seems realistic to assume that both dimensions can play a role for individual employment outcomes. Nevertheless, in the literature on microeconomic modeling of labor market behavior, the custom is to concentrate on the choice aspect as captured by measured individual characteristics. That said, [Dagsvik et al. \(2012\)](#) report results where their model besides choice variables contains year-dummies that are intended to capture effects stemming from the business cycle. In this paper, we treat the choice and chance dimension symmetrically in the unrestricted model formulation, and we test econometrically, for married and cohabitating women in the work force, the hypothesis that the probability of being employed depends on the business cycle.

Our test is based on the assumption that if chance matters, fortunate and unfortunate episodes will be linked to fluctuations at the aggregate level of the economy. The data set is a sample of independent cross-sections for married and cohabitating women in the Norwegian labor force covering the period from 1988q2 to 2008q4.<sup>1</sup> The reason for

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<sup>1</sup> Realistically, the results can to some degree be sample dependent. We therefore also make use of a second data set that has been sampled in the same manner as the first one.

focusing on married and cohabiting women is that empirical analyses typically find that the labor market behavior of these women are more responsive to policy changes than their male partners. One important reason is that a large proportion of women in this group continue to take the main responsibility for family and children, and thus they have stronger preferences for home work. Since their male partner is participating in the labor market in most cases, household incomes do not drop to zero even if the female is not working, and the woman is not forced to accept the first job offer she receives. She might continue search in order to get a better job. The fact that we are employing data for persons in the workforce may be interpreted as a strong test of the importance of frictions, since such persons have a strong tie to the labor market from the outset.

In our sample there are 82 potential periods in which macroeconomic shocks might occur. Since the number of observations is large (50,487) we might in principle estimate a general model that includes a dummy variable for each potential break together with the variables that measure individual attributes (education length and the number of children in different age groups for example). However, all periods in the sample are not likely to be equally important when it comes to friction. The methodological task is therefore to find the significant calendar dummies objectively, and to retain in the final model only those dummies that represent significant frictional effects of macroeconomic shocks. We use the computer based automatic model selection algorithm Autometrics (see Doornik, 2009) as our tool in the testing of the hypothesis that aggregate shocks (as represented by dummies) have no effect on the individual probability of being employed.

As a background, it is interesting to note that although Norway is often regarded as an “oil-driven” economy that is characterized by even growth, our sample contains periods where there have been large changes in job-creation and job-destruction. At the start of our sample, in 1988, employment growth was still positive, following the credit led boom that started in 1983. During 1988 the housing market did however collapse and real house prices fell by 40% from the first quarter of 1988 to the first quarter of 1993. There was a major banking crisis, and the first years of the 1990s were marked by financial consolidation among households and by low growth. During this period there was a sharp rise in the aggregate unemployment rate, and unemployment spells became longer, as the graphs in Fig. 1 below show. Employment growth also became weak and negative during the first five years of the new millennium, but then a period with unprecedented high employment growth started in 2005. A significant part of the increase in employment was made up of temporary as well as more permanent immigration of workers from East Europe, for instance Poland and the Baltic States. Our sample ends at the start of the international financial crisis, and a drop in the growth rate is visible at that point.

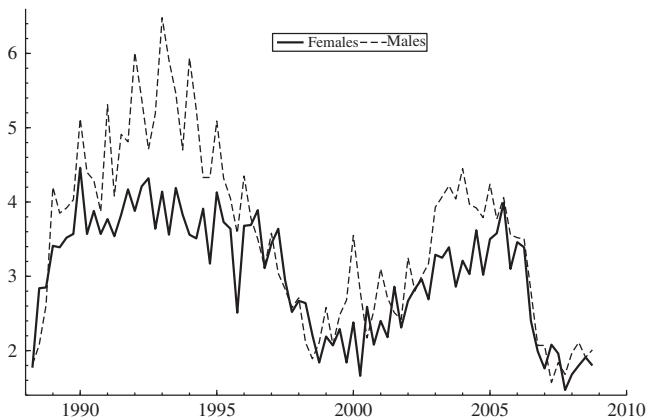


Fig. 1. Macro unemployment rates by gender, in percent.

Looking at the literature, we find that several studies focus on the relative importance of job creation and job destruction rates as determinants of unemployment duration. As summarized by Hall (2005), missing job opportunities for unemployed persons are more important than elevated separation rates in explaining increased unemployment rates during periods of recessions. Our data do not allow us to study the effects of job creation and job separation rates or unemployment duration since we do not have repeated cross section data. As already noted, our focus is on the relative importance of chance versus choice as determinants of individual unemployment. Our data are particularly suited for this type of analysis since we have data for a fairly long time period covering several business cycles. To the best of our knowledge we have conducted the first study analyzing this aspect of unemployment.

The rest of the paper is organized as follows: In Section 2 we give our model and state our hypotheses. A description of the data set is given in Section 3. Section 4 is devoted to automatic model selection. Our empirical results are reported in Sections 5–10. Section 11 concludes. Appendix A contains summary statistics for our main data set, whereas Appendix B contains some results related to Sections 9 and 10.

## 2. Logit model with variables representing frictions

As noted above, it is of interest to investigate whether the probability of being unemployed depends on macroeconomic fluctuations or intermittent shocks that are exogenous to the individual, but common to all employed and job-seeking married and cohabiting women. With reference to a theoretical model that includes the separation probability and the employment opportunity arrival rate, one way to introduce aggregate shocks is to allow both of the two rates to be non-constant as a result of macroeconomic events. In the following we refer to such variations as *frictions*, cf. Krusell et al. (2010).

We investigate the friction hypothesis econometrically within the framework of a standard logit model. Assume that agent  $i$  is searching for employment. When receiving a particular job offer, the agent compares the utility of the arriving job offer and the expected utility of continued search. In this comparison the female uses her perceptions about the job arrival rate and the job separation rate. These rates depend on the skills of the agent (education and work experience), the functioning of the labor market including exogenous shocks and business cycles. In addition, comparisons of utilities are influenced by the agent's non-labor income and the number of children in different age groups in the family. A dummy variable for central residence is introduced to consider that the job arrival rate might be higher in urban areas.

Let  $q_{it}^*$  be the difference between the utility of the arriving job offer and the expected utility of continued search. Alternatively,  $q_{it}^*$  might as well be interpreted as the log of the odds ratio. In what follows we will assume that this difference can be modeled as

$$q_{it}^* = X_{1it}\delta_1 + X_{2it}\delta_2 + \varepsilon_{it}, \tag{1}$$

where  $X_1$  includes years of schooling, experience, experience squared, number of children in three age groups,<sup>2</sup> a binary variable for urbanity and the logarithm of real non-labor income and with  $\delta_1$  as the corresponding vector of coefficients (including an intercept). Moreover,  $X_2$  is a (row-)vector consisting of variables that capture joint fluctuations in the employment opportunity arrival rate and the job separation rate (at present, we have no ambition of identifying separate effects of the two friction parameters), and  $\delta_2$  denotes the associated parameter vector.  $\varepsilon$  denotes a random error term that is included to capture the effects of variables that are latent to the researcher, but known by the agent.

While  $q_{it}^*$  is a latent variable that cannot be observed in our data, what we observe is whether the female is employed (job offer is

<sup>2</sup> The three age groups we consider are 0–3 years, 4–6 years and above 6 years.

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