The interplay between insurance and assistance in unemployment compensation systems

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Abstract

This paper analyses the interplay between the insurance and assistance components of unemployment compensation systems. In a matching framework à la Pissarides, we assume that, when laid-off, a worker whose employment spell has lasted long enough is eligible for unemployment insurance benefits. Unemployment insurance is then given for a limited duration and the amount of benefits depends on the past wage. The unemployed who are not eligible for insurance benefits or no more eligible (because they have exhausted their rights) receive assistance benefits. Unlike insurance benefits, assistance benefits are constant over the unemployment spell and are payed as long as the person is unemployed. The model is calibrated to reproduce the main features of the French labour market. Most of the variables of the model are estimated using the French sample of the European Panel Survey. We then study the impact of different reforms of the unemployment compensation system. Our calibration exercises show that, as in the standard matching model, the amount of both types of benefits affects negatively employment. However, the quantitative impact appears to be small : a 19% increase of assistance benefits causes a 0.26 points rise of the unemployment rate. Shortening the duration of insurance benefits is shown to raise the equilibrium unemployment rate. Inversely, softening the eligibility criteria for insurance benefits raises both the workers' expected welfare and the share of the employed eligible to unemployment insurance. Reducing the required past employment spell for eligibility from 120 to 100 days reduces the unemployment rate by 0.1 points.

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1. Introduction

Most European countries are characterized by the coexistence of two unemployment compensation systems. When laid-off, a worker whose employment spell has lasted long enough receives unemployment insurance benefits. Besides this insurance system, the unemployed who are not eligible for insurance benefits or who have exhausted their rights can still get assistance benefits from the government[1]. In the particular case of France, to be eligible for insurance benefits, a person must have been laid-off and have been employed for at least 4 months during the last 8 months. Unemployment insurance is then given for a limited duration, with unemployment duration depending on the past wage and declining over time[2]. The unemployed who are not eligible for insurance benefits or no more eligible receive a basic income called RMI[3], provided they are over 25 and the resources of their household, whatever their origin, are under a threshold that depends on family composition. This basic income, created in 1988, was originally aimed at fighting against poverty, but actually plays the role of the assistance component of the French unemployment compensation system. Unlike insurance benefits, assistance benefits are constant over the unemployment spell and are payed as long as the person is unemployed.

Unemployment insurance, on the one hand, and unemployment assistance, on the other hand, have been extensively analyzed, both from a theoretical and an empirical point of view. However, the *interplay* between these two compensation systems, when they happen to exist simultaneously, has not attracted much attention.

Indeed, a series of papers have studied the optimal profile of insurance benefits over the unemployment spell: flat sequence of benefits versus declining time sequence. For instance, Hopenhayn and Nicolini (1997) develop a dynamic principal-agent model where the principal, i.e. the government, maximizes the welfare of an unemployed worker whose search effort cannot be monitored. They show that unemployment benefits should decrease with the unemployment spell. In a quite different framework, a search and matching model with both endogenous wage and search effort, Friedriksson and Holmlund (1999) find the same normative result: a declining time sequence of unemployment benefits is socially optimal, that is maximizes a utilitarian welfare function. This idea has been challenged by Cahuc and Lehmann (2000) in a paper closely related to the preceding one. Unlike Friedriksson and Holmlund (1999), Cahuc and Lehmann

[1] This is the case for example in Spain, Sweden, Germany or the Netherlands (see Ortega, Gollier and Portier (2000)).

[2] Until the last reform of the system July 2001.

[3] RMI: "Revenu Minimum d'Insertion", Minimum Income for Insertion.

(2000) focus on the welfare of the long-term unemployed rather than on the social welfare. They show that a more declining time-sequence of unemployment benefits may strongly reduce the welfare of the long-term unemployed.

From an empirical point of view, a series of papers try to assess the impact on employment of some recent reforms of insurance schemes. For instance, Carling, Holmlund and Vejsiu (2000) use the Swedish evidence to estimate the effect of benefit cuts in the 90's on the exit rate from unemployment.

Unemployment assistance has also been extensively analyzed. From a theoretical viewpoint, the standard search and matching model à la Mortensen and Pissarides provides a useful framework for analyzing the effects of unemployment assistance on employment. Indeed, in this framework, unemployment benefits have the usual properties of assistance benefits: they are constant over the unemployment spell and are payed as long as the person is unemployed. The key results this standard search and matching model yields to thus apply to assistance benefits. From an empirical point of view, a series of empirical work tries to assess the impact of assistance benefits on the exit rate from unemployment. In the case of France, Laroque and Salanié (2000) and Gurgand and Margolis (2001) are recent examples.

To the best of our knowledge, however, the coexistence of unemployment insurance and unemployment assistance, which happens actually in most European countries, has not attracted much attention. Yet, taking into account the interaction between these two compensation systems helps understanding their consequences on employment and welfare. A change in unemployment compensation schemes has probably not the same quantitative impact on employment and welfare in a model where both insurance and assistance coexist than in a standard model.

The aim of this paper is twofold. First, we develop a theoretical model to analyze the interactions between unemployment insurance and assistance. In a matching framework à la Pissarides (2000), we assume that the meetings between employers and job seekers are determined by a constant returns to scale function. Wages are assumed to be the Nash cooperative outcome of a (non-cooperative) bargaining between each firm and each worker. When laid-off, a worker whose employment spell has lasted long enough receives during a limited period of time an unemployment insurance benefit which depends on her past wage. If the individual has not yet found a job when her rights to insurance benefits are exhausted, she receives assistance benefits as long as she is unemployed. On the other hand, a worker becomes eligible to unemployment insurance if her employment spell has lasted long enough. Otherwise, she receives only assistance benefits if laid-off.

Second, we assess the quantitative impact, on employment and welfare, of the coexistence of unemployment insurance and assistance. The model will be calibrated for the French case. More precisely, most of the variables will be estimated, and not simply chosen to reproduce the main features of the French labour market. The data we use for the estimation are drawn from the French sample of the European Panel Survey. This sample of households covering the period 1993-1997 contains informations on retrospective earnings and labor market status. In particular, an activity and an earnings history data sets are available. This allows us to estimate the monthly transition rates between four states: employment with eligibility to unemployment insurance, employment without eligibility to unemployment insurance, unemployment and receipt of insurance benefits, unemployment and no eligible for insurance benefits (that is receipt of assistance benefits provided the resources of the household are below a threshold).

We then study the effects of alternative reforms of the unemployment compensation system: an increase in the amount of insurance or assistance benefits; a reduction in the duration of unemployment benefits ; a shorter duration of the employment spell necessary to be eligible for insurance benefits (softening eligibility).

As usual in this literature, an increase in assistance benefits strengthens the bargaining power of workers, thus pushing wages and unemployment up. In the French case, we find that the effect on unemployment is small : a 19% increase of the assistance benefit increases the unemployment rate by 0.26 points. This policy increases also the share of the unemployed not eligible for unemployment insurance.

Raising insurance benefits leads to the same qualitative effects, except for an important difference, namely that it lowers the wages of the workers not eligible to unemployment insurance.

Shortening the duration of unemployment benefits decreases the wages earned by employees eligible to unemployment insurance but *boosts* unemployment, since it results in higher wages for workers not eligible. Indeed, it becomes more interesting for a firm to hire a worker not eligible to unemployment insurance, which strengthens the bargaining power of such a worker. Moreover, the expected welfare of individuals is lowered.

Finally, a shorter duration of the employment spell necessary to be eligible for unemployment insurance leads to a distributional conflict between workers and firms: while workers' expected welfare improves, firms become worse-off. For the French case, the improvement of workers' expected welfare holds even if we take the extreme assumption that unemployment insurance and assistance are financed exclusively by workers. Reducing the average employment spell required for eligibility from 120 to 100 days results in a small decrease of the equilibrium unemployment

rate (0.1 points).

The paper is organized as follows. The model is presented in section 2. In section 3, the data we use for estimating the main variables are presented and the model is calibrated to reproduce the main features of the French labor market. In section 4, changes in the unemployment compensation scheme are simulated and their effects on wages, the unemployment rate and the share of the unemployed who receive insurance benefits are assessed. Section 5 concludes and gives some directions of future research.

2. The Model

2.1. Environment

The economy consists of n individuals and an endogenous number of firms. At any date, individuals can be in four different states. Employed workers can be either eligible to unemployment insurance if laid-off or not (respectively e_1 and e_2). When unemployed, a part of the individuals (u_1) receive unemployment insurance benefits while the remaining (u_2) receive assistance benefits. The transition probabilities between these four different states are assumed to be Poisson rates.

When an unemployed agent receiving assistance benefits gets a job, he does not become instantaneously eligible to unemployment insurance. As a result, it is optimal for firms to open vacancies for two types of position: one type (v_1) for the workers eligible to unemployment insurance and the other one (v_2) for the workers not eligible. Meetings between individuals and firms are ruled by a standard matching function for each type of position. Time is continuous and lasts forever. The entire analysis will be carried out in steady state. The structure of the model is depicted in Fig. 2.1 :

The flow from unemployment to employment for jobs of type i is determined by a constant returns to scale matching function[4]:

$$m_i = m(v_i, u_i) \qquad i = 1, 2 \tag{2.1}$$

Given the CRS property of the technology and the standard random matching assumption, the probability for a firm of contacting a worker and for a worker of contacting a firm are respectively:

[4] We are now exploring an alternative modelling, with only one *type* of vacancy. This leads however to further analytical difficulties.

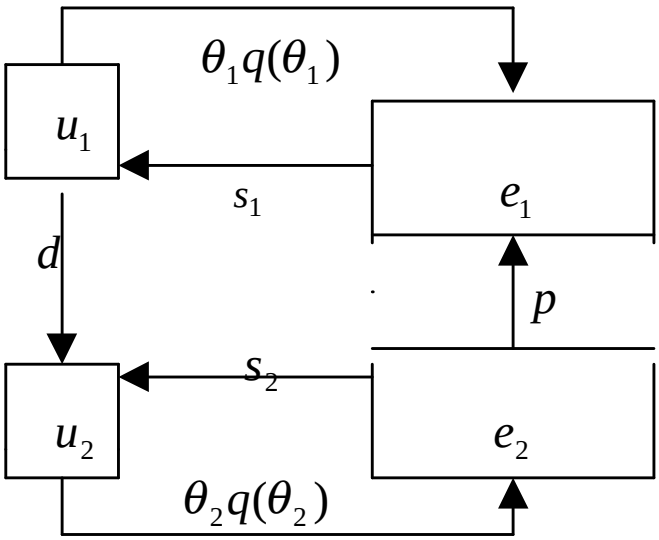

Figure 2.1: Dynamic Structure of the Model

$$q(\theta_i) \equiv \frac{m(v_i, u_i)}{v_i} = m(1, \frac{1}{\theta_i}) \tag{2.2}$$

$$\frac{m_i}{u_i} = \frac{m(v_i, u_i)}{u_i} = m(\theta_i, 1) = \theta_i q(\theta_i) \tag{2.3}$$

with $\theta_i \equiv v_i/u_i$ being the "market tightness" for type i position, $i = 1, 2$.

Let s_i denote the exogenous separation rate for a type i position (with $s_1 > s_2$), d the transition rate from unemployment insurance to assistance, and p the rate at which a worker becomes eligible to unemployment insurance. Then, the model is described by the following dynamic equations:

$$\dot{e}_1 = \theta_1 q(\theta_1) u_1 - s_1 e_1 + p e_2 \tag{2.4}$$

$$\dot{e}_2 = \theta_2 q(\theta_2) u_2 - s_2 e_2 - p e_2 \tag{2.5}$$

$$\dot{u}_1 = s_1 e_1 - d u_1 - \theta_1 q(\theta_1) u_1 \tag{2.6}$$

2.2. The Employment and Unemployment Income of Workers

Let U denote the expected discounted flow of income for an unemployed individual who receives insurance benefits, B the discounted value of receiving assistance benefits, and E_1 (E_2) the corresponding value if the individual is employed in a type1 (type 2) position.

The expression for the income of an unemployed agent entitled to unemployment insurance is given by:

$$rU = a + \lambda w_1 + \theta_1 q(\theta_1)(E_1 - U) + d(B - U) \tag{2.7}$$

While unemployed, the individual receives an unemployment insurance benefit which depends on her past wage ($a + \lambda w_1$, with $a > 0$, $\lambda < 1$ and $a + \lambda w_1 < w_1$). With an (endogenous) probability $\theta_1 q(\theta_1)$, she finds a type 1 job and gets a capital gain of $E_1 - U$ while, with a probability d, she loses her entitlement to unemployment insurance and experiences a capital loss of $B - U$.

In turn, the expected discounted flow of income for an unemployed agent in an income support programme is:

$$rB = b + \theta_2 q(\theta_2)(E_2 - B) \tag{2.8}$$

While unemployed the individual gets a fixed assistance benefit b. With a probability $\theta_2 q(\theta_2)$, she finds a type 2 job and experiences a capital gain of $E_2 - B$.

Similarly, we have:

$$rE_1 = w_1 + s_1(U - E_1) \tag{2.9}$$

i.e. when employed in a type 1 position, an individual earns w_1. Should a separation occur, she bears a capital loss of $U - E_1$. The expression for the expected value of being employed in a type 2 position is analogous, except that the individual gets a type 1 position with a probability p per unit of time.

$$rE_2 = w_2 + s_2(B - E_2) + p(E_1 - E_2) \tag{2.10}$$

2.3. Firms' Optimisation Decision

Firms post vacancies for type 1 (type 2) positions that are filled with an endogenous probability $q(\theta_1)$ ($q(\theta_2)$). Let γ_i denote the (per unit of time) cost of posting a vacancy of type i and V_i its

value while unfilled. Then, the value of an unfilled vacancy is ($i = 1, 2$):

$$rV_i = -\gamma_i + q(\theta_i)(J_i - V_i) \tag{2.11}$$

On the other hand, the value for a firm of a filled type 1 job (J_1) is given by:

$$rJ_1 = y - w_1 + s_1(V_1 - J_1) \tag{2.12}$$

where y is the worker's productivity, w_1 the wage (obtained from the wage bargaining process specified below) and $V_1 - J_1$ the capital loss born with a separation probability $s_1 dt$. The expression for the value of a filled type 2 job (J_2) is analogous, except that the job becomes a type 1 position with a probability pdt.

$$rJ_2 = y - w_2 + s_2(V_2 - J_2) + p(J_1 - J_2) \tag{2.13}$$

Firms are assumed to post vacancies of each type up to the point where the expected income from posting a further vacancy is zero ($V_i = 0$ for $i = 1, 2$). Then, from (2.11):

$$J_i = \frac{\gamma_i}{q(\theta_i)} \quad i = 1, 2 \tag{2.14}$$

stating that in equilibrium, the expected income from a filled vacancy must equal the total costs of posting it.

2.4. Wage setting

2.4.1. Type 2 Jobs

Wages of type 2 jobs are assumed to be the outcome of a bilateral Nash bargaining between each individual firm and worker. The worker receives an income equal to E_1 when an agreement is reached. Her "threat point" is B. The income of the firm when the match occurs is J_2 and its threat point V_2. Thus w_2 is the solution to:

$$\underset{w_2}{MAX}\ (E_2 - B)^{\beta}(J_2 - V_2)^{1-\beta} \tag{2.15}$$

where β is the worker's bargaining power. The wage solving the problem is (see appendix):

$$w_2 = \beta y + \frac{r+p}{r}(1-\beta)b + \frac{r+p}{r}\beta\gamma_2\theta_2 + \beta p J_1 - (1-\beta)pE_1 \tag{2.16}$$

As usual in these models, the wage depends positively on labour market tightness θ_2: the worker gets a larger part of the surplus whenever meeting alternative firms is easier. It is

also increasing in the "size of the cake" (y) and in the income support benefit, since a higher guaranteed income improves the threat point of the individual. As type 2 jobs are turned into type 1 ones with a probability p, the situations of both the firm (J_1) and the worker (E_1) in such a case influence the negotiated wage. More precisely, if the value of a type 1 job to a firm (to a worker) is high, the firm (the worker) will be weaker when bargaining, and the resulting wage is high (low).

2.4.2. Type 1 Jobs

Wages for type 1 jobs are also assumed to be the outcome of a bilateral Nash bargaining. The problem is analogous to the preceding one, except for an important element, namely that the current unemployment benefit depends on the wage negotiated in the past. Let w_1^k be the wage bargained by firm k when meeting a worker. The problem is given by:

$$\underset{w_1^k}{MAX}\ (E_1^k - U)^{\beta}(J_1^k - V_1)^{1-\beta} \tag{2.17}$$

Its FOC is:

$$\beta \frac{\partial E_1^k}{\partial w_1}(J_1^k - V_1) + (1-\beta)(E_1^k - U)\frac{\partial J_1^k}{\partial w_1} = 0 \tag{2.18}$$

From (2.7) and (2.9), we obtain the expression of E_1^k as a function of w_1^k once we take into account that the value of being unemployed in the future in case of separation depends on the present wage :

$$E_1^k = \frac{w_1^k(A(\theta_1) + \lambda s_1)}{(r+s_1).A(\theta_1)} + s_1\left(\frac{a + \theta_1 q(\theta_1)E_1 + dB}{(r+s_1).A(\theta_1)}\right), \tag{2.19}$$

where $A(\theta_1) \equiv r + \theta_1 q(\theta_1) + d$.

Then,

$$\beta\left(\frac{y - w_1^k}{r+s_1}\right)\frac{(A(\theta_1) + \lambda s_1)}{A(\theta_1)} = (1-\beta)\left(\frac{w_1^k - rU}{r+s_1}\right) \tag{2.20}$$

Simplifying and taking into account that all firms choose at the equilibrium the same wage gives,

$$w_1 = \beta y\left(\frac{\lambda s_1 + A(\theta_1)}{\beta\lambda s_1 + A(\theta_1)}\right) + (1-\beta)rU\left(\frac{A(\theta_1)}{\beta\lambda s_1 + A(\theta_1)}\right) \tag{2.21}$$

Imposing $J_1 = \frac{\gamma_1}{q(\theta_1)}$ and $V_1 = 0$ in (2.18) and using (2.7),

$$(1-\beta)(r+d)U = (1-\beta)a + (1-\beta)\lambda w_1 + (1-\beta)dB + \beta\gamma_1\theta_1\left(\frac{\lambda s_1 + A(\theta_1)}{A(\theta_1)}\right) \tag{2.22}$$

Substituting (2.22) in (2.21), and using the equilibrium expression for B (appendix),

$$w_1[(\beta\lambda s_1 + A(\theta_1))(r+d) - (1-\beta)r\lambda A(\theta_1)] = \beta y(\lambda s_1 + A(\theta_1))(r+d) + r\beta\gamma_1\theta_1(\lambda s_1 + A(\theta_1))$$
$$+d\beta\gamma_2\theta_2 A(\theta_1) + (1-\beta)(db+ra)A(\theta_1) \tag{2.23}$$

2.5. Equilibrium

The equilibrium is found using the free-entry conditions of firms, the equations describing the value of the different states to the agents [(2.7) to (2.13)] and the solutions to the Nash bargains. We first determine labour market tightness for type 2 positions (θ_2) as a function of the situation in the type 1 jobs' market (θ_1). More precisely, from (2.11) and (2.12),

$$w_1 = y - \frac{\gamma_1(r+s_1)}{q(\theta_1)}. \tag{2.24}$$

Substituting in (2.23), assuming for simplicity a Cobb-Douglas matching function with parameter $\alpha = 0.5$ and simplifying, we obtain an expression for θ_2 as a function of θ_1:

$$\begin{aligned}\theta_2 \;=\; & \frac{1}{d\beta\gamma_2}\left(y(1-\beta)(r(1-\lambda)+d) - \frac{r\beta\gamma_1\theta_1(A(\theta_1)+\lambda s_1)}{A(\theta_1)} - (1-\beta)(db+ra)\right. \\ & \left. -\frac{\gamma_1(r+s_1)\theta_1^{1/2}[(r(1-(1-\beta)\lambda)+d)A(\theta_1)+\beta\lambda s_1(r+d)]}{A(\theta_1)}\right)\end{aligned} \tag{2.25}$$

On the other hand, from (2.7), (2.9), (2.24) and (6.1) in appendix, we get:

$$E_1(r.A(\theta_1) + s_1(r+d)) = \left(y - \frac{\gamma_1(r+s_1)}{q(\theta_1)}\right)(A(\theta_1)+\lambda s_1) + s_1 a + \frac{s_1 d\beta\gamma_2\theta_2}{(1-\beta)r} + \frac{s_1 db}{r} \tag{2.26}$$

Substituting (2.26) into the equation for w_2 (2.16) and using $J_1 = \frac{\gamma_1}{q(\theta_1)}$,

$$w_2(r.A(\theta_1) + s_1(r+d)) = y\left[\beta r.A(\theta_1) + \beta s_1(r+d) - (1-\beta)p(A(\theta_1)+\lambda s_1)\right]$$
$$+p\tfrac{\gamma_1}{q(\theta_1)}\left[\beta r.A(\theta_1) + \beta s_1(r+d) + (r+s_1)(1-\beta)(A(\theta_1)+\lambda s_1)\right]$$
$$+\tfrac{(1-\beta)b+\beta\gamma_2\theta_2}{r}\left[-ps_1 d + (r+p)(r.A(\theta_1)+s_1(r+d))\right] - (1-\beta)ps_1 a$$

From $V_i = 0$, (2.11), (2.12) and (2.14),

$$w_2 = y - \frac{\gamma_2(r+s_2+p)}{q(\theta_2)} + p\frac{\gamma_1}{q(\theta_1)}$$

Equalizing these two equations in w_2, we get the expression for θ_2 as a function of θ_1.

$$\begin{aligned} & -s_1 p\gamma_1(1-\beta)\theta_1 + (1-\beta)\left[(y-b)(r+p) - \gamma_1 p(r+s_1)\lambda s_1\right]\theta_1^{1/2} - \gamma_2(r+s_2+p)r\theta_1^{1/2}\theta_2^{1/2} \\ & -\beta\gamma_2(r+p)\theta_1^{1/2}\theta_2 - \gamma_2(r+s_2+p)(r+s_1)(r+d)\theta_2^{1/2} + \frac{\beta}{r}\left[ps_1 d - (r+p)(r+d)(r+s_1)\right]\theta_2 \\ = \quad & -(1-\beta)\left[y(r+d)(r+s_1) + ps_1 a + yp(r+d+\lambda s_1) + \frac{bps_1 d}{r} - b(r+p)(r+d)(1+\frac{s_1}{r})\right] \end{aligned}$$

Substituting (2.25) into this last equation leads to an equation determining labour market tightness for type 1 contracts (θ_1) as a function of the parameters of the model (p, d, γ_1, γ_2).

The steady-state equilibrium number of individuals in each state is obtained by imposing $\dot{e}_1$=$\dot{e}_2$=$\dot{u}_1$= 0 in (2.4, 2.5, 2.6). After some computations, we get:

$$e_2 = \frac{ds_1\theta_2 q(\theta_2)n}{ds_1\left[s_2+p+\theta_2 q(\theta_2)\right] + p\theta_2 q(\theta_2)\left[s_1+d+\theta_1 q(\theta_1)\right]}$$

$$e_1 = \frac{p\theta_2 q(\theta_2)[d+\theta_1 q(\theta_1)]n}{ds_1\left[s_2+p+\theta_2 q(\theta_2)\right] + p\theta_2 q(\theta_2)[s_1+d+\theta_1 q(\theta_1)]}$$

$$u_1 = \frac{ps_1\theta_2 q(\theta_2)n}{ds_1\left[s_2+p+\theta_2 q(\theta_2)\right] + p\theta_2 q(\theta_2)[s_1+d+\theta_1 q(\theta_1)]}$$

2.6. Welfare

Finally, we can define the following welfare measure for individuals:

$$W \equiv \frac{u_1 U + u_2 B + e_1 E_1 + e_2 E_2 - \frac{b}{r}u_2 - (\frac{a+\lambda w_1}{r})u_1}{n},$$

and an analogous measure for firms:

$$W_F \equiv \frac{e_1}{e_1+e_2}\frac{\gamma_1}{q(\theta_1)} + \frac{e_2}{e_1+e_2}\frac{\gamma_2}{q(\theta_2)}.$$

3. Estimation and calibration

The model cannot be solved analytically. Hence, it will be calibrated to reproduce the main features of the French labour market. Before this calibration is made, a brief account of the French unemployment compensation system is presented. Unemployment insurance is given for a limited duration, the amount of benefits depends on the past wage and the sequence of benefits is declining over time. To be eligible for insurance benefits, a person must have been laid-off and have been employed at least for 4 months during the last 8 months. In such a case, she will receive insurance benefits during only 4 months. If the person has been employed at least for 14 months during the last 24 months, she will receive insurance benefits during 30 months: 9 months at full rate, and the remaining 21 months at a digressive rate. The unemployed who are not eligible for insurance benefits can receive assistance benefits, provided they are over 25 and the resources of their household, whatever their origin, are under a threshold that depends on family composition[5]. Assistance benefits are constant over the unemployment spell and are payed as long as the person is unemployed. If the person is not eligible for insurance benefits and the resources of her/his household are above the threshold, she/he has no right to any unemployment compensation.

To calibrate the model we proceed in the following way. First, as usual in the literature, we assume a Cobb-Douglas matching function[6] such that $q(\theta_i) = \theta_i^{-1/2}$. The surplus of filled jobs is also supposed to be equally shared between workers and firms: $\beta = \frac{1}{2}$. Hence we assume that the share of workers in the surplus of filled jobs equals the elasticity of the matching function with respect to the unemployment rate. Hosios [1990] shows that the aggregate production is maximized in this case.

Beside these assumptions usual in the literature, most of the variables of the model can be estimated, and not simply chosen to reproduce the main features of the French labor market. The data we use for the estimation are drawn from the French sample of the European Panel Survey. This sample of households covering the period 1993-1997 contains informations on retrospective earnings and labor market status. In particular, information on (net) wages in both type 1 and type 2 jobs, w_1 and w_2, can be computed. The amounts of assistance benefits (b) and unemployment insurance benefits ($b(w)$) are also known, which allows us to estimate

[5] 2100 FF (320.14 euros) for a single, 3000 FF for a couple, 3600 for a couple with a child.

[6] This assumption is quite standard in the literature (see for example Blanchard and Diamond [1989] or Mortensen and Pissarides [1997]).

the parameters λ and a (Table 3.1)[7].

w_1	w_2	λ	a	b
9063	5190	0.3	2100	2100

Table 3.1: *The estimated wages, unemployment benefits and assistance benefits in the French labor market. European Panel, January 1993-December 1997, Insee.*

Moreover, an activity and an earnings history data sets are available. The respondents are asked to report the labor market state they are in for each month between January 1993 and December 1997: employed in a type 2 position, employed in a position with fixed duration or an apprenticeship or a seasonal work, self employed, unemployed or non participating. The outflow from and inflow to non-participation and self-employment will not be taken into account. The earnings history data set provides monthly information on the type of unemployment compensation received by the unemployed: insurance benefits or assistance benefits. When combining these monthly informations on activity and earnings, it appears that an individual can be in four situations: employed and eligible to unemployment insurance (type 1 position), employed and not eligible to unemployment insurance (type 2 position), unemployed and receiving insurance benefits, unemployed and not eligible for insurance benefits (that is receiving assistance benefits provided the resources of the household are below a threshold). Transition rates between these different states are estimated by maximum likelihood. Let $n_i(t-1)$ denote the number of individuals in status i $(i = 1, ..., 4)$ at date $t-1$, and $n_{i,j}(t)$ the number of individuals who were in status i at date $t-1$ and are in status j at date t. Then the maximum likelihood estimator of the transition rate from i to j is the following:

$$\widehat{p}_{i,j} = \frac{\sum_{t=1}^{T} n_{i,j}(t)}{\sum_{t=1}^{T} n_i(t-1)}$$

The estimated values for p, the rate at which a worker becomes eligible to unemployment insurance, s_1, the type 1 jobs separation rate, s_2, the type 2 jobs separation rate, $\theta_1^{1/2}$, the exit rate from unemployment to type 1 jobs, $\theta_2^{1/2}$, the exit rate from unemployment to type 2 jobs, and d, the transition rate from unemployment insurance to assistance, are given in Table 3.2.

[7] An alternative is to compute a so as to guarantee that the budget constraint of the unemployment insurance system is balanced. In that case, $a = \frac{w_1(1-\tau)(e_1-u_1\lambda)}{u_1}$, where w_1 becomes then a *gross* wage. For this, data on both employees' and employers' contributions to the unemployment insurance system is required, in order to recover the gross wage. Unfortunately, the latter is not yet available.

s_1	s_2	$\theta_1^{1/2}$	$\theta_2^{1/2}$	p	d
0.85 %	12.5 %	6.9 %	6.5 %	25.4 %	3.98 %

Table 3.2: *The estimated monthly transition rates in the French labor market. European Panel, January 1993-December 1997, Insee.*

As it could be expected, a worker employed in a type 2 job a given month has a much higher probability of being unemployed the following month than a worker employed in a type 1 job: 12.5 % versus 0.85 %. The percentage of type 2 jobs which are turned into type 1 ones the following month is close to 25%. Thus a worker employed in a type 2 job has a much higher probability of becoming eligible to unemployment insurance the following month than of being unemployed. Not surprisingly, the monthly probability of leaving unemployment is higher for the unemployed who receive insurance benefits than for those who are not eligible: each month, 6.9 % of the former find a job while this is the case for 6.5 % of the latter. Lastly, 3.98 % of the unemployed who receive insurance benefits a given month are no longer eligible the following month.

The remaining parameters, namely y the productivity, r the interest rate, γ_1 and γ_2 the costs of posting a vacancy respectively for a type 1 and a type 2 job, cannot be estimated. However, since we know w_1, w_2, θ_1 and θ_2, the parameters y, r, γ_1 and γ_2 can be simply deduced from the data (Table 3.3).

γ_1	γ_2	y	r
39.5	42.5	9300	0.01

Table 3.3: *The deduced parameters.*

Once the transition rates have been estimated and the remaining parameters have been chosen in order to reproduce the estimated values of w_1, w_2, θ_1 and θ_2, computing the model gives the following results for the endogenous variables:

θ_1	θ_1	w_1	w_2	u	$\frac{u_1}{u}$	$\frac{e_1}{e}$
48.98	48.83	9062	5063	12 %	54 %	98.8 %

Table 3.4: *Computational exercises for the French labor market.*

For the sake of simplicity, we do not take into account that unemployment insurance pays a declining compensation over the unemployment spell. Instead, in the model, the decrease in benefits over time stems from the coexistence of unemployment insurance, that pays relatively

high benefits at the beginning of the unemployment spell, and unemployment assistance, that gives a relatively low compensation to those who are no more eligible for unemployment insurance. Nevertheless, this will not prevent us from studying the effect of a more declining time sequence of unemployment benefits, since an increase in d, the probability of losing insurance benefits, can also be interpreted as a more declining time sequence of unemployment benefits.

4. The results

Once the model has been calibrated to reproduce the main features of the French labour market, we can simulate changes in the unemployment compensation scheme and evaluate their effects on wages, the unemployment rate, the share of the unemployed who receive insurance benefits and the share of the employed who are eligible to unemployment insurance. .

Increasing assistance benefits:

An increase in the assistance benefit (b) strengthens the threat point of type 2 workers (B) and enables them to get a higher wage (w_2). This makes less profitable for firms to open vacancies for type 2 jobs (both θ_2 and J_2 decrease). Raising the assistance benefit modifies also the situation in the "unemployment insurance/type 1 contracts" segment of the economy. Indeed, when an unemployed individual exhausts her rights to unemployment benefits (with probability d), she gets now a higher assistance transfer. As a result, the expected discounted income from unemployment (U) rises, resulting in a weaker position of firms offering type 1 contracts (higher w_1, and lower θ_1 and J_1). In addition to an unambiguous rise of the total unemployment level, this policy increases the share of the employed who are not eligible to unemployment insurance. Finally, this policy lowers both the welfare of firms (W_F) and that of the workers (W). In quantitative terms (see table 4.1) , an increase of the RMI from 2100 to 2500 FF (19%) increases the wages of type-2 workers by 265 FF (5 %) and the unemployment rate by 0.26 points (2%).

b	w_1	w_2	u	W	W_F
2100	9062	5063	12.39	789693	276.717
2500	9065	5328	12.65	787926	273.063

Table 4.1: *Increasing the assistance benefit*

Increasing unemployment benefits:

An increase in the unemployment benefit (through an increase of a and/or λ) strengthens the threat point (U) of the workers eligible to unemployment insurance, enables them to obtain a higher wage (w_1) and a higher value of employment (E_1), and lowers the profitability of type 1 jobs (θ_1) and the number of type 1 employees (e_1). While these effects are analogous to those of the preceding section, the impact on the "assistance benefit/type 2 contract" segment of the economy is different. The transmission mechanism is now as follows : when a firm offering a type 2 position meets a type-2 unemployed, the value of an agreement to this individual is now higher, since the type 2 position turns into a type 1 with probability p, and the value associated to a type 1 job (E_1) has risen as a result of the policy. Then, the bargaining position of the worker is weaker, she gets a smaller wage w_2, firms open more vacancies for type 2 jobs (θ_2 and J_2 increase) and more individuals find type 2 jobs (higher e_2). As a result, the share of the employed not eligible to unemployment insurance ($1-\frac{e_1}{e}$) increases. Concerning unemployment, the negative effect on type 1 jobs dominates the indirect (positive) effect on type 2 employment and thus total unemployment increases. Finally, we find as before that both the utilitarian welfare of individuals and that of firms decrease. In the example of table4.2, an increase of 912 FF in the *ex post* unemployment benefit (18.9%) increases slightly the wage of type-1 workers, decreases that of type-2 workers by 438 FF (8.6%) and leads to a higher unemployment rate (0.38 points, 2.9%).

λ	w_1	w_2	u	W	W_F
0.3	9062	5063	12.39	789693	276.717
0.35	9069	4846	12.58	788297	269.101
0.4	9076	4625	12.77	786811	261.638

Table 4.2: *Increase in* λ

Shortening the duration of unemployment benefits:

The length of unemployment benefits is measured here by the inverse of the exogenous probability d for a type-1 unemployed to become a type-2 unemployed. The effects of an increase in d (see Table 4.3 for an example for the French economy) come through two different (though connected) channels. The first channel corresponds to changes in the bargaining positions of the agents. If the length of unemployment benefits is shortened, a type-1 unemployed agent ends up in the (less generous) assistance regime more easily. As $B < U$, this means that her income during unemployment is lowered and her position in the bargaining weakened. This leads to smaller (higher) w_1 and E_1 (θ_1 and J_1). From (1.16), it appears that w_2 depends positively on

the expected value of a type-1 job to the firm (J_1) and negatively on E_1. As type 2 contracts are turned into type1 contracts with probability p, a higher (lower) value of a type-1 match to the firm (worker) weakens the firm's bargaining situation, and thus w_2 becomes higher. The second channel corresponds to a pure "flow effect": as unemployment benefits have a shorter duration, the pool of type-1 unemployed decreases, and thus the total number of type 1 employees (e_1) is reduced even if θ_1 (and consequently the transition probability from unemployment to employment) increases. Due to this effect, shortening the duration of unemployment benefits increases the share of the employed not eligible to unemployment insurance. Concerning total unemployment, it increases slightly for the values of the parameters corresponding to the French economy (0.24% for a 25.13% decrease in the duration of unemployment benefits). Finally, the welfare of individuals is lower, and that of firms higher.

d	w_1	w_2	u	W	W_F
3.98	9062	5063	12.39	789693	276.717
4.48	9058	5197	12.4	789117	281.379
4.98	9054	5320	12.42	788528	285.68

Table 4.3: *Shortening the duration of unemployment benefits*

Softening the eligibility criteria for unemployment insurance :

We study here the effects of a shorter duration of the employment spell necessary to be eligible for insurance benefits, i.e. an increase in p. A first effect is that the value both for a worker and a firm of holding a type 2 job is enhanced (see (1.16)), since both agents prefer at equilibrium type 1 contracts. The subsequent movement of w_2 is thus in principle ambiguous, but can be signed as negative in the French case (see table 4.4). For the same reason, firms open more vacancies for type 2 jobs (θ_2 increases). On the other hand, the flow effect explains why both the number of employed and unemployed workers not eligible to unemployment insurance (respectively e_2 and u_2) shrink. The unemployed who receive assistance benefits are better-off (B is higher) and this improves also the situation of type-1 unemployed, since they become type-2 unemployed with probability d. This increase in U enables the unemployed who receive insurance benefits to have a better position in bargaining, and thus w_1 rises and θ_1 becomes smaller. The flow effect explains why e_1 and u_1 increase, and why the share of the employed not eligible to unemployment insurance is reduced. Concerning welfare, a conflict arises again, since the firms and workers' welfare vary in opposite directions. Unemployment decreases slightly.

p	w_1	w_2	u	W	W_F
25.4	9062	5063	12.39	789693	276.717
27.4	9064	4946	12.34	790524	274.256
29.4	9066	4829	12.29	791245	272.109

Table 4.4: *Softening the eligibility criteria for unemployment insurance*

More frequent negative shocks to employment with eligibility to insurance benefits:

When s_1 gets higher, the value of a filled type-1 job for a firm gets smaller, labour market tightness θ_1 decreases and the same is true for U, E_1, w_1 and $e_{1.}$. This is the standard result in Pissarides (1990). This shock is transmitted to type 2 contracts through the value of a filled type-2 job, since type 2 jobs become a type 1 with probability pdt. Then, θ_2, w_2, E_2, B decrease, while e_2 increases due to a flow effect. This shock affects negatively both the firm and the worker in terms of welfare.

More frequent negative shocks to employment without eligibility to insurance benefits:

The effects of an increase in s_2 on the type-2 contracts' segment of the economy are analogous to those of an increase in s_1 for the type–1 contract's segment. The effects on the rest of the economy are qualitatively different. Indeed, the reduction of U following the increase in s_2 lowers the threat point U of type 1 workers in their wage bargaining. As a result, w_1 falls and firms open more vacancies for type 1 contracts (higher θ_1). Then, although e_1 decreases (due to a flow effect), its decrease is less than proportional to that of e_2, and the share of the employed not eligible to unemployment insurance decreases.

5. Conclusion

In this paper, we suggest that a change in the unemployment compensation scheme has not the same quantitative impact on employment and welfare in a country where both unemployment insurance and assistance coexist than in a country where only one of them exists. Different reforms of the unemployment compensation scheme are considered: an increase in the amount of insurance or assistance benefits; a longer duration of insurance benefits; a shorter duration of the employment spell necessary to be eligible for insurance benefits. These two last reforms can be thought of as a softening of the eligibility criteria for insurance benefits. Our calibration exercises

show that, as in the standard case, the amount of both types of benefits affects negatively employment. A more surprising result is that shortening the duration of insurance benefits increases both unemployment and the share of the employed not eligible to unemployment insurance. Inversely, a shorter duration of employment necessary to be eligible for insurance benefits increases both employment and the share of the employed eligible to unemployment insurance. Thus taking into account the interaction between unemployment insurance and assistance helps understanding their consequences on employment and welfare.

The calibration exercises will be extended in the future to study the unemployment compensation systems of other countries, and in particular the other European countries included in the European Panel Survey.

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6. Appendix

The optimality condition of problem (2.15) is given by :

$$(1-\beta)(E_2 - B) = \beta(J_2 - V_2)$$

Using the expressions for B, E_2, V_2 and J_2 ((2.8) and (2.10) to (2.12)), the wage solving this problem is :

$$w_2 = \beta y + \beta p J_1 - (1-\beta)pE_1 + (1-\beta)(r+p)B.$$

Imposing $J_2 = \frac{\gamma_2}{q(\theta_2)}$ and $V_2 = 0$ in the FOC and using (2.8),

$$(1-\beta)rB = \beta\gamma_2\theta_2 + (1-\beta)b. \tag{6.1}$$

Substituting,

$$w_2 = \beta y + \beta p J_1 - (1-\beta)pE_1 + \frac{r+p}{r}\beta\gamma_2\theta_2 + \frac{r+p}{r}(1-\beta)b.$$