Unemployment and Benefits for Frequently Unemployed Workers: Estimation of an Unbalanced Panel VAR model on Count Data

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Abstract

This study investigates the causes of unemployment persistence from a microeconomic perspective. We focus more specifically on the interrelated dynamics of unemployment and insurance benefits for the workers that have at least 4 unemployment spells, a population rarely studied in the applied litterature. Using a large French administrative data set, we propose a slight extension of the method proposed by Holtz-Eakin, Newey and Rosen (1988) and consider a correlated effect panel vector autoregressive specification based on count data. This approach allows us to disentangle the so called "state dependence", the impact of unemployment compensation and the effect of the unobserved individual heterogeneity. Our results indicate that, once accounted for individual heterogeneity, the lenght of unemployment would be almost proportional to the length of unemployment benefits.

JEL Classification :C23,J64,J65,J68

1 Introduction

Since the early 1980s, high and persistent unemployment has been a major concern in Europe. The initial impulse in economic literature was driven by the macroeconomic nature of the phenomenon and a particular attention was granted to the explanations based on hysteresis hypothesis, i.e. the dependence of the "natural rate" on past unemployment rate realizations (see Roëd (1997)

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for a detailed survey). Recently an important room in understanding unemployment persistence was made for microeconomic approach and the question of whether or not the duration of unemployment depends on past unemployment experience has attracted great attention from labor economists [1]. While American studies (Heckman and Borjas (1980), Corcoran and Hill (1985), Lynch (1989) and Choi and Shin (2002)) have found little evidence of state dependence, it seems to be strongly present in Europe. Narendranathan and Elias (1993), Arulampalam and al. (2000) and Gregg (2001) demonstrate that individuals experiencing unemployment are more likely to be unemployed in the future in Britain. The state dependence is further empirically confirmed by Andress (1999), Flaig et al. (1993), Muhleisen and Zimmerman (1994) on German data, by Winter-Ebmer and Zweimüller (1992) for Austrian labor market, by Frijters and al. (2009) in case of Holland and Gangji and Plasman (2007) for Belgium.

However, little is known about the mechanism that lies behind this state dependence. Formation of preferences, depreciation of skills and search effectiveness, or stigma effects are often evoked as possible sources. In this paper, we focus on the relationship between the generosity of unemployment compensatory system and individual labor market transitions. The results of previous empirical studies converge to confirm the predictions of job search models regarding the negative relationship between the generosity of unemployment insurance and the duration of unemployment. Nevertheless, the related literature mainly deals with the "static disincentives", while the eligibility to UI benefits and duration of entitlement mainly depend on the employment history of individuals. A fuller picture of the dynamics of unemployment can be provided by examining it in conjunction with the dynamics of benefit receipt. These considerations have been taken into account by a bunch of studies focusing on state dependence in unemployment insurance spells. Corak (1993) finds a positive relationship between the number of past occurrences of unemployment insurance benefits receipt and the duration of future receipt. A study by Choi and Shin (2002) confirms this finding on US data and adds that the duration of UI spells increases by 33% due to positive occurrence dependence solely. Regarding lagged duration dependence, Arranz and Muro (2004) show that an increase in the duration of previous unemployment benefit periods lengthens the expected duration of future unemployment benefit periods in Spain.

While the hazard rate approach is a standard framework to analyze unemployment durations, we follow a different path in this paper by adopting a panel vector autoregressive specification based on count data[2]. We hence focus on the interrelated dynamics of unemployment and insurance benefits and consider a broader concept of persistency, i.e. any relationship between previous individual

[1] In their seminal paper, Heckman and Borjas (1980) distinguish several types of structural state dependence: occurrence dependence, duration dependence and lagged duration dependence which refer, respectively, to the effects of the number of past spells, the elapsed time spent in the current spell and the lengths of previous unemployment spells on the probability of leaving current unemployment.

[2] The count and duration approaches can be seen as two different representations of the same underlying stochastic process (see Winkelmann (2008)). Andress (1989), Winter-Ebmer (1991), Stancanelli and Miniaci (1997) also use count data to study repeated unemployment.

labor market outcomes and current labor market opportunities. Using a large French administrative data set, we apply an extension of the method proposed by Holtz-Eakin, Newey and Rosen (1988), which allows us to disentangle true state dependence and the effects of unobserved individual heterogeneity without imposing distributional assumptions. We also control for the initial conditions problem.

The reminder of this paper is organized as follows. The next section is devoted to a brief presentation of the French unemployment compensation system. Section 3 describes the data. Section 4 presents the statistical model. Results are discussed in Section 5. Section 6 finally concludes.

2 Institutional Features

2.1 The French Unemployment Compensation System

As in most European countries, unemployment compensation in France combines insurance and welfare programs. The Unemployment Insurance system (UI) is funded by contributions from workers and employers and jointly administrated by representatives of both parts within a non-profit association, UNEDIC, mainly in charge of compensatory law and benefits provision. The National Employment Agency, ANPE, partners UNEDIC by operating job placement, professional counseling and training activities. To qualify for UI benefits, claimants must have worked at least 4 months during the last 18 months prior to unemployment, be aged under 60 (or 65 if they are not yet entitled to a full retirement pension), suffer an involuntary loss of job[3], register as job seeker with the local UI agency, be physically capable of working and actively searching for work. The level of benefits is fully determined by previous earnings. Within the analyzed period (January 1999 to June 2001), benefits are paid at a step declining rate and the replacement ratio lies between 57.4% for the highest wages and 75% for the lowest ones. The duration of the entitlement period ranges from 4 to 60 months depending on the age and the employment history of unemployed workers. Non compliance with the eligibility rules is subject to benefit sanctions[4].

The Unemployment Assistance system (UA) is taken on by the State. It grants supplementary income to individuals who have exhausted UI benefits or do not qualify for receiving them. The solidarity allowance are means-tested against household income and require from the unemployed worker to prove 5 years of employment within 10 years before the contract of employment ended. Pay-

[3]Unemployed workers voluntarily leaving their job, who have not found work within the 4 months following the resignation may request that their file be reviewed by UNEDIC, which may decide to pay benefit depending on the efforts made to find a new job.

[4]Claimants who do not prove active job search, refuse suitable job offers, fail to keep the local UI agency informed about their personal situation and to show to summons at the employment office or make incorrect declarations about everything that is relevant to the payment of the UI benefits may face a temporary reduction and/or a withdrawal for up to 6 months.

ments are of fixed amount and may last indefinitely (as long the qualifying requirements are met). Workers who do not meet eligibility criteria for unemployment compensation benefits can still apply for other labour market minimum income supports (such as RMI for example).

3 Data and Descriptive Analysis

3.1 Dataset

The empirical analysis is based on two matched sources of administrative data : i) *the Fichier Historique Statistique* (from the National Employment Agency) which covers all registered unemployed persons since 1993[5] and contains exhaustive information on labour market histories and socio-demographic characteristics; and ii) the *Segment D3* (from the Unemployment Insurance Fund) which provides some complementary insights on benefits recipients financial situation such as the previous wage, the amount of benefits, the duration of the entitlement period or the enforcement of sanctions. Transitions in and out of unemployment are recorded on a daily basis. However, since we only observe unemployment insurance payments on a monthly basis, we choose a one month period as time reference.

We measure the duration of job search as the number of days (in a month) that an individual has been registered with the unemployment agency[6]. In order to cope with possible inconsistencies in unemployment registration, we assume that periods less than one month apart belong to the same spell. Unemployment spells can end through the taking of a new job, withdrawal of the labour force or deregistration for "administrative" reasons. For convenience, we use the expression "employment spell" to refer to the time spent out of the unemployment register when the former outflow direction was employment. Finally, we measure compensation duration in a similar way, i.e. as the number of days in a month that an individual received unemployment benefits.

3.2 Sample selection

From the database, we have a $1/12^{th}$ representative sample in which we consider all the unemployed who became registered between January and December 1999. Job seekers are observed up until June 2001[7]. In order to focus on a homogeneous sample, we make a number of additional sample restrictions. First, we drop disabled job seekers as well as people classified as "non immediately available for work". We also exclude people aged over fifty-two at the time

[5] According to Chardon and Goux (2002) estimation based on labor force surveys, 90% of ILO-unemployed would also register at the employment offices.

[6] In these data, the definition of unemployment differs from the ILO standards in the sense that people are recorded as job seekers as long as they report so to ANPE on a monthly filled form, even if they declare occasional or short-term jobs (called *reduced activity*).

[7] This choice is driven by the fact that new compensation rules were adopted by the French Unemployment Insurance Fund starting from July 2001

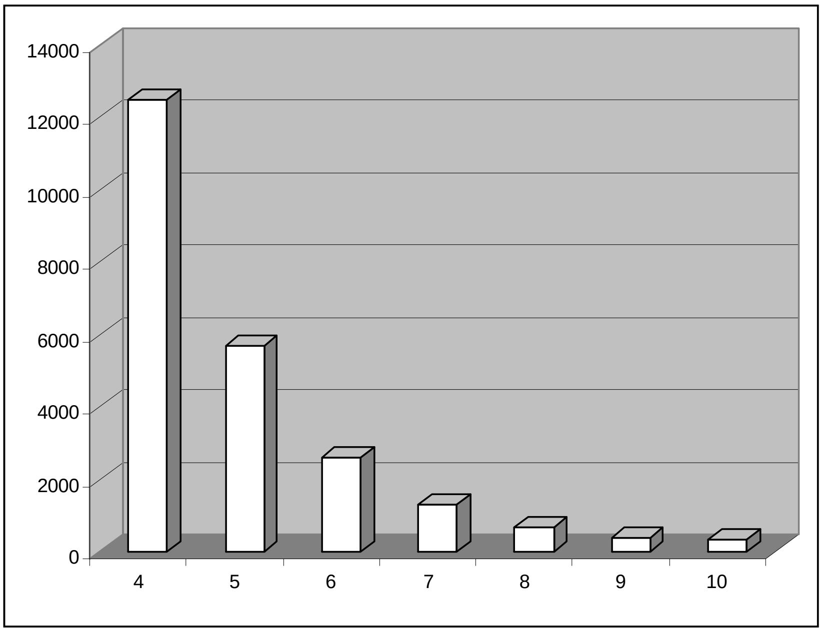

Figure 1: Number of individuals for each spell length

of registration to avoid special programs for older workers. Last, we eliminate benefit recipients who are covered by a different set of unemployment compensation regulations (*"régimes spéciaux"*). The final sample includes 6,031,320 observations.

3.3 Descriptive analysis

We restrict our analysis to frequent renewals of unemployment spells : we found 23 552 individuals with at least four spells of unemployment, representing a total of 115873 spells. Among this spells, only 30% benefit from a financial unemployment compensation. This low figure could come from the fact that the more workers use unemployment compensation, the less they have compensation rights left. However, for each individual, the benefits vary from one spell to another. If we compute an aggregate rate of compensation, we find that 40% of the workers have benefited from unemployment compensation.

The econometric analysis should allow us to disantangle what part of unemployment duration comes from the unemployment benefits, what part comes from state dependence and what part comes from the individual correlated effects.

4 Estimation issues

4.1 The model

We consider the number of days in unemployment for the individual i at spell t, denoted y_{it}, and the number of unemployment days with a benefit in the same spell, denoted x_{it}. Our model explains the number of days in unemployment by the lagged numbers of days and also by the number of days with a benefit.

We use a vector autoregression model because such a device allows us to compute several quantities of interest. First, we can measure the persistence of unemployment by examining the lagged coefficients of the unemployment count. Second, we can compute the short-run and long-run multipliers associated to the benefits variable. Third, we can extract information from the lags structure of the benefits variable. Notice that we do not consider the causality that runs from unemployment to benefits because the benefits derive in an automatic manner from the lagged number of days worked and, therefore, from the number of lagged unemployment days.

Following the literature on panel count data (Hausman, Hall, Griliches; 1984; Blundell, Griffith and Van Reenen, 1995; Crépon and Duguet, 1997), we introduce the following VAR generalization of the linear feedback model :

$$\begin{aligned} y_{it} &= \sum_{\ell=1}^{m} \alpha_\ell y_{it-\ell} + \sum_{\ell=1}^{m} \beta_\ell x_{it-\ell} + \exp\left(\gamma_i + \delta_t\right) + u_{it}, \\ i &= 1, ..., N,\ t = (m+1), ..., T \end{aligned}$$

where the exponential guarantees the positivity of the count prediction. The parameter α_i is the usual individual correlated effect and δ_t the correlated spell effect. Notice that with count data the presence of a spell effect δ_t will imply that the coefficient of the individual effect varies other time since $\exp\left(\gamma_i + \delta_t\right) = \exp\left(\gamma_i\right)\exp\left(\delta_t\right)$. This comes from the multiplicative nature of count data models. This feature of count data models also implies that there is no time constant in the equation. The disturbance u_{it} is the usual white noise.

In order to retrieve additional information from the individual effects, we model it in two parts :

$$\gamma_i = z_i \zeta + \eta_i,$$

where z_i are the time-invariant explanative variables of unemployment (qualification, activity etc.), including a constant term, and η_i a disturbance that we allow to be correlated with z_i. This modeling is well adapted to our data, since most variables are constant over time. The idea behind that modeling is that there is a part of the individual effect that we can explain by individual variables and a an unobservable part. We will consider later an IV estimation of this relationship.

The model can be written :

$$\begin{aligned} y_{it} &= \sum_{\ell=1}^{m} \alpha_\ell y_{it-\ell} + \sum_{\ell=1}^{m} \beta_\ell x_{it-\ell} + \psi_t f_i + u_{it}, \qquad (1) \\ i &= 1,...,N,\ t=(m+1),...,T \end{aligned}$$

with $\psi_t = \exp(\delta_t)$ and $f_i = \exp(\alpha_i)$, therefore we get a standard VAR model with a correlated individual effect whose coefficient varies over time. The estimation of this type of model has been considered in Chamberlain (1983) and Holtz-Eakin, Newey and Rosen (1988).

4.2 The estimation

There are two problems to solve in order to get our estimates :

- We apply an slight extension of the method of Holtz-Eakin, Newey and Rosen (1988).
- The sample is not balanced, so that we need a specific estimation strategy in order to get estimates for the whole sample.

4.2.1 Estimation of the reduced form parameters

In order to eliminate the individual effect from equation (1) we apply the transformation by Chamberlain (1983). One multiplies the equation $t-1$ by $r_t = \psi_t/\psi_{t-1}$ and subtract it from equation t. This gives :

$$\begin{aligned} y_{it} - \frac{\psi_t}{\psi_{t-1}} y_{it-1} = &\sum_{\ell=1}^{m} \alpha_\ell y_{it-\ell} + \sum_{\ell=1}^{m} \beta_\ell x_{it-\ell} + \psi_t f_i + u_{it} \\ &- \frac{\psi_t}{\psi_{t-1}} \left\{ \sum_{\ell=1}^{m} \alpha_\ell y_{it-\ell-1} + \sum_{\ell=1}^{m} \beta_\ell x_{it-\ell-1} + \psi_{t-1} f_i + u_{it-1} \right\} \end{aligned}$$

which can be written :

$$\begin{aligned} y_{it} &= \sum_{\ell=1}^{m+1} a_{\ell,t} y_{it-\ell} + \sum_{\ell=1}^{m+1} b_{\ell,t} x_{it-\ell} + v_{i,t}, \qquad (2) \\ i &= 1,...,N,\ t=(m+3),...,T \qquad (3) \end{aligned}$$

with :

$$\begin{aligned} a_{1,t} &= r_t + \alpha_1, \qquad (4) \\ a_{\ell,t} &= \alpha_\ell - r_t \alpha_{\ell-1}, \\ a_{(m+1),t} &= -r_t \alpha_m, \\ b_{1t} &= \beta_1, \\ b_{\ell t} &= \beta_\ell - r_t \beta_{\ell-1}, \\ b_{(m+1),t} &= -r_t \beta_m, \\ v_{it} &= u_{it} - r_t u_{it-1}. \end{aligned}$$

We will first estimate the parameters $a = \left(a_{1,t}...a_{(m+1),t}, b_{1,t}...b_{(m+1),t}\right)$ before to come back to the structural parameters α, β and $r = \left(r_{T-(m+1)}, ..., r_T\right)$. Since there are constraints on the parameters, we will solve it through the application of asymptotic least squares (or minimum distance) estimation.

Such a system must be estimated by the GMM-Chamberlain method (see Crépon and Mairesse, 1996). In order to proceed to the estimation, we rewritte the equation (2) for all individuals at the same date. Let :

$$\begin{aligned}
\underset{(N,1)}{Y_t} &= \begin{pmatrix} y_{1t} \\ \vdots \\ y_{Nt} \end{pmatrix}, \ \underset{(N,1)}{X_t} = \begin{pmatrix} x_{1t} \\ \vdots \\ x_{Nt} \end{pmatrix}, \\
\underset{(N,2m+2)}{W_t} &= \left(Y_{t-1}, ..., Y_{t-(m+1)}, X_{t-1}, ..., X_{t-(m+1)}\right)
\end{aligned}$$

N_t is the vector of unemployment for all individuals at date t, and W_t is the corresponding matrix of explanatives variables. The vector of the disturbance terms is equal to :

$$\underset{(N,1)}{V_t} = \begin{pmatrix} v_{1t} \\ \vdots \\ v_{Nt} \end{pmatrix},$$

and the vector or coefficients at date t is :

$$\underset{(2m+2,1)}{A_t} = \left(a_{1,t}, ..., a_{(m+1),t}, b_{1,t}, ..., b_{(m+1),t}\right)'.$$

Then we can rewritte equation (2) as :

$$\underset{(N,1)}{Y_t} = \underset{(N,2m+2)}{W_t} \underset{(2m+2,1)}{A_t} + \underset{(N,1)}{V_t}, \ t = (m+3), ..., T$$

the final equation is obtained by stacking these equations :

$$\begin{aligned}
\underset{(N\times(T-m-2),1)}{Y} &= \begin{pmatrix} Y_{m+3} \\ \vdots \\ Y_T \end{pmatrix}, \ \underset{(N\times(T-m-2),1)}{V} = \begin{pmatrix} V_{m+3} \\ \vdots \\ V_T \end{pmatrix}, \\
\underset{((T-m-2)(2m+2),1)}{A} &= \begin{pmatrix} A_{m+3} \\ \vdots \\ A_T \end{pmatrix},
\end{aligned}$$

and

$$\underset{(N\times(T-m-2),N\times(T-m-2)(2m+2))}{W} = \operatorname{diag}\left(W_{m+3}, ..., W_T\right),$$

so that :

$$Y = WA + V. \tag{5}$$

The matrix of instrumental variables at date t is given by :

$$\underset{(N,2(t-2))}{Z_t} = (Y_{t-2}, ..., Y_1, X_{t-2}, ..., X_1),$$

notice that the number of instruments varies with each date since the more the observation is far from the first observations, the more there are lagged variables that can be used as instruments. The global instrument matrix is given by :

$$\underset{(N\times(T-m-2),T(T+1)-(m+2)(m+3)-(T-m-1))}{Z} = \mathrm{diag}\left(Z_{m+3,...,}Z_T\right).$$

To get the estimate, premultiply equation (5) by Z' in order to get :

$$Z'Y = Z'WA + Z'V,$$

since $\mathrm{Plim}\, Z'V/N = 0$ we can apply GLS to these equations, that is we perform asymptotic least squares. In order to estimate the covariance of $Z'V$ we need a first step estimator, defined by the application of 2SLS to the previous equation, year by year :

$$\widetilde{A}_t = \left[W_t' Z_t \left(Z_t' Z_t\right)^{-1} Z_t' W_t\right]^{-1} W_t' Z_t \left(Z_t' Z_t\right)^{-1} Z_t' Y_t,$$

the we can form a vector of the residual for period t :

$$\widetilde{V}_t = Y_t - W_t \widetilde{A}_t,$$

so that we can estimate Ω by :

$$\widetilde{\Omega}_{r,s} = \sum_{i=1}^{N} Z_{ir}' Z_{is} \widetilde{v}_{ir} \widetilde{v}_{is},$$

where $\widetilde{v}_{it}$ is the i-th element of $\widetilde{V}_t$ and Z_{it} is the i-th row of Z_t. Finally the GLS estimator on the entire vector A is obtained through :

$$\widehat{A} = \left[W' Z \widetilde{\Omega}^{-1} Z' W\right]^{-1} W' Z \widetilde{\Omega}^{-1} Z' Y.$$

4.2.2 Estimation of the structural form parameters

The main problem is to come back to the structural form of the coefficients. With count data models, one there is a non linear relationship between the reduced form and the structural form parameters. Indeed, contrary do HNR we cannot make the assumption that $r_t = 1 \forall t$, since it would be equivalent to impose that there is no time effect in our equation. Fortunately, there is a simple consistent estimator that we use as a starting value for our structural parameters estimation. The first series of identification constraints is

$$a_{1,t} = r_t + \alpha_1,\ t = m+3, ..., T$$

this implies :

$$a_{1,t} - a_{1,t-1} = r_t - r_{t-1},$$

consider know the second set of constraints :

$$a_{\ell,t} = \alpha_\ell - r_t \alpha_{\ell-1},$$

it implies :

$$a_{\ell,t} - a_{\ell,t-1} = -\left(r_t - r_{t-1}\right)\alpha_{\ell-1},$$

suming up on both sides, we get :

$$\begin{aligned}\sum_t \left(a_{\ell,t} - a_{\ell,t-1}\right) &= -\sum_t \left(r_t - r_{t-1}\right)\alpha_{\ell-1} \\ &= -\alpha_{\ell-1}\sum_t \left(a_{1,t} - a_{1,t-1}\right)\end{aligned}$$

so that :

$$\alpha_{\ell-1} = -\frac{\sum_t \left(a_{\ell,t} - a_{\ell,t-1}\right)}{\sum_t \left(a_{1,t} - a_{1,t-1}\right)},\ \ell = 2, ..., m$$

and this suggest the following consistent estimates :

$$\widehat{\alpha}_{\ell-1} = -\frac{\sum_t \left(\widehat{a}_{\ell,t} - \widehat{a}_{\ell,t-1}\right)}{\sum_t \left(\widehat{a}_{1,t} - \widehat{a}_{1,t-1}\right)},\ \ell = 2, ..., m$$

this implies that we can estimate α_1 by :

$$\widehat{\alpha}_1 = -\frac{\sum_t \left(\widehat{a}_{2,t} - \widehat{a}_{2,t-1}\right)}{\sum_t \left(\widehat{a}_{1,t} - \widehat{a}_{1,t-1}\right)},$$

so that we can estimate the r_t coefficients by :

$$\widehat{r}_t = \widehat{a}_{1,t} - \widehat{\alpha}_1,$$

for the last lag coefficient, we simply sum up both sides of the following constraint :

$$\begin{aligned}a_{(m+1),t} &= -r_t\alpha_m \Rightarrow \sum_t a_{(m+1),t} = -\sum_t r_t \alpha_m \\ &\Leftrightarrow \alpha_m = -\frac{\sum_t a_{(m+1),t}}{\sum_t r_t},\end{aligned}$$

so that we take :

$$\widehat{\alpha}_m = -\frac{\sum_t \widehat{a}_{(m+1),t}}{\sum_t \widehat{r}_t}.$$

For the β coefficients, the solution is simply :

$$\begin{aligned}
\widehat{\beta}_1 &= \frac{1}{T-(m+2)} \sum_{t=m+3}^{T} \widehat{b}_{1t}, \\
\widehat{\beta}_{\ell-1} &= -\frac{\sum_t \left(\widehat{b}_{\ell,t} - \widehat{b}_{\ell,t-1}\right)}{\sum_t \left(\widehat{b}_{1,t} - \widehat{b}_{1,t-1}\right)}, \ \ell = 3, ..., m, \\
\widehat{\beta}_m &= -\frac{\sum_t \widehat{b}_{(m+1),t}}{\sum_t \widehat{r}_t}.
\end{aligned}$$

This estimator is consistent and its covariance matrix can be computed using Slutsky theorem. However, in this paper, we prefer to use it as a starting value for the optimal minimum distance estimator. In order to perform an optimal estimation of the model, we need to introduce some additionnal notations :

- π denotes the auxilliairy parameter. In the context of this paper, this is the reduced form estimates. It is defined as :

$$\pi = (a', b')'$$

- θ denotes the parameter of interest. In the context of this paper, this is the structural form estimates. It is defined as:

$$\theta = \left(\alpha', \beta', r'\right)$$

- In order to apply minimum distance estimation, we need to meet two requirements. First, we have a consistent and asymptotically normal estimator of π (denoted $\widehat{\pi}$) and, secondly, there exist a differentiable relationship between π and θ. Both requirements are met, since $\widehat{\pi}$ is obtained from the HKN method that provides a CAN estimate and the constraints are given by equation (4) , which are clearly differentiable.

In our case, we even have the additional simplification that the relationship can be writen under the form :

$$\Psi = \pi - g(\theta) = 0,$$

so that $\partial\Psi/\partial\pi'$ equals the identity matrix. This simplifies all the standard expressions. The minimum distance is obtained by solving the following (nonlinear) program :

$$\min_\theta \Psi' S \Psi,$$

where S is the weighting matrix. In our case, the optimal weighting matrix is simply equal to :

$$S = \mathrm{Vas}\left(\widehat{\pi}\right)^{-1},$$

so that we solve :

$$\widehat{\theta} = \arg\min_{\theta} \left(\widehat{\pi} - g\left(\theta\right)\right)' \operatorname{Vas}\left(\widehat{\pi}\right)^{-1} \left(\widehat{\pi} - g\left(\theta\right)\right),$$

the structural form estimator $\widehat{\theta}$ is consistent and asymptotically normal, with estimated covariance matrix :

$$\widehat{\operatorname{Vas}}\left(\widehat{\theta}\right) = \left[\frac{\partial g}{\partial \theta'}\left(\widehat{\pi}, g\left(\widehat{\theta}\right)\right) \operatorname{Vas}\left(\widehat{\pi}\right)^{-1} \frac{\partial g}{\partial \theta}\left(\widehat{\pi}, g\left(\widehat{\theta}\right)\right)\right]^{-1}.$$

4.2.3 Estimation on ubalanced panels

Since the panel is not balanced, we perform separate estimations for each number of unemployment spells, from $T = 4$ to $T = 10$. When $T \geq 10$, we keep the first ten spells only since there are not enough observations to estimate for each number of spells separately. Therefore we obtain $T - 3$ estimated parameters denoted $\widehat{\theta}_4$ to $\widehat{\theta}_{10}$. For the global estimation, we propose to take the minimum variance linear combination of these estimators, which is given by :

$$\widehat{\theta}^{(k)} = \sum_{t=4}^{T} \alpha_t^{(k)} \widehat{\theta}_t^{(k)}, \text{ with } \alpha_t^{(k)} = \frac{\widehat{\mathrm{V}}\left(\widehat{\theta}_t^{(k)}\right)^{-1}}{\sum_{j=4}^{T} \widehat{\mathrm{V}}\left(\widehat{\theta}_j^{(k)}\right)^{-1}},$$

for the k-*th* coefficient. This estimator is consistent and asymptotically normal.

5 Results

The results are presented in Table 1. Our first result is that the lagged spell duration is negligible, with a coefficient of -0.025. Although this coefficient is significant at the 5% level, its quantitative impact in a prediction would be negligible compared to the individual effect and the unemployement benefit effect. It is clear that this significance result comes from the large sample size. Therefore, we find that once controled for individual and spell correlated effects there seems to be no lagged dependence in the unemployment spells.

The second results is that the effect of the unemployment benefits is strong. The coefficient is equal to 0,92 so that 10 days of benefit would generate 9 additionnal days in unemployment. This results does not contradict the possibility that individuals would adjust their unemployement length according to their benefit rights. However, we should interpret this result carefully since the individual effect, that contains information about productivity, could be more important than the benefits effect.

6 Conclusion

We have performed an estimation of an unbalanced panel VAR model on count data, relating the duraction of unemployment spells to the corresponding length of unemployment benefits. We account for the potential endogeneity and correlated individual effetct biaises.

Our results are clear-cut : persistence in unemployment would come from both the individual effects and from the lenght of unemployment benefits. We find almost no lagged dependance once these two effects have been taken into account. We also find that the unemployment duration of frequently unemployed individual, is almost proportional to their benefits duration (0,9).

The next step is to perform more research on the correlated individual effect, in order to examine how it is related to the permanent individual data available in our d

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Table 1 : Regression Results

Model : $y_{i,t} = \alpha_1 y_{i,t-1} + \beta_0 x_{it} + \psi_t f_i + u_{it}$

$y_{i,t}$ = length (in days) of the t-*th* unemployment spell of the i-*th* individual

$x_{i,t}$ = number of unemployment benefits (in days) that correspond to $y_{i,t}$

f_i = correlated individual effect ; ψ_t = correlated spell effect ; $u_{i,t}$ = idiosyncratic disturbance ; $r_t = \psi_t / \psi_{t-1}$.

Estimation according to Holtz-Eakin, Newey and Rosen (1988) : Generalized Method of Moments and Asymptotic Least Squares.

T	4		5		6		7		8		9		10		Optimal	
Parameter	Estima-tion	Asymptotic Student	Estima-tion	Asymptotic Student	Estima-tion	Asymptotic Student	Estima-tion	Asymptotic Student	Estima-tion	Asymptotic Student	Estima-tion	Asymptotic Student	Estima-tion	Asymptotic Student	Estima-tion	Asymptotic Student
α_1	-0.017	1.26	-0.006	0.44	0.018	1.13	0.017	1.15	-0.046	2.22	0.032	1.34	-0.071	8.02	-0.025	4.88
β_0	1.004	25.01	1.003	32.23	1.037	29.13	1.009	26.12	0.904	16.07	1.008	28.80	0.824	48.37	0.923	80.97
r_4	0.982	49.88	1.070	39.27	1.054	26.52	0.967	20.36	1.057	18.04	1.010	11.93	0.858	30.00	0.987	80.51
r_5			0.955	38.05	0.978	25.47	1.090	20.55	0.909	17.09	1.109	12.24	1.182	36.85	1.026	65.41
r_6					1.040	27.96	1.016	20.11	1.035	20.35	0.878	11.46	1.025	20.76	1.018	46.46
r_7							0.995	22.45	0.952	20.50	0.889	13.52	0.759	19.81	0.886	38.48
r_8									0.980	19.46	1.175	16.25	1.265	24.18	1.129	34.80
r_9											1.054	13.00	0.787	21.88	0.831	25.27
r_{10}													0.925	29.84	0.925	29.84
N	12483		5709		2619		1326		679		392		344		23552	
NxT	49932		28545		15714		9282		5432		3528		3440		115873	