On-the-job search equilibrium with endogenous unemployment benefits

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ABSTRACT

This paper develops an on-the-job search model with wage posting where unemployment benefits are proportional to past wages. We emphasize that this contributes to increasing the reservation wages of unemployed workers and introduces a feedback effect of the distribution of wages on the distribution of unemployment benefits. We show that the model predictions are consistent with some stylized French facts and quantify the impact of inefficient rejections of low-wage offers by the unemployed. We find that, by reducing the indexing of unemployment benefits to previous earnings and increasing lump-sum transfers, it is possible to increase both employment and welfare.

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1. Introduction

In their seminal paper, Burdett and Mortensen (1998) (BM henceforth) not only show that pure wage dispersion can exist at equilibrium with the on-the-job search, but also that the interplay with unemployment benefits dispersion gives rise to "inefficient unemployment" according to BM's definition. This means that some unemployed workers reject low-wage offers, which pushes up the unemployment rate. Although this dispersion of the unemployment benefits (UB) does not reflect any heterogeneity of workers' ability, these job rejections are unambiguously inefficient. The distribution of UB should therefore collapse to a mass point. However, it is obvious that there is also an insurance motive for the UB system because consumption-smoothing raises the well-being of risk-averse workers.[1] This argument favors the indexing of UB to previous earnings,

which would lead to a dispersed distribution of UB. From another standpoint, Marimon and Zilibotti (1999) and Acemoglu and Shimer (2000) argue that a generous UB system can be considered as a subsidy to the search activity; this allows workers to find high productivity jobs and contributes to raising output and welfare. Overall, the indexing of UB to previous earnings introduces a trade-off between inefficient unemployment on the one hand, and insurance/subsidy motives on the other hand. The aim of this paper is to quantitatively analyze this trade-off by extending the BM framework to allow UB to be proportional to past wages.

In most OECD countries (see OECD (1994)), the UB distribution is not a mass point. UB systems therefore differ according to average replacement rates but also according to the heterogeneity of the unemployment compensations. The UB system typically embodies two components: a "Beveridge" component (lump-sums) associated with redistribution, and a "Bismarck" component associated with the insurance *i.e.* the UB indexing to previous earnings. The extent of this indexing differs largely across countries (between 57.4% and 75% of gross wages in France, 60% of the net wages in Germany, 40% of gross wages in Italy…). Moreover, the UK, Australia and New Zealand are noticeable exceptions where there are only lump-sum transfers (the "Beveridge" component).

The first goal of this paper is to show how the on-the-job search equilibrium with endogenous wage dispersion is affected by endogenous

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[1] Since Shavell and Weiss (1979) and Hopenhayn and Nicolini (1997), it is well-known that the optimal UB system reflects a trade-off between the positive impact of consumption-smoothing and the adverse moral hazard effect related to unobservable search efforts.

unemployment benefits. Secondly, this paper aims at showing the main trade-offs behind the definition of an optimal UB system in the context of the on-the-job search equilibrium.

Previous works in line with BM assumed that the dispersion of unemployed reservation wages is exogenous. This implies that the position of workers within the unemployment distribution does not depend on the worker's career and his previous wage earnings (see, *e.g.* Bontemps et al. (2000), or Postel-Vinay and Robin (2002)). Unemployed benefits/reservation wages dispersion modifies the shape of the wage distribution, but the latter has no feedback effect on the distribution of the unemployed. In this paper, we emphasize that the proportionality of UB to past wages implies an unexplored argument for the job search decision of the unemployed which raises their reservation wages. An unemployed worker indeed expects that if he accepts a wage equivalent to his benefits, this can imply lower unemployment compensation in the future event of the job's destruction; he would earn only a fraction of the accepted wage. Endogenous UB dispersion then introduces additional restrictions on the job contact rates: the probability of the worker accepting a wage offer now depends only on the wage dispersion and no longer on an ad-hoc distribution of the UB.

From the empirical point of view, a first objective is to assess the on-the-job search model's performance as regards its ability to replicate not only the distribution of wages but also the distribution of UB.

As can be seen from Table 1 and Fig. 6 in Appendix A, the heterogeneity of UB is high in France.[2] More precisely, the dispersion is relatively higher for unemployed incomes than for wage earnings: the coefficient of variation is larger for UB than for wages, whatever the skill of the workers. Fig. 1 examines the value of the earnings decile over average earnings (both for wages and unemployment benefits)[3] and then shows that both for low-skilled and medium-skilled workers the distribution of UB is unambiguously flatter than the distribution of wages. Numerical experiments based on the French low-skilled labor market show that our model allows a good fit of both distributions (wages and unemployment benefits). It implies a large right-hand tailed of the UB distribution, which is in some extent the outcome of job rejections by the unemployed. This suggests, therefore, that to explain a worker's upward mobility along the wage distribution during his career it could be worthwhile to consider indexing of UB to previous earnings (see Burdett et al. (2009) or Bagger et al. (2006) for alternative explanations of this mobility[4]).

Because the dispersion of the UB is endogenous, our model is a useful tool to examine the impact of reforming the UB system, on unemployment, productivity and welfare. First, our model is well-suited to quantify the potential extent of inefficient unemployment. Moreover, because we consider endogenous productivity dispersion, as was first suggested by Mortensen (2000)[5] to generate the observed hump-shaped wage distributions,[6] our model also allows us to deal with the productivity argument discussed in Marimon and Zilibotti (1999) and Acemoglu and Shimer (2000). Finally, we introduce risk-aversion in order to take into consideration the insurance motive related to the UB system.

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[2] See Appendix A for a detailed description of the data.

[3] To read these graphs, notice for instance that the value of this ratio approximately equates 1 for the fifth decile of low-skilled workers, both for wages and unemployment benefits; that is, the average wage (UB) is close to the median wage (UB).

[4] The papers of Burdett et al. (2009) or Bagger et al. (2006) rule out this problem by abstracting from the labor market institutions. In these models, upward mobility along the wage distribution comes only from experience (human capital accumulation) and the on-the-job search.

[5] At the time of job creation, firms invest in match-specific capital.

[6] It is now well known that the standard BM framework implies a strictly increasing wage earnings density function. Exogenous productivity dispersion helps to generate hump-shaped wage distributions (see, *e.g.*, Bontemps et al. (2000)). Chéron et al. (2008) show that endogenous productivity dispersion is also able to fit the French distribution of wages.

Table 1
Wages and unemployment incomes dispersion in France.

	Wages	UB	UB<2Y
standard deviation mean	Low-skilled 34.2%	40.2%	38.6%
standard deviation mean	Medium-skilled 36.3%	45.6%	44.5%
standard deviation mean	High-skilled 45.7%	53.7%	48.7%

UB<2Y = UB for workers unemployed for less than 2 years.

Our quantitative analysis is based on the French low-skilled full-time labor market. We find that the impact of job-offer rejections on the unemployment rate is not very large but significant, around one percentage point. This gives an assessment of the inefficient unemployment for low-skilled workers in France. We then show that the optimal UB system for this population would correspond to a "Beveridge" system with only lump-sum transfers without any indexing of the UB to previous earnings.

The remainder of the paper is as follows. The first section presents the model. The second section is devoted to calibration, model assessment and policy analysis. The last section concludes.

2. A wage posting model with unemployment benefits proportional to past wages

This paper extends the job search-wage posting framework *à la* Burdett–Mortensen to allow for endogenous unemployment benefits which are proportional to past wages. Letting b denote this unemployed income, we assume:

$$b = \rho w_{-1} + all \tag{1}$$

where w_{-1} stands for the former wage, and *all* is a lump-sum transfer. The benefit b has therefore two components: *all* the Beveridge component associated with redistribution across the unemployed, and ρw_{-1} the Bismarck component associated with insurance.

Overall, this implies that the equilibrium wage offer density function depends on the distribution of unemployed incomes, which in turn depends on the distribution of wage earnings. A first contribution of this paper is then to solve the corresponding fixed-point.

2.1. Labor market flows

We consider a minimum wage $\underline{w}$ which bounds below the wage distribution and gives the level of the iso-profit. This suggests that without any variation of the minimum wage, the number of vacancies is fixed as well as contact rates. Therefore, for simplicity, we consider two exogenous arrival rates of wage offers, λ_0 and λ_1 for the unemployed and the employed, respectively.

We denote the steady-state number of employed workers being paid a wage no greater than w by $G(w)(1-u)$, where $G(w)$ is the distribution of wage earnings across employed workers and u the overall unemployment rate. Let $F(w)$ be the distribution of wage offers, and s be the job destruction rate. At steady-state the flow of workers leaving employers offering a wage no greater than w equals the flow of workers hired with a wage no greater than w:

$$\lambda_0 \int_{\underline{w}}^{w} [F(w)-F(x)]u(x)dx = (s + \lambda_1[1-F(w)])(1-u)G(w) \tag{2}$$

where $F(w)-F(x)$ is the probability that an unemployed worker with reservation wage x receives and accepts a wage offer no greater than w. $u(x)$ gives the mass of unemployed workers with a reservation