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"MICROECONOMIC ANALYSIS OF UNEMPLOYMENT PERSISTENCE IN BELGIUM"

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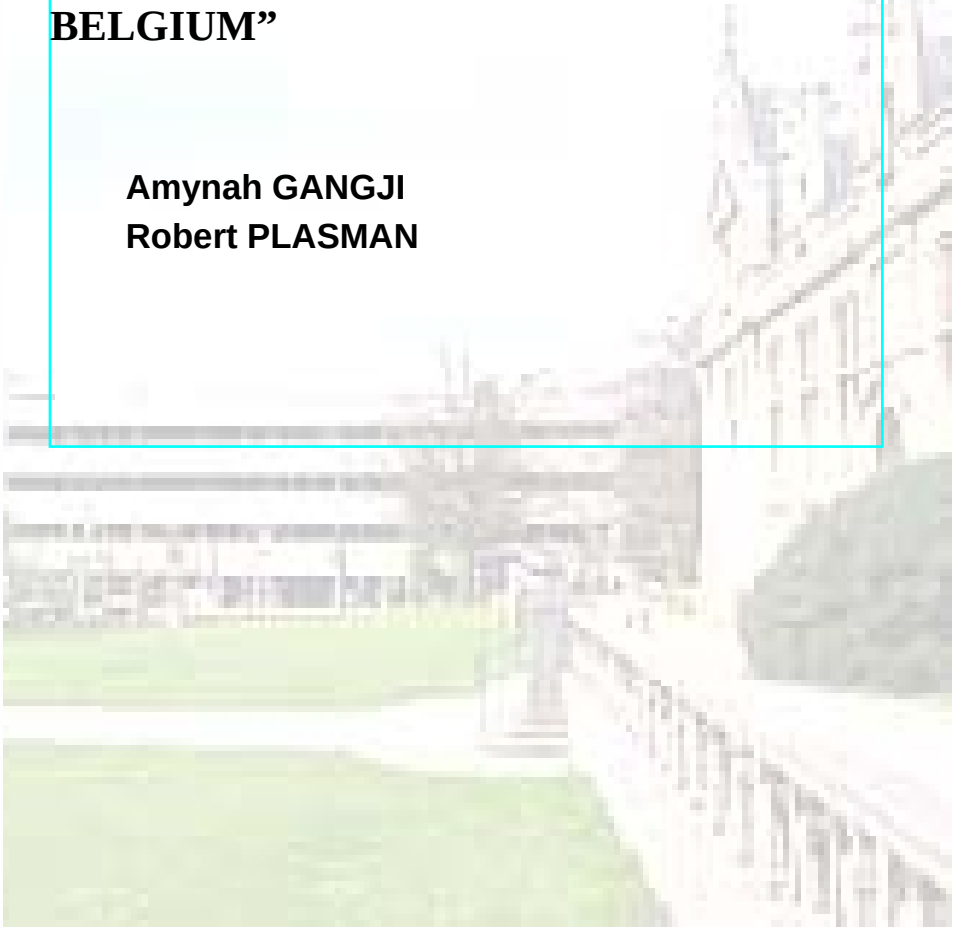

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Microeconomic analysis of unemployment persistence in Belgium

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Abstract:

This study investigates the causes of unemployment persistence among the Belgian labour force. The underlying issue was to determine the impact of past unemployment spells on future labour market opportunities. Some European studies have demonstrated the existence of a true causal relationship between successive unemployment spells implying a stigmatisation effect for the unemployed. This so-called state dependence can occur through a reduction in human capital or through employer recruitment and labour retention practices. The model used is a dynamic random effects probit model controlling for unobserved heterogeneity and the initial condition problem. It was applied on the Panel Study on Belgian Households, covering the years 1994 to 2002. The results suggest that while observed and unobserved heterogeneity explain between 57% and 82% of unemployment persistence, the remainder is induced by the presence of state dependence. All else equal, an individual unemployed this year will be between 11.4 and 33 percentage points more likely to be unemployed next year as compared with an employed person. The presence of a stigmatisation effect of unemployment involves that the costs of unemployment are much higher than the simple loss of income and human capital associated to the current job loss. The study demonstrates the importance to concentrate the efforts on the prevention of unemployment.

Keywords: unemployment persistence, state dependence, dynamic random effects probit model, unobserved heterogeneity, initial condition, Belgium

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Introduction

Since the beginning of the seventies, following the oil crisis, most European countries have faced high and persistent unemployment rates. As a small open economy, Belgium was not exempt of it. Many economists have tried to better understand the causes of this phenomenon in order to define adequate policies to curb it. Some have advanced the idea that there could be a persistence phenomenon by which the unemployment rate today would be related to its past achievements. Nowadays, unemployment persistence in Europe is a well-known fact. If, at the beginning, the tools used to study this phenomenon were referred primarily to macroeconomic fundamentals, some economists thereafter were rather interested in individual behaviours. They wanted to determine how past unemployment experiences influence future individual labour market prospects. If unemployment persistence is actually present, it can either come from differences in characteristics, observable or not, between individuals influencing their propensity to experience unemployment spells or come from a true causal relationship between past and present unemployment spells. The second possibility is called state dependence of unemployment [1].

The purpose of this paper is to analyze the determinants of unemployment persistence in term of occurrence at the individual level within the Belgian labour force. Among other things we will measure how a previous unemployment experience increases the probability of an individual to be unemployed today. The model used is a dynamic random effects probit model controlling for unobserved heterogeneity and the initial condition problem. It will be applied on the Panel Study on Belgian Households (PSBH), covering the years 1994 to 2002.

Better understanding the causes of persistence in unemployment occurrence could be very useful for the implementation of appropriate policies against unemployment. Indeed, their success is largely conditional on to what extent unemployment incidence in itself has a

damaging effect on future labour prospects and to what extent unemployment incidence depends on unfavourable individual characteristics. If there is existence of state dependence in unemployment persistence, unemployment costs are much higher than the currently loss of wage. There is therefore a need to include these future effects into any costs assessments. The presence of a stigmatisation effect also highlights the need for active labour market policies in order to decrease the long term unemployment rate. Finally, in that case, the prevention of initial unemployment experience becomes an important policy objective, indicating namely the need to focus on education and training.

The remainder of the paper is organized as follow. The next section presents the theoretical framework explaining the existence of state dependence as well as empirical results. The sample design and the data are described in section three. The fourth section develops the dynamic panel data model allowing for the introduction of state dependence. The main empirical results of the determinants of unemployment incidence are presented in the fifth section. The sixth section will display marginal effects of state dependence on unemployment persistence. The final section concludes.

Theoretical framework and some empirical results

Heckman and Borjas (1980) were amongst the first ones to model the impact of a former unemployment experience on future individual behaviours on the labour market. Following this work a vast literature on the subject has been developed, particularly regarding the analysis and the measurement of duration and occurrence dependences. Generally, most economists agree on the fact that unemployment impairs an individual's future employment prospects: observations suggest that an individual who has recently experienced an

unemployment spell is more likely to be also observed unemployed in the near future than someone who has never been unemployed. This observed correlation between successive unemployment spells at the individual level is explained in the economic literature either because of the presence of a structural state dependence or because of underlying characteristics making individuals more vulnerable to unemployment.

True state dependence can be defined as "a genuine behavioural effect in the sense that an otherwise identical individual who did not experience unemployment would behave differently in the future than an individual who experienced unemployment" (Heckman and Borjas, 1980).

Several explanations can be found in the economic literature that clarify the causal relationship existing between successive unemployment spells (see for example Arulampalam, 2002; Arulampalam *et al.*, 1998; Corcoran and Hill, 1980; Narendranathan and Elias, 1993; Heckman and Borjas, 1980).

They are mostly based on the human capital and on the segmented market theories. A first justification for the existence of a stigmatization effect of unemployment is on the firms' side. Indeed, during recruiting procedures, firms are not able to observe the worker's future productivity. Therefore, they will use various job criteria to sort applicants. They can in particular judge them through their past history on the labour market. In that case, unemployment incidence can be used as an indicator of lower productivity or less reliability if firms place sufficiently confidence in this information to make their recruiting decision. Consequently, the unemployed will be systematically worried when applying (Lockwood, 1991; Heckman and Borjas, 1980; Hämäläinen, 2003; Taylor, 2002). Another firm practice that may create a causal relation between consecutive unemployment spells is the "last in-first out" procedure (Narendranathan and Elias, 1993).

A second set of justifications lies on the supply's side. Some authors argue that unemployment may modify the characteristics or the behaviour of individuals, which in their turn will influence the labour market status (Heckman and Borjas, 1980). For instance, according to the human capital theory, unemployment prevents the accumulation of human capital within a firm but also implies a deterioration of more general skills and knowledge with, as consequence, a degradation of future wages and prospects in the labour market. Because of this more precarious situation, the individual could rapidly return to unemployment (Heckman and Borjas, 1980). Another example can be found in the segmented market theory. Indeed, it postulates that unemployment may induce the individuals to develop a greater attraction for leisure or less assiduity to work. Therefore, it could involve the exclusion of the primary market, with stable and better remunerated jobs. Consequently, the unemployed workers are especially confronted with the secondary market with shorter periods of employment, followed by increasingly longer unemployment spells (Lollivier, 2000). Finally, after long unemployment spells, the unemployed might be discouraged and finally accept weaker wages than initially hoped or poorer quality job implying a loss of qualification and experience and thus increasing the probability to experience unemployment again.

Even though theoretical models suggest a causal link from past to future unemployment it is not straightforward to establish this in empirical works since some statistical artefacts induce spurious state dependence.

Indeed, the observation of unemployment persistence could be explained by individual characteristics affecting job offers arrivals or job-retention rate, and consequently influencing the propensity to be unemployed. Those characteristics, observable or not, could lead to spurious correlation if they are not correctly taken into account. As far as the observed characteristics are concerned, they are generally inserted in the model as control variables. However, it may be that these differences are unobservable for the analyst (punctuality or

responsibility for example). If the unmeasured differences among individuals remain uncontrolled and are correlated over time, previous unemployment spell may appear to determine further unemployment solely because it acts as a substitute for temporally persistent characteristics. Those unobserved individual characteristics are called unobserved heterogeneity and could partly explain the observation of unemployment persistence. The only way to separate state dependence and heterogeneity is to use panel data techniques (Corcoran and Hill, 1980; Hämäläinen, 2003).

The state dependence could also be biased by two other sources of spurious correlation. First, a spurious correlation could emerge because of the overlapping of a same unemployment spell over several periods. Therefore, during the analysis, one could conclude that the individual has known several unemployment spells whereas only one unique experience is concerned. Second, spurious correlation could appear if the past history of the individual on the labour market before his entry in the sample is not correctly taken into account (Flaig *et al.*, 1993)

Some economists have therefore tried to measure the impact of state dependence on unemployment persistence by controlling for these different statistics artefacts.

American studies have found little evidence of state dependence in unemployment even if unemployment persistence is found in the raw data (Corcoran et Hill, 1985), Heckman and Borjas (1980)). According to the authors the observation of unemployment persistence is only explained by unobserved heterogeneity and data collection (Corcoran et Hill, 1985).

At the opposite, state dependence seems to be present in Europe. As far as United Kingdom is concerned, Narendranathan and Elias (1993) and Gregg (2001) focussed on the youth labour force, using the "National Child Development Study", a birth cohort panel survey. They both demonstrated the presence of state dependence in unemployment. Narendranathan and Elias (1993) estimated that an unemployed person may be 2.3 more

likely to be unemployed the following year than an individual who is currently employed. Gregg (2001) demonstrated that individuals experiencing unemployment represent a minority of the labour force, indicating that it is always the same individuals who experience unemployment. However, even if both papers demonstrate the presence of state dependence, its magnitude is weak. Arulampalam, Booth and Taylor (2000) and Arulampalam (2002), using the "British Household Survey" found a stronger state dependence for the entire active male labour force. However, when differentiating the results by age categories, they found that the younger face weaker state dependence than the older. They explain this result by the fact that "job-shopping" among the youth labour force is more accepted by the employers, since they are at the beginning of their careers.

Stigmatisation effect in unemployment occurrence was also found in Germany by Flaig *et al*. (1993) and Muhleisen and Zimmerman (1994), both using the «*German Socio Economic Panel (GSOEP)*» (1984-1989). The first authors find that the probability to become unemployed is ten times higher for individuals unemployed in the preceding period than for those who were in employment. State dependence has also been demonstrated in Finland and Austria (Hämäläinen, 2003; Winter-Ebmer and Zweimuller, l992). Most of those studies have demonstrated the importance to introduce unobserved individual heterogeneity in order not to overestimate the role playing by the stigmatization effect in the observed persistence in unemployment.

As far as Belgium is concerned, Cahuzac (1998) found that past spells of unemployment are not informative about the future labour market status as far as white collar workers are concerned. He concludes that as for the American cases, the observed persistence in unemployment is partly due to data collection procedure or unmeasured personal characteristics.

We have decided to test again the hypothesis using a different technique allowing among other things to control for exogenous variables. Indeed, the methodology used by Cahuzac (1998), which is a fixed effects conditional logit model, only controls for time invariant characteristics through the inclusion of the heterogeneity term.

Data and sample

The data used are drawn from the « Panel Study on Belgian Households » (PSBH). It consists in a harmonized questionnaire submitted each year to a representative sample of individuals and households in Belgium and covering the years 1992-2002. The original sample in 1992 consisted in approximately 4.400 households and 8.700 adults (aged 16 years or more). It ended with about 3.000 households and 5.300 individuals in 2002. Moreover, the database covers a wide range of topics such as family structures, economic activity, housing, health, education, income, geographical mobility, living conditions, values and opinions, etc. In particular, it includes many targeted questions related to individual labour market trajectories.

The sample used for the study corresponds to the last nine waves of the database (1994-2002) [2]. It includes men and women aged between 18 and 57 years [3] in 1994 and active in the labour market for the same year. Individuals remain in the sample until the end of the studied period (2002) except if they become inactive, if they have missing values or are not interviewed any more. Moreover, new entries (after 1994) will not be accepted since the econometric specification of the model requires a common date of entry for all individuals. The sample is therefore unbalanced and the sample decreases from 3815 individuals in 1994 to 1508 persons in 2002.

[Take in Table I]

The variable of interest is the experience of unemployment. The individual is considered as having experienced unemployed if he declares to be in unemployment for at least one month during the year considered. About 15% of the sample has been unemployed for at least one month in 1994. This proportion decreases during the studied period to 7% in 2002. This falling may be explained by the attrition rate of the sample as well as by the trend on the labour market.

Table I also shows that unemployment persistence in Belgium is quite high. On average about 77% of individuals who experienced unemployment in the previous period are also unemployed in the current period. This high unemployment persistence could be partly explained by the presence of state dependence. However it should be kept in mind that spurious correlation can emerge if a same unemployment spell overlaps several periods (years) [4] or if underlying characteristics (observable or not) influencing the propensity to be unemployed are not correctly taken into account. The objective of the study will be therefore to disentangle spurious correlation from true state dependence in order to better understand unemployment persistence in Belgium.

Econometric specification

The econometric methodology used in order to test the eventual existence of a true state dependence in unemployment occurrence is a dynamic random effects probit model. It incorporates a correction for unobserved heterogeneity as well as for the initial condition problem [5].

The reduced form model of unemployment incidence will be specified for individual i at time t as:

$$y_{it} = 1(\beta x_{it} + \lambda z_i + \gamma y_{it-1} + \nu_{it} > 0), \qquad i = 1,2,...,N; \qquad t = 2,...,Ti \qquad (1)$$

where 1(.) is an indicator function equal to one if the enclosed statement is true and zero otherwise;

y_{it} is binary and takes the value 1 if the individual is unemployed at the time of interview and zero otherwise;

x_{it} represents exogenous and observable individual and environmental characteristics affecting unemployment probabilities, which vary through time;

z_i symbolizes all the observable time-invariant variables;

y_{it-1} denotes the previous labour market status. Its inclusion allows testing for the eventual presence of state dependence in unemployment occurrence;

ν_{it} is the error term, independent of observable characteristics and such that ν_{it} is independently and identically distributed.

However, as we have seen from the previous section, several corrections have to be made to the model in order to avoid biased estimation of the true state dependence arising from spurious correlation.

First, the unobservable individual-specific characteristics are taken into account by decomposing the error term into two components:

$$\nu_{it} = \mu_{it} + \varepsilon_i \qquad (2)$$

where μ_{it} is the random error term which varies among individuals and through time, independent of observable characteristics and such that $\mu_{it} \sim IIN\ (0,\sigma^2_\mu)$;

ε_i represents the individual-specific unobserved heterogeneity, varying across individuals but assumed to be time-invariant. This specification allows observationally identical individuals to face different probabilities of experiencing unemployment

given unobservable characteristics such as motivation, responsibility, punctuality, etc. Assuming that this individual-specific term is treated as randomly distributed such that $\varepsilon_i \sim IIN(0,\sigma^2_\varepsilon)$ and is supposed to be independent of x_{it}, z_i and μ_{it} leads to a random effects probit model (discussed namely in Heckman, 1981a, 1981b; Guilkey and Murphy, 1992). Among other things, since the unobserved heterogeneity persists over time, it implies that the composite error term is correlated across cross section units in time. It is supposed that the correlation between successive error terms for the same individual is a constant.

$$corr(\nu_{it},\nu_{is}) = \frac{\sigma^2{}_\varepsilon}{\sigma^2{}_\varepsilon + \sigma^2{}_\mu} = \rho, t \neq s \tag{3}$$

However, assuming independence between unobserved heterogeneity and observable characteristics should be further discussed. If this hypothesis is violated maximum likelihood estimates will be biased. Mundlak (1978) suggested parameterizing ε_i in order to allow a correlation between ε_i and observable characteristics, assuming a linear regression function of ε_i in the means of all time varying covariates.

Second, because we are estimating dynamic models, we need to take into account the individual pre-sample history. Otherwise, endogeneity problem may arise since the start of the observation period does not correspond to the start of the stochastic process generating the propensity to be unemployed. This could lead to a correlation between individual effects and the initial observation and therefore give biased and inconsistent estimates (Arulampalam *et al.*, 2000). Different techniques exist in order to solve this so-called initial condition problem (see for example Hsiao, 2003; Heckman, 1981c; Orme, 1997; Woolridge, 2005). Wooldridge (2005) has proposed an attractive methodology that model the distribution of the unobserved effect on the initial observation value.

Combining the two corrections mentioned above results in modelling the distribution of the individual effects as:

$$\varepsilon_i = \varphi y_{i1} + \delta \bar{x}_i + \alpha_i \tag{4}$$

where $\alpha_i \sim \text{IIN}(0,\sigma^2_\alpha)$ and is independent of the explanatory variables in equation (1)

Consequently the following equation entirely specifies the unemployment behaviour:

$$y_{it} = 1(\beta x_{it} + \lambda z_i + \gamma y_{it-1} + \varphi y_{i1} + \delta \bar{x}_i + \alpha_i > 0), \qquad i = 1,2,...,N; \qquad t = 2,...,Ti \tag{5}$$

According to Heckman (1981a, 1981b), one can estimate the parameters by marginalisation of the likelihood function with respect to the α's if assuming that the conditional distribution of y_{it} on α_i, x_{it}, $\bar{x}_i$, z_i, and y_{it-1} is independent normal. Marginalising the likelihood with respect to α gives:

$$\log L = \sum_{i=1}^{N} \log \int_{-\infty}^{\infty} \left\{ \prod_{t=2}^{T} \Phi[((\beta x_{it} + \lambda z_i + \gamma y_{it-1} + \varphi y_{i1} + \delta \bar{x}_i + \sigma_\alpha \tilde{\alpha})(2y_{it} - 1))] \right\} \phi(\tilde{\alpha}) d\tilde{\alpha} \tag{6}$$

where $\tilde{\alpha} = \alpha/\sigma_\alpha$ and σ_v is set equal to one. Φ and ϕ are respectively the distribution and the density functions of a standard normal.

A last issue needs to be corrected, which is the spurious correlation between successive unemployment spells that may appear if the individual observed as unemployed at successive waves is in the same unbroken spell. According to Arulampalam *et al.* (2000), as long as the average duration of unemployment is lower than the period between two successive interviews, one can expect that most individuals observed in unemployment over two consecutive periods experiment two distinct spells rather than an unbroken spell. In that case the spurious correlation should not be too important. However, in our case, the mean duration of unemployment spells is quite high. Therefore the unemployment equation will be estimated

according to three different specifications. Specification 1 will consist in the basic unemployment equation in which the one year lagged dependent variable is added as explanatory variable. Specification 2 is based on the first one in which unemployment spells lasting longer than 12 months have been excluded. Finally, specification 3 consists in the unemployment equation in which the two years lagged dependent variable is added as explanatory variable. This gives a measure of state dependence over two years.

Results

The results of the estimations of equation (5) are presented in Table II, for the three different specifications of the model.

[Take in Table II]

The observable characteristics introduced in the econometric specification reflect individual job search intensity, job offers arrivals as well as marginal productivity and job retention rate which, in their turn, influence job-to-unemployment and unemployment-to-job transitions [6]. They can be grouped in three different categories.

The first one concerned individual and household characteristics. We can observe a concave and negative relationship between age and unemployment likelihood. Older people have accumulated more experience on the labour market and therefore have higher human capital implying higher marginal productivity. Also, their job retention rate should be superior since they have higher seniority. We can also observe that men are less likely to experience unemployment than women. Household characteristics (marital status and the presence of children) do not have a strong influence on unemployment probability. When the number of children is significant, it has a positive sign meaning that the presence of numerous children inside the household could be interpreted by the employer as a sign of less attachment to the

firm or greater absenteeism (Narendranathan and Elias, 1993). Having the Belgian nationality decreases the probability of experiencing unemployment. Also, being disabled reduces job search intensity and can be considered as a signal of weaker productivity involving a weaker job retention rate or fewer jobs offers (Taylor, 2000).

A second category of variables measures the individual human capital through educational levels. The higher the level of education, the higher is the probability to be in employment. Various explanations may be advanced to explain this phenomenon. Educated people may have more efficient job search method and more motivation. They can also appear as more attractive from the point of view of potential employers. Lastly, the higher recruiting and dismissal costs of graduated people involve a higher job retention rate (Taylor, 2000).

The third variables category is related to labour demand which can be approached namely by employment growth rate and unemployment rate. Both variables are stated in function of age, gender, corresponding year and the region where individuals are living. While unemployment rate is insignificant, the employment growth rate has a positive influence on the probability of experiencing an unemployment spell. Lastly year dummies were also added to the model in order to take into account the global economic trend over the period 1995-2002. When significant, they have a negative sign. Those results show that the likelihood for an individual to find a job is strongly related with tensions on the labour market and the business cycle.

An important result is the significance of the coefficient attached to the initial condition for the three specifications. We can therefore reject the null hypothesis that the initial condition is not independent of the heterogeneity term. It is thus necessary to endogenize it.

However, the main question remains. Is there evidence of a scary effect in unemployment occurrence amongst the Belgian labour market? Results show that the probability to be unemployed today is positively and significantly correlated to the presence of unemployment in the previous period, and this, whatever the specification considered and after controlling for the initial condition problem and unobserved heterogeneity. The importance of the individual heterogeneity term can be demonstrated by the value taken by the share of the total variance attributed to the heterogeneity term (ρ) which is relatively important (respectively 28%, 25% and 51% for the three specifications). Moreover, the test associated with this value, whose null hypothesis is that this coefficient is not significantly different from 0, is rejected for all specifications. This means that estimating the unemployment equation by panel brings more information than a simple probit.

All else being equal, an individual experiencing unemployment in previous period has a higher propensity to be unemployed today than somebody who was at work. The coefficients attached to this variable lies between 0.9 and 1.9 according to the specification considered. This is consistent with other studies on the subject, which obtain relatively similar coefficients [7]. The explanation of this observed causal relationship is the presence of a stigmatisation effect. Unemployment incidence reduces individual human capital and may be considered as an indicator of lower productivity or less reliability by recruiters. This experience may also influence individual behaviour such as motivation or ambition. Lastly, after some time, the unemployed might be discouraged and finally accept poorer quality jobs or weaker wages involving a loss of qualification and experience, and therefore increasing the probability of living an unemployment spell in the future.

Lastly, it should be noticed that the coefficient associated with state dependence is higher in the first specification than in two others. This result can be explained by the fact that in specification 1, the effect of state dependence could be over-estimated being given the

presence of a significant number of individuals for which unemployment spells are longer than the period considered. However, even when unemployment spells longer than one year are rejected (specification 2), the coefficient attached to the lagged dependent variable remains high and significant.

Marginal probabilities

The coefficients estimated with the random effects probit model do not lend directly to a marginal effects interpretation. However, it is interesting to measure the impact of the stigmatisation effect on the probability to be unemployed. One way to proceed is to compare the predicted probabilities conditional on the different labour market status on the previous period (employed in t-1 or unemployed in t-1) (Arulamapalam, 2002). However, since we are working in a panel data framework, it is required to take into account the fact that individuals observed as identical may have different unemployment propensities considering the presence of unobserved heterogeneity. Chamberlain (1984) suggested first to compute the marginal effects for each individual and thereafter taking the mean on the whole sample, giving us a mean effect for a randomly chosen individual (Arulamapalam and Booth, 2000; Hämäläinen, 2003).

The mean effect of changing the covariate y_{it-1} from $y_{it-1}{}^{a}$ to $y_{it-1}{}^{b}$ on the probability of a randomly chosen individual to experience unemployment is given by [8]:

$$\int \left[prob(y_t = 1 \mid y_{it-1} = y_{it-1}{}^{b}, \alpha)\right] - \left[prob(y_t = 1 \mid y_{it-1} = y_{it-1}{}^{a}, \alpha)\right](d\alpha) \qquad (7)$$

Also, the probability distribution of y_{it} conditional on y_{it-1}, x_{it} and z_i and marginal on ε has the following form:

$$prob(y_{it} = 1 \mid y_{it-1}, z_i, x_{it}, \bar{x}_i) = \Phi\left[\frac{\beta x_{it} + \lambda z_i + \gamma y_{it-1} + \varphi y_{i1} + \delta \bar{x}_i}{\sqrt{\sigma^2{}_\alpha + \sigma^2{}_\mu}}\right] \quad (8)$$

Consequently, the formula allowing computing the marginal effects of state dependence on the unemployment probability is given by:

$$\frac{1}{N}\sum_{i=1}^{N}\left\{\Phi\left[\frac{\beta x_{it} + \lambda z_i + \gamma y_{it-1}{}^{b} + \varphi y_{i1} + \delta \bar{x}_i}{\sqrt{\sigma^2{}_\alpha + \sigma^2{}_\mu}}\right] - \Phi\left[\frac{\beta x_{it} + \lambda z_i + \gamma y_{it-1}{}^{a} + \varphi y_{i1} + \delta \bar{x}_i}{\sqrt{\sigma^2{}_\alpha + \sigma^2{}_\mu}}\right]\right\} \quad (9)$$

where the denominator represents the root square of the total variance and the parameters are replaced by their estimators.

Practically we first compute the predicted probability for each individual assuming that they all have known an unemployment spell in the preceding period. Secondly we compute the predicted probabilities for each individual assuming they all were in employment in the previous period. Then the difference in the predicted probabilities is computed for each individual. When taking the mean of these differences we obtain a state dependence measure all else being equal as well as the part that it explains in the observed persistence. Table III reports the marginal effects of the lagged dependent variable computed for each of the three specifications of the unemployment equation.

[Take in Table III]

The results show that observed and unobserved heterogeneity explain between 57% and 82% of unemployment persistence calculated from the raw data. The results vary according to the specification considered. The remainder is explained by the presence of state dependence between successive unemployment spells.

According to the first specification, in Belgium, an individual who has experienced unemployment in the previous period will be 33 percentage points more likely to be in this situation again one year later than a person who was in employment. However, in this case, state dependence is overestimated since the sample incorporates lots of individuals remaining in unemployment more than one year. However, even when rejecting those individuals, state dependence remains positive, amounting to 11.4 percentage points (specification 2). Finally, the measure of state dependence over two years amounts to 17.7 percentage points.

Conclusion

This study analyses the determinants of unemployment persistence among the Belgian labour force through the end of the nineties using the Panel Study on Belgian Households (PSBH). The main purpose was to measure the eventual presence of state dependence in term of occurrence in unemployment persistence. To test the hypothesis we used a random effects probit model controlling for unobserved heterogeneity, the initial condition problem as well as the overlapping of a same unemployment spell over several periods.

The results strongly suggest the presence of state dependence in unemployment persistence even after controlling for unobserved heterogeneity and the overlapping of a same unemployment spell over several periods. State dependence explains between 18% and 43% of observed persistence, the remainder being induced by observed and unobserved heterogeneity. Moreover, all else being equal, a randomly chosen individual experiencing unemployment in t-1 will be between 11.4% and 33% more likely to be unemployed again in t than an individual who was in employment in t-1. Other important unemployment determinants are sex, region, age and nationality. Educational level also has a significant role

since the chances to hold a job increase as the level of education is raising. It seems also useful to control for labour demand characteristics, employment growth rate and time dummies variables being all significant. Finally, the results also show the importance to use panel data in order to incorporate unobserved individual heterogeneity, as well as to endogenize the initial condition.

The presence of state dependence involves that unemployment has long lasting and fatal consequences on future labour market prospects and that the unemployed will not behave on the labour market in the future in the same way that someone who has never faced unemployment. Different interpretations may be advanced to explain this phenomenon. On the one hand, unemployment generates human capital depreciation, specific or not to the firm, and can consequently be interpreted as a signal of lower productivity from the employers point of view. On the other hand, the individuals experiencing unemployment won't have the same behaviours than before. According to economic theory, it could induce the individual to develop a greater attraction for leisure as well as less assiduity to work and less motivation. He may also, if he is strongly discouraged, accept weaker wages than initially hoped or poorer quality job implying a loss of qualification and experience and thus increasing the probability to be unemployed again.

The presence of a stigmatisation effect of unemployment involves that the costs of unemployment are much higher than the simple loss of income and human capital associated to the current job loss. The study demonstrates the importance to concentrate the efforts on the prevention of unemployment. Among other things, it is important to correctly accompany young people in their transitions between school and employment in order to avoid unemployment to be their first experiment on the labour market. It is necessary to increase their employability by providing them as much experience and attachment on the labour market as possible. Attention should also be given to older unemployed persons. Namely, it is

important to correctly accompany workers suffering from involuntary job termination and help them to find a new job as quick as possible, so that unemployment is avoided. There is consequently a huge breathing space for public intervention in the fight against unemployment.

Notes

[1] It is also known as scary effect or stigmatisation effect.
[2] Variables harmonisation problems appeared with the first two waves of the dataset.
[3] Individuals below 18 years were rejected from the sample since they have not attained the legally age to leave full-time education. Individuals over 57 years in 1994 were also rejected so that the sample does not comprise retired individuals for the whole period (1994-2002).
[4] They may be an important part of the unemployed since long term unemployment is relatively high in Belgium compared to the rest of Europe. See appendix 1.
[5] The model explained in this part essentially comes from Arulampalam (2002), Arulampalam *et al.* (2000), Hämäläinen (2003) and Narendranathan *et al.* (1993).
[6] See appendix 3 for descriptive statistics
[7] See appendix 2
[8] The methodology applied to compute the marginal effect of state dependence on the unemployment probability comes from Arulamapalam and Booth (2000) and Hämäläinen (2003), who used the procedure employed by Chamberlain (1984).

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Table I: Unemployment persistence in the sample

	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Observations	3 815	3 367	3 016	2 268	2 338	2 064	1 862	1 658	1 508	**21 896**
Experiencing at least one month of unemployment	569	455	407	320	250	193	154	139	105	**2 592**
in %	14.91%	13.51%	13.49%	11.99%	10.69%	9.35%	8.27%	8.38%	6.96%	***11.84%***
Prob(yt=1|yt-1=1) (1)		78.21	82.16	76.52	78.93	76.92	79.88	84.62	81.82	79.37
Prob(yt=1|yt-1=0) (2)		2.47	3.06	2.41	1.41	1.78	1.12	1.9	0.43	1.98
Persistence (1) - (2)		75.74	79.1	74.11	77.52	75.14	78.76	82.72	81.39	**77.39**

Source: PSBH, wave 3-11 and own computation

Table II: Results of the estimation of the unemployment equation

	Specification1		Specification 2		Specification 3	
Unemployed at t-1 [1]	1.876	(29.35)***	1.522	(24.08)***	0.903	(12.56)***
Individual characteristics						
Age	-0.197	(3.06)***	-0.067	(-0.93)	-0.361	(4.34)***
Age squared	0.002	(3.39)***	0.003	(3.62)***	0.004	(4.93)***
Male	-0.277	(2.64)***	-0.215	(2.29)**	-0.333	(2.17)**
Married	-0.116	(-0.73)	-0.075	(-0.46)	-0.376	(1.99)**
1child	-0.127	(-1.17)	-0.085	(-0.73)	-0.039	(-0.30)
2children	0.139	(-0.98)	0.214	(-1.40)	0.339	(1.99)**
3children	0.014	(-0.06)	0.149	(-0.63)	0.39	(-1.51)
4children	0.598	(-1.55)	0.626	(-1.49)	0.926	(1.96)**
Belgian	-0.482	(2.13)**	-0.417	(1.68)*	-0.232	(-0.93)
Handicap	0.029	(-0.29)	0.042	(-0.37)	0.143	(-1.26)
Level of education						
Lower secondary education	-0.242	(2.57)**	-0.159	(-1.62)	-0.323	(2.50)**
Upper secondary education	-0.555	(5.85)***	-0.453	(4.58)***	-0.773	(5.98)***
Short term higher education	-0.88	(8.17)***	-0.777	(6.95)***	-1.184	(8.19)***
Long term higher education	-0.937	(8.21)***	-0.759	(6.56)***	-1.304	(8.52)***
Labour market characteristics						
Unemployment rate	0.006	(-0.54)	0.011	(-0.94)	-0.005	(-0.37)
Employment growth	-0.048	(2.35)**	-0.046	(2.07)**	-0.013	(-0.56)
w4	1.838	(2.46)**	6.879	(9.04)***		
w6	-0.07	(-0.86)	-0.21	(2.46)**	-0.07	(-0.80)
w7	-0.252	(2.73)***	-0.596	(6.11)***	-0.239	(2.25)**
w8	-0.075	(-0.55)	-0.542	(3.80)***	-0.31	(1.82)*
w9	-0.241	(1.75)*	-0.865	(6.28)***	-0.406	(2.28)**
w10	-0.205	(-1.30)	-1.026	(6.63)***	-0.307	(-1.46)
w11	-0.486	(2.64)***	-1.673	(8.81)***	-0.509	(2.07)**
Initial Condition	1.305	(15.15)***	1.052	(11.97)***	2.108	(20.16)***
Means of time varying covariates						
mean(Age)	0.184	(2.66)***	0.098	(-1.27)	0.32	(3.57)***
mean(Age squared)	-0.002	(2.65)***	-0.003	(3.71)***	-0.004	(3.66)***
mean(Belgian	0.035	(-0.14)	0.023	(-0.08)	-0.4	(-1.42)
mean(Handicap)	0.345	(2.25)**	0.159	(-0.94)	0.364	(1.88)*
mean(Married)	-0.048	(-0.28)	-0.053	(-0.3)	0.13	(-0.61)
mean(1child)	0.144	(-0.99)	0.035	(-0.23)	0.035	(-0.2)
mean(2children)	-0.047	(-0.27)	-0.189	(-1.03)	-0.256	(-1.18)
mean(3children)	0.053	(-0.2)	-0.261	(-0.93)	-0.368	(-1.11)
mean(4children)	-0.198	(-0.42)	-0.352	(-0.7)	-0.208	(-0.35)
mean(Unemployment rate)	0.017	(-1.3)	0.007	(-0.52)	0.037	(2.34)**
mean(Employment growth)	0.072	(-1.13)	0.093	(1.74)*	0.069	(-0.73)
Constant	-1.328	(2.15)**	-1.819	(2.93)***	-0.628	(-0.75)
Observations	18304		17344		14964	
N	3352		3352		3008	
Log Likelihood	-2380.43		-2120.73		-2171.2	
σ^2_e	0.620		0.583		1.017	
ρ	0.278		0.253		0.508	
Likelihood-ratio test of ρ=0	93.37***		80.3***		588.12***	

Notes: [1] Unemployed in t-2 for specification 3; *** (**;*) significant on a 1 (5;10)% level, z statistics in parentheses

$$\rho = \frac{\sigma^2_{\varepsilon}}{\sigma^2_{\varepsilon} + \sigma^2_{\mu}}$$

Table III: Marginal probabilities of state dependence

	Specification 1	Specification 2	Specification 3
Observed persistence in the raw data	0.774	0.624	0.758
Marginal effects of state dependence	0.331	0.114	0.177
In % of observed persistence	42.77%	18.26%	23.34%

Appendix 1: Long term unemployment in Belgium

		Flanders		Wallonia		Brussels		Belgium	
		A.V.	*%*	*A.V.*	*%*	*A.V.*	*%*	*A.V.*	*%*
- 1 month	*M*	6 341	9.81	4 133	4.67	1 683	4.87	12 157	6.47
	W	6 740	9.18	4 591	4.34	1 558	4.81	12 889	6.09
	T	**13 081**	**9.48**	**8 724**	**4.49**	**3 241**	**4.84**	**25 046**	**6.27**
1 to 3 months	*M*	7 132	11.04	5 560	6.28	2 455	7.10	15 147	8.07
	W	7 629	10.39	5 169	4.89	1 977	6.10	14 775	6.98
	T	14 761	10.70	10 729	5.52	4 432	6.62	29 922	7.49
3 to 6 months	*M*	9 441	14.61	7 578	8.55	3 624	10.49	20 643	10.99
	W	9 779	13.32	7 414	7.01	2 987	9.22	20 180	9.54
	T	**19 220**	**13.93**	**14 992**	**7.72**	**6 611**	**9.88**	**40 823**	**10.22**
6 months to 1 year	*M*	13 053	20.20	14 995	16.93	5 107	14.78	33 155	17.66
	W	14 639	19.94	15 247	14.42	4 562	14.09	34 448	16.29
	T	27 692	20.06	30 242	15.56	9 669	14.44	67 603	16.93
1 to 2 yeras	*M*	13 823	21.39	17 613	19.88	8 031	23.24	39 467	21.02
	W	16 118	21.96	19 134	18.10	6 912	21.34	42 164	19.93
	T	**29 941**	**21.69**	**36 747**	**18.91**	**14 943**	**22.32**	**81 631**	**20.44**
2 to 3 years	*M*	6 474	10.02	10 613	11.98	4 498	13.02	21 585	11.50
	W	7 280	9.92	12 150	11.49	4 054	12.52	23 484	11.10
	T	**13 754**	**9.97**	**22 763**	**11.71**	**8 552**	**12.77**	**45 069**	**11.29**
3 to 5 years	*M*	4 271	6.61	9 353	10.56	4 019	11.63	17 643	9.40
	W	5 061	6.89	13 367	12.64	4 156	12.83	22 584	10.68
	T	**9 332**	**6.76**	**22 720**	**11.69**	**8 175**	**12.21**	**40 227**	**10.07**
5 to 10 years	*M*	2 570	3.98	9 926	11.20	3 405	9.85	15 901	8.47
	W	3 746	5.10	16 234	15.35	4 039	12.47	24 019	11.35
	T	**6 316**	**4.58**	**26 160**	**13.46**	**7 444**	**11.12**	**39 920**	**10.00**
+ than 10 years	*M*	1 505	2.33	9 014	10.18	1 735	5.02	12 254	6.53
	W	2 413	3.29	14 428	13.65	2 144	6.62	18 985	8.98
	T	**3 918**	**2.84**	**23 442**	**12.06**	**3 879**	**5.79**	**31 239**	**7.82**
Total	*M*	64 610	100.00	88 588	100.00	34 557	100.00	187 755	100.00
	W	73 405	100.00	105 734	100.00	32 389	100.00	211 528	100.00
	T	**138 015**	**100.00**	**194 322**	**100.00**	**66 946**	**100.00**	**399 283**	**100.00**

Source: ONEM, rapport mensuel juin 2004

M: Men, W: Woman, T: Total

Appendix 2: Results of the literature review

Authors	Country(period)	Sample			$Unempl_{t-1}$
Flaig *et al.* (1993)	Germany (1985-1989)	Men aged between 25 and 61 years in 1984, not self-employed neither student.			1.097
Narendranathan and Elias (1993)	UK (1974-1981)	Cohort of individuals who have left school before 1974.			0.850
Mülheisen *et al.* (1994)	Germany (1985-1989)	Men being at least 19 years in 1984, not self-employed neither student.			3.309
Arulampalam *et al.* (2000)	UK (1991-1995)	Men active in the labour market, being at least 16 years in 1991 and less than 60 years in 1995.	<25 years	Base sample	1.047
				excluding unemployment spells>1years	1.405
				$Unempl_{t-2}$ on waves 1,3 and 5	0.933
			>25 years	Base sample	0.980
				excluding unemployment spells>1years	1.070
				$Unempl_{t-2}$ on waves 1,3 and 5	1.307
Arulampalam (2002)	UK (1991-1997)	Men active in the labour market being at least 16 years in 1991 and less than 60 years in 1997.	<25 years	with a diploma	0.865
				no diploma	1.056
			>25 years	with a diploma	1.200
				no diploma	1.656
Hämäläinen (2003)	Finland (1987-1998)	Individuals being at least 30 years in 1988 and not studying anymore			0.970

Appendix 3: Descriptive statistics

	Wave 3		Wave 4		Wave 5		Wave 6		Wave 7		Wave 8		Wave 9		Wave 10		Wave 11	
	1994		1995		1996		1997		1998		1999		2000		2001		2002	
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Unemployed	0.1491	0.3563	0.1351	0.3419	0.1349	0.3417	0.1199	0.3250	0.1069	0.3091	0.0935	0.2912	0.0827	0.2755	0.0838	0.2772	0.0696	0.2546
Individual characteristics																		
Male	0.533	0.50	0.534	0.50	0.536	0.50	0.536	0.50	0.532	0.50	0.535	0.50	0.538	0.50	0.537	0.50	0.534	0.50
Age	37.566	9.30	38.532	9.10	39.504	8.94	40.362	8.70	41.266	8.44	41.972	8.24	42.747	8.05	43.542	7.84	44.388	7.64
Age squared	1497.6	723.89	1567.5	726.78	1640.4	731.75	1704.7	725.85	1774.1	718.59	1829.6	713.18	1892.0	708.28	1957.3	699.81	2028.7	694.50
Married	0.926	0.26	0.929	0.26	0.937	0.24	0.946	0.23	0.947	0.22	0.950	0.22	0.958	0.20	0.962	0.19	0.965	0.18
No children	0.053	0.22	0.096	0.29	0.094	0.29	0.097	0.30	0.144	0.35	0.126	0.33	0.128	0.33	0.136	0.34	0.126	0.33
1child	0.677	0.47	0.697	0.46	0.717	0.45	0.723	0.45	0.725	0.45	0.722	0.45	0.728	0.44	0.729	0.44	0.739	0.44
2children	0.464	0.50	0.447	0.50	0.446	0.50	0.442	0.50	0.441	0.50	0.441	0.50	0.452	0.50	0.466	0.50	0.477	0.50
3children	0.238	0.43	0.240	0.43	0.229	0.42	0.221	0.41	0.220	0.41	0.206	0.40	0.187	0.39	0.192	0.39	0.195	0.40
4children or more	0.213	0.41	0.221	0.42	0.233	0.42	0.244	0.43	0.245	0.43	0.255	0.44	0.256	0.44	0.243	0.43	0.229	0.42
Belgian	0.067	0.25	0.075	0.26	0.074	0.26	0.077	0.27	0.076	0.27	0.080	0.27	0.086	0.28	0.086	0.28	0.082	0.27
Handicap	0.019	0.14	0.017	0.13	0.018	0.13	0.017	0.13	0.018	0.13	0.017	0.13	0.018	0.13	0.014	0.12	0.018	0.13
Level of education																		
Primary education	0.091	0.29	0.089	0.29	0.083	0.28	0.077	0.27	0.070	0.26	0.068	0.25	0.062	0.24	0.062	0.24	0.060	0.24
Lower secondary ed.	0.217	0.41	0.215	0.41	0.213	0.41	0.206	0.40	0.201	0.40	0.200	0.40	0.199	0.40	0.194	0.40	0.190	0.39
Upper secondary ed.	0.311	0.46	0.304	0.46	0.303	0.46	0.307	0.46	0.307	0.46	0.299	0.46	0.298	0.46	0.303	0.46	0.302	0.46
Short term higher ed.	0.206	0.40	0.211	0.41	0.218	0.41	0.222	0.42	0.228	0.42	0.236	0.42	0.237	0.43	0.241	0.43	0.240	0.43
Long term higher ed.	0.175	0.38	0.180	0.38	0.183	0.39	0.188	0.39	0.194	0.40	0.196	0.40	0.204	0.40	0.201	0.40	0.207	0.41
Labour market characteristics																		
Unemployment rate	n.a.	n.a.	9.854	6.63	9.902	5.70	8.799	5.37	8.853	5.01	7.854	4.40	6.168	3.73	5.395	3.33	6.245	3.52
Employment growth	n.a.	n.a.	0.809	1.41	0.044	0.91	1.439	1.15	0.174	1.11	4.278	2.05	2.197	0.50	-0.951	0.94	0.395	1.45
Number of observations		3815		3367		3016		2268		2338		2064		1862		1658		1508

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