Does the ILO Definition Capture All Unemployment? *

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Abstract

The labour market status of many non-working persons is at the boundary between unemployment and inactivity. As the unemployed, they seek and are available for work; unlike them, their last search action was not enough close to meet the ILO definition of unemployment. In this paper we examine by non-parametric tests how the transition probabilities of these out-of-the-labour-force job seekers differ from those of the unemployed as well as the other non-participants. First, using data from the European Community Household Panel, we show that in most EU countries these job seekers constitute a distinct labour market state. Second, we rely on information only available in the Italian Labour Force Survey to derive a measure of search intensity which we use to break down the out-of-the-labour-force job seekers. On the basis of their transition probabilities, the most actively searching among them are indistinguishable from the unemployed.

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1 Introduction

The concepts and definitions recommended by the International Labour Office (ILO) in 1982 provide the guidelines followed by European statistical agencies to compile labour force statistics. The adult population, aged 16 years and over, is divided into three mutually exclusive groups: (1) the employed; (2) the unemployed; (3) the inactive, i.e. the people out of the labour force. The employed comprise all persons who during the reference period were in paid employment (including family workers). The unemployed are persons who during the reference period had no occupation, were available to start work and had actively sought employment during the previous four weeks. People neither employed, nor unemployed are considered inactive and are excluded from the labour force.

In all European countries the behaviour of many people is at the boundary between unemployment and inactivity. They look like the unemployed, since they report being searching and immediately available for work; they are not included among them, since their last search action was taken before the previous four weeks. These people (henceforth, labelled "potential labour force", or simply "potentials") are excluded from the active population because their search intensity, as measured by the time elapsed since last search action, falls below the minimum set by the ILO guidelines. We calculate that, on average, this requirement leaves out of the European labour force about a fifth of all people who declare to be seeking work.[1] The sheer size of this group hints at the critical role played by the ILO four-week requirement in the measurement of European unemployment. It is therefore important that it be subjected to scrutiny.

The correct identification of labour market states is not just a matter of classification or an exercise in measurement. Theory tells us that "less intensive" job seekers may affect the employment and wage outcomes in the labour market. The recent literature on the matching process, for instance, recognises that the hiring rates depend not only on the unemployed but also on people out of the labour force, possibly with lower success probability with respect to the unemployed (e.g. Broesma and Van Ours, 1999, Mumford and Smith, 1999). However, if the inactive population (or part of them) are to be treated as an input in the job matching function, we need to quantify them empirically.

A standard way to evaluate labour market classifications is to compare transition probabilities between different states (e.g. Flinn and Heckman, 1983; Jones and Riddell, 1999). If transition

[1] Jones and Riddell (1999, p. 149) estimates that in Canada people "who desire work but are not searching for it" constitute between 25 and 35 per cent of unemployment.

probabilities from two states towards all others are statistically similar, then the two states cannot be regarded as truly distinct. In this paper, we follow this tradition, but we innovate on the existing literature in two ways: first, we impose less structure on the data by using a non-parametric test instead of resorting to logit or probit models; second, we perform a comparative analysis, which allows us to point at important commonalities across European labour markets. We carry out two different exercises.

We first test whether transition probabilities differ between the unemployed, the potentials and the other inactive persons in European countries. Data are drawn from the European Community Household Panel, a harmonised annual longitudinal survey conducted by national statistical offices from 1994 to 2001 under Eurostat co-ordination. Our results suggest that the transition probabilities of potentials are always different from those observed for other non-participants, while in some cases they can be considered similar to those of the unemployed. Therefore we conclude that the European labour markets can be better described by four distinct states (employed, unemployed, potentials and other inactive population) instead of the three-way characterisation of the ILO guidelines, confirming the conclusion reached by Jones and Riddell (1999) for Canada.

Secondly, we identify the search intensity that makes the unemployed different from the potentials. We break down the potential labour force by search intensity, as proxied by the "number of months since last search action". We first compare the transition probabilities of the unemployed with those of the group of the most intensive job seekers among the potentials. Then, we repeat the test by enlarging this latter group in steps, adding job seekers whose last action is the more and more behind in time. In Italy, the only country for which this proxy is available, the unemployed and the potentials turn out to be behaviourally indistinguishable when the last search action of the latter occurred not long before the ILO four weeks. Taking these results at their face value, we compute that the ILO requirement may lead to underestimate the Italian unemployment rate by almost two percentage points in 2000.

The paper is organised as follows. In Section 2 we illustrate, with an example from the search literature, how measuring imperfectly the pool of job seekers may affect our understanding of the labour market. Section 3 discusses the importance of potential labour force and tests whether it is a distinct state from unemployment and inactivity in the EU labour markets. The non-parametric test is presented in Subsection 3.2. Section 4 compares the behaviour of potentials characterised by different levels of search intensity with that of the unemployed in Italy. Section 5 concludes.

2 Why does a better identification of job seekers matter?

We illustrate the importance of correctly identifying job seekers by an example drawn from the search literature (Broersma and Van Ours, 1999; Petrongolo and Pissarides, 2001).[2] In theoretical studies it is often assumed that the matching technology exhibits constant returns to scale. In empirical tests the problem is how to quantify job seekers, as the statistics on unemployment may be too narrowly, or too widely, defined with respect to the theoretical concept. The use of a wrong measure might bias the estimates of the elasticity of matches to job seekers.

Let the matching function be a standard Cobb-Douglas with constant returns to scale,

$$M = S^{\eta} V^{1-\eta}, \tag{1}$$

where M represents total hires (net of job-to-job flows), S is the number of job seekers and V is the number of vacancies. Suppose that we estimate a log-linear version of (1) proxing S with the number of the unemployed according to the ILO definition (U):

$$\log M = \beta_U \log U + \beta_V \log V + \epsilon. \tag{2}$$

In fact, job seekers also include some people out of the labour force (P), so that $S = U + P$. What is the bias introduced by using the wrong variable in the regression? The estimated coefficient ($\hat{\beta}_U$) is related to the true coefficient (η) by:

$$\hat{\beta}_U = \eta \left(\frac{U}{U+P} \right) \left(1 + \frac{\partial P}{\partial U} \right). \tag{3}$$

There are two sources of distortion. The first ($\frac{U}{U+P}$) is the standard attenuation bias due to measurement error. The second comes from the omission of variable P and is related to the functional link between P and U, i.e. to the correlation between the number of ILO-unemployed and the number of other job seekers. In principle, this correlation can be of any sign: if negative, it reinforces the first downward bias; if positive, it smoothes or even reverses the downward distortion. A negative correlation might arise when a higher level of ILO-unemployment discourage other potential job seeker from searching, as in Broersma and Van Ours (1999). A positive correlation might show up when the matching function is estimated on a cross section of countries or regions, since a higher ILO-unemployment tends to be associated with a larger potential labour force (e.g. Viviano, 2003, for Italy), even when they are negatively correlated over the cycle.

[2] Along similar lines, we could examine the Phillips curve and show that the sensitivity of price dynamics to labour market tightness is upward or downward biased depending on whether the number of out-of-the-labour-force job seekers is positively or negatively related to unemployment as measured by ILO.

3 Participation and inactivity in European labour markets

According to the ILO recommendations, adult people are to be considered employed if they did some work in the week before the interview. Persons are classified as unemployed if: (1) they are without work; (2) they seek work; (3) they are available to start working within the following two weeks; (4) they sought employment at some time during the previous four weeks.[3] Thus, non-working individuals are not only asked whether they were searching for work, but also how intensively: somebody who did not take at least one search step during the preceding four weeks is excluded from the unemployed, and from the labour force, even if conditions (1) to (3) are met.

It follows that the population out of the labour force is a composite aggregate, which can be further subdivided in relation to the degree of labour market attachment. At least three subgroups can be identified:

1. Job seekers, whose last search action occurred more than four weeks before the interview. These persons and the unemployed differ in the time passed after the last action. We name these inactive persons "potential labour force" or "potentials" to emphasise the similarities with the unemployed.

2. Non-searching individuals, who would be willing to start work if offered a job. In many respects, they can be seen as "discouraged labour force".

3. People neither searching, nor willing to work. This group of inactive population is referred to as "unattached" to the labour market.

In EU countries official labour market statistics, like the unemployment and the participation rates, are computed from data collected in the national labour force surveys (LFS). As we have no access to detailed LFS data for EU countries, nor do they contain all information we need for our tests, in this section we rely on the comparative data of the European Community Household Panel (ECHP). The ECHP is a fully harmonised annual longitudinal survey conducted by national statistical offices from 1994 to 2001 under Eurostat co-ordination (see Peracchi, 2002, for a description and an assessment).[4] The survey focuses on households' income and standard of living, but it

[3] In this paper we do not consider the effects of the new European Commission regulation 1897/2000 which excludes from the unemployment pool the people merely registering in an employment office. This more restrictive definition has been adopted only by Spain, but the appropriateness of this new definition for the description of the Spanish labour market has been criticised by Garrido and Toharia (2003).

[4] Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain and the United Kingdom participated from the beginning. Austria joined in 1995 and Finland in 1996. Similar

also collects information on demographic characteristics and job search behaviour. Importantly for our purposes, the format of questions concerning labour market status and behaviour mimic that of the LFSs.

Labour market statistics based on the ECHP data are presented in Table 1 for all EU countries. The composition of the working-age population (i.e. from 16 to 64 years) refers to the last available year, generally 2000 except Germany, Luxembourg and the United Kingdom (1996).[5] The main group of non-working persons is by far that of the unattached individuals, followed by the unemployed. Potentials and discouraged workers account for a much smaller, but not negligible, share. Their importance is better understood by looking at their size as a fraction of the number unemployed (Table 2). Such proportion varies widely across countries: it ranges from 13 per cent in Spain to 80 per cent in Denmark. Potentials are relatively more sizeable among women. Discouraged workers are less numerous, summing, on average, at around 7 per cent of the unemployment. In brief, 1 in 5 job seekers (i.e. the sum of the unemployed and the potentials) is not considered among the unemployed because of the four-week ILO requirement. The ILO criterion is crucial in determining the size of European unemployment. Does it do it correctly?

3.1 How many labour market states in Europe?

The ILO four-week requirement is a crude way to separate individuals who are really searching for a job from those who are not. It sets a minimum level of search intensity that job seekers have to exert in order to be classified as unemployed: at least one search action must be taken in a four week period. However, such condition may be exceedingly rigid. From the theoretical standpoint, the total effort put in job search—which is assumed to be positively correlated with the probability to find a job—depends on individual resources, search costs and expected returns and it is endogenously determined, given the labour market conditions (Pissarides, 2000).[6]. The "optimal" number of search steps may depend on the cycle, or on the efficiency of public and private

data for Sweden were made available starting with 1997. The German, Luxembourg and British ECHP surveys were discontinued in 1996 and replaced by existing national panel surveys, the German Socio-Economic Panel Study (GSOEP), the Panel Socio-Economique Liewen zu Luxembourg (PSELL) and the British Household Panel Survey (BHPS). In this paper, we use the database released in 2003, containing 7 waves (1994-2000). Since the GSOEP, the PSELL and the BHPS do not contain the information necessary to apply ILO definitions, for Germany, Luxembourg and the United Kingdom we only utilise the ECHP waves.

[5] Observations are weighted by cross-sectional weights. Population composition from ECHP data does not exactly correspond to that obtained by LFSs even if the main conclusions still hold. In the Netherlands and France the ECHP questionnaire does not allow us to identify the group of discouraged.

[6] Some studies identify search intensity with the probability to apply for a job during a given period (see Petrongolo and Pissarides, 2001) or with the number of applications sent per unit of time. It can be shown that these definitions coincide with that based on the time length between two search actions.

employment offices. As a consequence, we may wonder whether this exogenously set minimum level of search intensity is a good criterion to distinguish between active and less active job seekers and, at the same time, whether it is correct to assimilate less intensive job seekers to other inactive people.

The investigation of labour market transitions is a well established method to assess the distinction between unemployment and inactivity. Clark and Summers (1979), for example, found this distinction to be weak in the United States in view of the large flows into employment directly from outside the labour force (and vice versa). They observed that unemployment persistence may result to be lower than it actually is. When an unemployed withdraws from the labour force and then re-entries within a short period, it is implausible that these events correspond to a "substantive change in job-seeking intentions" (p. 31). Nevertheless, official statistics record two relatively brief spells of unemployment, whereas a single lengthy spell would be a more appropriate description. Flinn and Heckman (1983) countered these findings by comparing the hazard rates of a sample of young white men with a high school diploma obtained in 1969, selected from the U. S. National Longitudinal Survey of Young Men. They concluded that the unemployed and the inactive population cannot be considered as one and the same.[7] This result ought to be generalised with caution. As noticed by Jones and Riddell (1999), the labour market attachment of the whole inactive population—which includes students, housewives and retired workers along with discouraged job seekers—is too heterogeneous to be compared with that of the unemployed. Studying a special longitudinal dataset derived from the Canadian LFS for the years 1979-1992, Jones and Riddell showed that people who desire but are not searching for work constitute a distinct group from both the unemployed and the other non-participants. Moreover, a subgroup of these discouraged workers display a behaviour close to that of the unemployed: their inclusion among the latter would have increased unemployment rates by about a percentage point in the period under consideration.

We estimate the transition probabilities for the EU countries from the ECHP data. The ECHP dataset is particularly suitable not only for its longitudinal nature, but also because it contains information on labour market states which closely resembles that available in LFSs.[8] A further

[7] Data from the same source, relative to high school graduates who received their diplomas in 1979, were analysed by Gönül (1992). She found that unemployment and out-of-the-labour-force are different states for young females, but not for young males. Tano (1991) used monthly transitions over the period 1967-1989 from the Gross Change Data, a sub-sample of the U. S. Current Population Survey. Unemployment and out of the labour force were found to be two distinct states for the young (aged 16 to 24), but not for the adults (aged 25 to 44).

[8] More precisely, we make use of five different variables of the ECHP public-use file: "ILO main activity status at the time of interview" (PE003); "looking for a job" (PS001); "in the past four weeks, have you taken active steps to find a job" (PS004 and PS005), "if a suitable job was available now, would you be able to start within the next two weeks? " (PS008). These variables are sufficient to define the four labour market states examined in this paper.

advantage is that it provides a comparative perspective. Table 3 reports the transitions into employment of unemployed, potentials and other non-participants (i.e. discouraged and unattached) for the 15 EU countries computed on the ECHP data. Figures relate to annual transitions and are averaged over all available pairs of consecutive waves.[9] We can notice that, with the exception of Sweden, the potentials' transition probabilities to employment are much higher than those of the other inactive population and are generally closer to those of the unemployed.

To sum up, these values suggest that the ILO measure of search intensity correctly distinguishes between unemployed and less intensive job seekers, but it fails to divide the potential labour force from the remaining inactive population. As a consequence, the ILO three-state representation may not be a satisfactorily description of the European labour markets. We formally test this proposition in the next two Sections.

3.2 A non-parametric test to compare transition probabilities

Consider a model with four states in the labour market: employed (E), unemployed (U), potentials (P), and other inactive population (N). The labour market dynamics can be summarised by a 4×4 transition matrix Π, where π_{ij} corresponds to the probability to move from state i at time t to state j at time $t+1$, $i, j = E, U, P, N$:

$$\Pi = \begin{pmatrix} \pi_{EE} & \pi_{EU} & \pi_{EP} & \pi_{EN} \\ \pi_{UE} & \pi_{UU} & \pi_{UP} & \pi_{UN} \\ \pi_{PE} & \pi_{PU} & \pi_{PP} & \pi_{PN} \\ \pi_{NE} & \pi_{NU} & \pi_{NP} & \pi_{NN} \end{pmatrix}. \tag{4}$$

In this general framework, two labour market states i and k cannot be considered as truly distinct if people classified in either state move with similar probabilities to all other states, i.e. if

$$\pi_{ij} = \pi_{kj} \tag{5}$$

for each $j \neq i, k$.[10] The potentials and the other non-participants (discouraged and unattached) are in equivalent states if $\pi_{PE} = \pi_{NE}$ and $\pi_{PU} = \pi_{NU}$. In this case the traditional ILO three states are a realistic characterisation of the labour market. Conversely, necessary and sufficient conditions for

[9] Because of data availability, we have transitions for all six pairs of consecutive waves (i.e. seven waves: 1994-2000) for 9 countries: Belgium, Denmark, France, Greece, Ireland, Italy, the Netherlands, Portugal, Spain. Six waves are used for Austria (1995-2000), three waves for Germany, Luxembourg and the United Kingdom (1994-1996), five waves for Finland (1996-2000) and four waves for Sweden (1997-2000). The number of observations available for each country is reported in Appendix 1. Data are weighted by longitudinal weights.

[10] By ignoring comparisons between π_{ij} and π_{kj} for $j = i, k$, we are implicitly assuming that the classification in i or k at time $t+1$ is randomly determined. Therefore the destination states i and k can be collapsed into a unique state and we need to check the equality with respect to 3 final $t+1$ states.

potential labour force and unemployment to be the same state are $\pi_{UE} = \pi_{PE}$ and $\pi_{UN} = \pi_{PN}$. Even in this case there are only three independent states, but now the ILO-unemployed and the potentials are not different and the ILO search intensity measure does not help to discriminate between different labour market conditions. Lastly, if transition probabilities indicate that the potentials differ from both the unemployed and the other non-participants, then the labour market would be better described by a classification based on four states.

In order to check conditions like (5), we need to estimate the empirical counterparts of π_{ij} and π_{kj} and to verify if they are equal. As we do not want to impose too much structure on the data, we depart from previous literature and we carry out a non-parametric test of the equality (5), both in the asymptotic and bootstrap version. Preliminarily, we must take sample attrition into account. When data are not affected by attrition, π_{ij} can be consistently estimated by $\widehat{\pi}_{ij} = \frac{N_{ij}}{N_{i.}}$, equal to the ratio between the number of people moving from state i to state j and the total number of people in state i at time t, $N_{i.}$. Therefore if we find that $\widehat{\pi}_{ij} = \widehat{\pi}_{kj}$ we can conclude that $\pi_{ij} = \pi_{kj}$. In reality, some people exit the sample before time $t+1$ and we must allow for the fact that we observe only part of N_{ij}.

Suppose to have a random sample of individuals whose labour market condition is observed at time t. Let A be an indicator equal to 1 if the person exits the sample before time $t+1$ and equal to 0 otherwise. Let N_{ij}^{A}, $A = 0, 1$, $i, j = 1, ..., I$, be the number of individuals moving from i to j whose sample participation is denoted by A. Let $N_{i.}^{A} = \Sigma_j N_{ij}^{A}$.

Consider the estimator:

$$\widehat{p}_{ij} = \frac{N_{ij}^{0}}{N_{i.}}. \tag{6}$$

In the presence of sample attrition, $N_{ij}^{0} < N_{ij}$ and $\widehat{p}_{ij}$ always underestimates the true transition probability π_{ij}. Note also that $\widehat{p}_{ij} = (1 - \omega_{ij})\widehat{\pi}_{ij}$, where $\omega_{ij} = \frac{N_{ij}^{1}}{N_{ij}}$. Therefore, if $\widehat{p}_{ij} = \widehat{p}_{kj}$, one cannot conclude that $\pi_{ij} = \pi_{kj}$, unless $\omega_{ij} = \omega_{kj}$ for all j. However, it is easy to show that under the hypothesis of random attrition the condition $\widehat{p}_{ij} = \widehat{p}_{kj}$ ensures that $\pi_{ij} = \pi_{kj}$.[11]

Let π_z be the vector composed by all transition probabilities from z to any other possible labour market state j, i.e. the vector of π_{zj}'s, with $j = 1, ..., I$; let $\widehat{p}_z$ be its estimator. From the central limit theorem we know that $\widehat{p}_z$ is asymptotically normal distributed.

Suppose that we want to compare transition probabilities from states i and k. Define the distance $d = \pi_i - \pi_k$ and its estimator $\widehat{d} = \widehat{p}_i - \widehat{p}_k$. The statistics $\sqrt{q}\Sigma_d^{1/2}(\widehat{d} - d)$ is asymptotically

[11] If $\widehat{p}_{ij} = \widehat{p}_{kj}$ for all the destination states, then $\frac{N_{i.}^{1}}{N_{i.}} = \frac{N_{k.}^{1}}{N_{k.}}$. Under the random attrition hypothesis $\omega_{ij} = \omega_i$ for all j and $\omega_{kj} = \omega_k$ for all j. It follows that $N_{i.}^{1} = \Sigma_j N_{ij}^{1} = \omega_i N_{i.}$ and $N_{k.}^{1} = \omega_k N_{k.}$. Thus, $\omega_i = \omega_k$ and $\pi_{ij} = \pi_{kj}$.

distributed as a standardised normal, where Σ_d is the variance of $\hat{d}$ and q is a function of N_i and N_k.[12] Consider a standardised version of d, the Mahalanobis norm,

$$D = \sqrt{q}[(\widehat{d} - d)^T \Sigma_d^{-1} (\widehat{d} - d)]^{1/2}, \tag{7}$$

Under the null that transition probabilities out of i and k are equal, the distance D must be small. Thus, under H_0, $d = 0$ and Equation (7) reduces to

$$D = \sqrt{q}[\widehat{d}^T \Sigma^{-1} \widehat{d}]^{1/2}. \tag{8}$$

where Σ is the variance-covariance matrix of both $\widehat{p}_i$ and $\widehat{p}_k$ and $q = \frac{N_i N_k}{N_i + N_k}$.[13]

Equation (8) provides a non-parametric test for the equality of states i and k. Under the random attrition hypothesis, the null hypothesis H_0 and regularity conditions, $\xi = D^2 \rightarrow \chi^2_I$, where I is equal to the number of destination states (in our case, $I = 3$).[14]

When sample size is too small for asymptotic results to be seen as reliable, a distribution for D can be derived by bootstrap. Consider the empirical counterpart of D, $\widehat{D}$, calculated on the observed sample and define the achieved significance level (p-value) of the test as the probability of observing a value at least as large as $\widehat{D}$ when the null is true:

$$C = Pr\left\{\widehat{D}^* \geq \widehat{D}\right\}, \tag{9}$$

where $\widehat{D}^*$ is a random variable having the distribution of the observed $\widehat{D}$ under the null. Small values for C are evidence against H_0.

By adapting the permutation test (see Efron and Tibshirani, 1993), a bootstrap test can be defined to recover a distribution for $\widehat{D}$. Let the observed sample be made of n individuals, of whom $N_{i.}$ are classified in state i at time t and $N_{k.} = n - N_{i.}$ in state k. Under H_0 the observed sample is just one realisation of all possible combinations $\begin{pmatrix} N_{i.} \\ n \end{pmatrix}$ of n identical individuals partitioned in two mutually exclusive groups. When H_0 is true the distance between state i and state k transition probabilities should be negligible.

The distribution for $\widehat{D}^*$ is obtained by the following algorithm.

[12] Given the independence of classification in state i or k, $q^{-1}\Sigma_d = \frac{1}{N_i}\Sigma_i + \frac{1}{N_k}\Sigma_k$, where Σ_i and Σ_k are the asymptotic variance-covariance matrices of $\widehat{p}_i$ and $\widehat{p}_k$, respectively.

[13] Under H_0, $\Sigma_i = \Sigma_k = \Sigma$, $q^{-1}\Sigma_d = \frac{N_i + N_k}{N_i N_k}\Sigma$ and, hence, $q = \frac{N_i N_k}{N_i + N_k}$. Note also that under H_0 individual classified in state i or k can be considered as belonging to the same state. Let then $\hat{p}$ be the vector of the estimated transition probabilities from this unique state towards all possible $t+1$ destination states $\hat{p}_j$, $j = 1, ..., I$. Σ is then the variance-covariance matrix of the multinomial process described by $\hat{p}$. It is easy to show that the main diagonal element of Σ^{-1} is equal to $\frac{1}{\widehat{p}_j} + \frac{1}{1 - \Sigma_j^I \widehat{p}_j}$. The out of diagonal element is instead equal to $\frac{1}{1 - \Sigma_j^I \widehat{p}_j}$.

[14] Because of the positive attrition probability $\sum_{j=1}^{I} \widehat{p}_{ij} < 1$, so that exit from the sample constitutes in practice a fourth destination state.

- Consider the set of $n = N_{i.} + N_{k.}$ individuals as a unique set of job seekers at time t.
- Select randomly and without replacement $N_{i.}$ individuals for state i and attribute the remaining $N_{k.} = n - N_{i.}$ to state k. This sample is referred to as sample b, $b = 1, 2, ...$
- Calculate the transition probabilities out of states i and k in sample b, $b = 1, 2, ...$ and derive the distance $\widehat{d}(b) = \widehat{p}_i(b) - \widehat{p}_k(b)$ and $\widehat{\Sigma}(b))$ for each bootstrap sample b.
- Calculate $\widehat{D}^*(b)$ for sample b, $b = 1, 2, ...$
- Iterate B times.

This algorithm provides an estimate of the distribution for $\widehat{D}$ under H_0. The achieved significance level (p-value) can be approximated by:

$$\widehat{C} = \# \left\{ \widehat{D}^*(b) > \widehat{D} \right\} / B. \tag{10}$$

3.3 Unemployed, potentials and other non-participants

The test statistics ξ and $\widehat{C}$ defined in the previous Section allow us to evaluate whether in EU countries potentials constitute a separate group from both the unemployed and the inactive. We make again use of the ECHP data.[15] Four problems are to be mentioned. First, transition probabilities refer to changes occurred in persons' labour conditions at a distance of one year. As some people move frequently from employment to non-employment states, it would have been preferable to examine transitions over a shorter period of times (e.g. a quarter). Second, sample size is much smaller in the ECHP surveys than in the national LFSs. To improve on the number of observations, we have pooled all available waves, under the assumption of stationary labour market dynamics. Third, the extent of attrition in the ECHP surveys is not negligible and varies considerably across countries: attrition rates between the first and second wave, for instance, range from 6 per cent or less in Italy and Portugal to as much as 24 per cent in the United Kingdom (Peracchi, 2002, p. 78). We tested the random attrition hypothesis which underlies statistics ξ and $\widehat{C}$, by gender and age group (16-34, 35-64) and we found that it is not contradicted by data.[16] Fourth, the ECHP surveys are generally based on stratified sampling frames (Peracchi, 2002, p. 66). As statistics ξ and $\widehat{C}$ are derived under the hypothesis of simple random sampling, the results presented below are an approximation.

[15] Luxembourg is not considered because of the small sample size.

[16] A non parametric test similar to that used by Jiménez-Martín and Peracchi (2002) for the Spanish LFS data has been carried out. Results are available upon request.

We first focus on the comparison between potentials and other inactive persons. Critical values ξ are reported in the upper part of Table 4, separately by gender and two age groups (ages 16-34 and 35-64). These estimates suggest that the null hypothesis $d = 0$ can be rejected for all EU countries considered here and for all sub-samples, except Sweden. This result is generally robust because available observations are often around or over 1,000 observations. In cases where the sample size is small (e.g. Austria, Finland, Sweden), we can look at the bootstrap p-values in the bottom part of Table 4.[17] They confirm the asymptotic results. For all sub-samples, except for Sweden, p-values are nil or very close to nil. We therefore reject the null hypothesis altogether and conclude that, in European countries except Sweden, the labour market attachment of potentials is significantly different from other non-participating persons.

The fact that the potentials behave differently from the other non-participants does not necessarily imply, however, that they are similar to the unemployed. The estimated achieved significance levels reported in Table 5 indicate that in most cases unemployment and potential labour force are not equivalent labour market states, even if many exceptions exist: all groups in Ireland and in the Netherlands, men of both age groups in Germany, younger men in Denmark and France, younger men and all women in the United Kingdom, older men in Belgium and Greece, older job seekers in Portugal, men and older women in Austria. To sum up, in 25 out of 56 cases the test suggests that unemployment and potential labour force may not be distinct states. A final remark concerns Sweden: since for older men and all women both the equality $U = P$ and $P = N$ cannot be rejected, the ECHP data seems to suggest that in this country it is very difficult to measure labour market attachment. Asymptotic and bootstrap results widely agree.

In conclusion potential labour force may be considered as an intermediate state between unemployment and non-participation, a state which is however very close to unemployment for many groups of workers. As already observed by Jones and Riddell (1999) for Canada, a four-state representation may be a better description of European labour markets than the standard three-way classification implicit in the ILO definitions.

4 Search intensity and the boundary between potentials and unemployed

In the previous Section we found that in Europe potential labour force is in general a distinct state from both unemployment and inactivity. By and large, the ILO four-week requirement contributes

[17] $\widehat{C}$ is estimated with $B = 1,000$ bootstrap replicates for each of the EU countries considered.

to sort out two types of job seekers whose search intensity is actually different. On the other hand, potentials are a heterogeneous group. They include people whose last search action occurred not long before the ILO four weeks as well as people who have not been taking any concrete search step for several months. The evidence that potential labour force and unemployment are distinct states may well be consistent with some subgroup of potentials behaving much like the unemployed. In other words, the test of Section 3 does not tell us whether "four weeks" is the right time interval to sort "more" from "less" intensive job seekers. In this Section we delve into this issue by exploiting the information on individual search intensity which is specifically available in the Italian LFS.

4.1 The Italian LFS

Until the early 1990s, the Italian Statistical Agency (Istat) used a notion of unemployment broader than the ILO definition and all job seekers—included those here labelled "potentials"—were considered unemployed. The standardised ILO definition has been adopted, in accordance with Eurostat guidelines, since October 1992. Istat has however kept asking all job seekers how many months passed since their last search action. Figure 1 reports the frequency distribution of this variable: the vast majority of potentials report that their last search step was taken less than 12 months before the interview.[18]

The collection of such information is a characteristic of the Italian LFS. By flicking through questionnaires of LFSs, we found that it is not gathered in any other EU countries, nor in Canada. It is also missing in the Current Population Survey in the United States. Most LFSs report information on the time since the last contact with public employment offices, a poor proxy of the last search step—especially where public employment offices play a minor role in job matching. Therefore, the Italian LFS provides a unique possibility to examine the composition of out-of-the-labour-force job seekers.

The Italian LFS has a longitudinal dimension based on a rotating scheme of the type 2-2-2. However, the linkage of individual records is problematic, because of the lack of a unique personal identifier and of errors in the household identifier. Istat has recently constructed algorithms which match individuals on the basis of time invariant personal characteristics (e.g. sex, date of birth, etc.) and information that can vary only in one dimension such as educational attainment (Ceccarelli et al., 2002; see also Paggiaro and Torelli, 1999). The longitudinal dataset currently released by Istat

[18] As shown by the spikes in Figure 1, this variable is subject to rounding effects caused by the tendency of respondents to approximate the exact number of months to the quarter or the year. Reporting errors are however likely to be less important when the step action was taken during the last year. The variable is top-coded at 99.

contains, however, only observations matched across waves at *one-year* distance. Here, we use a preliminary file of observations matched on a *quarterly* basis across the four waves of 2000, made available to us within a joint research project with Istat. Attrition and reporting errors preclude complete matching. However, the loss of information is limited, around 6 per cent for the quarterly matched files (against 10 per cent for the yearly ones).[19] Pooling data for all four quarters of 2000 makes up a total of more than 320,000 observations.

4.2 A test of search intensity and "grey areas" in the Italian labour market

The number m of months since last search step is interpreted here as an inverse measure of search intensity: the larger m, the lower is the frequency of search actions and the less intensively a person is seeking job. As a consequence, we should expect that the probability of a transition into employment is inversely related to m. At the same time, as m increases, the less attached a person is to the labour market and the more likely to stop searching in the next period. This intuition is confirmed by Figure 2, where we plot the transition probabilities of the job seekers towards employment and non-participation, respectively, as a function of m. (The unemployed correspond to $m = 1$.) These simple relationships are the basis to test the ILO four-week requirement by investigating whether the transition probabilities of the unemployed and of the more actively searching among the potentials are different.

We preliminarily verify that the LFS evidence is consistent with that from the ECHP by replicating the test discussed in Section 3. Observations are subdivided not only by sex and age,[20] but also by residence area, in order to take into account the relevant differences existing between the North-Centre and the South of Italy.[21] Because of the very large number of observations available (see Appendix 1), we only compute the statistic ξ. The results, reported in Table 6, suggest that the equality $P = U$ cannot be rejected only for older women living in the South and they confirm the adequacy of at least a four-state representation of the Italian labour market.

Let $P(m)$ denote the group of potentials whose last search step was taken no more than m months before the interview. The transitions of group $P(m)$ are compared with those of the

[19] We do not test here whether attrition reduces sample representativeness. However, see the conclusion reached by Jiménez-Martín and Peracchi (2002, p. 100) in their study of the Spanish LFS: "... similar to what has been found for other surveys, we find little evidence that attrition causes important biases in quarterly transition probabilities estimated from the matched data. The main exceptions are transitions of young people from inactivity to employment and transitions of those aged 50+ from employment to out of the labour force".

[20] In the Italian LFS working-age population includes people aged 15, rather than 16-64 as in the ECHP.

[21] Two areas are defined: North-Centre and South. The North-Centre includes Valle d'Aosta, Piemonte, Lombardia, Trentino Alto Adige, Veneto, Friuli Venezia Giulia, Liguria, Emilia Romagna, Toscana, Umbria, Marche, Lazio; the South includes Abruzzi, Molise, Campania, Basilicata, Puglia, Calabria, Sicilia, Sardegna.

unemployed U and of the other inactive N for different values of m. Notice that, the higher m, the more diluted is labour market attachment, since the group of potentials $P(m)$ is expanded by including people who are less intensive job seekers. The results are reported in Table 7 for $m = 2, 4, 6, 12, 24$. Two points can be made. First, for all values of m, potentials are always distinct from other non-participants, even when their last search step occurred long before the ILO interview. Second, the boundary between unemployment and potential labour supply appears to be blurred for certain categories: older men whose last search step was taken no more than 6 months before the interview in the Centre-North; older women whose last search step was taken no more than 4 months before the interview in the Centre-North; older men whose last search step was taken no more than 12 months before the interview in the South; young females who last sought work up to two month before the interview in the South; older women living in the South.

Especially in Southern regions four weeks may not be the right time interval to sort out different types of job seekers. Given the pro-cyclical nature of search intensity, the ILO requirement is presumably less severe when unemployment is low. On the contrary, it may be too strict and lead to underestimate unemployment in those segments of the labour market where average search intensity is low.

In order to appreciate the implications of our results for the unemployment rate, we have reported in Table 8 the ILO rates and the rates obtained by including among the unemployed all groups of potentials for which the hypothesis $U = P(m)$ was not rejected at a 5 per cent significance level. The comparison in Table 8 shows significant "hidden" unemployment, especially in the weakest segments of the labour force. The unemployment rate might be up to 9 percentage points higher than it is on the basis of the ILO definition among older women in the South. While the unemployment rate would increase only marginally in the North and Centre, in the South it would be revised from 21 to 25 per cent. The overall national unemployment rate would go from 11 to 13 per cent.

5 Conclusions

In this paper, we have investigated the impact of the ILO standards on the description of the European and Italian labour markets. Using the first seven waves of the ECHP 1994-2000 and four quarterly waves of the Italian LFS for 2000, we have identified a subset of job seekers whose behaviour is at the boundary between unemployment and inactivity. As the unemployed, these persons report that they seek work and they are available for work; but since they last sought work

more than four weeks before the interview, they fail one of the conditions specified by the ILO to be considered as unemployed. This "grey area" of the labour market is labelled "potential labour force".

We have, first, shown that potentials are in general a separate group of job seekers, distinct from both ILO unemployed and other non-participants. This evidence confirms for EU countries the result of Jones and Riddell (1999) for Canada that a four-state representation is a better description of labour markets than the three-way characterisation of the ILO. Secondly, we have found that, in Italy, the distinction between unemployment and potential labour force is less neat when the latter group is defined to include only the "most active" non-participant job seekers—where the notion of "most active" varies across socio-demographics groups. For instance, consider people living in the North-Centre in the age class 35-64: transition probabilities are similar for men whose last search action was taken no more than 6 months before the interview; the corresponding search time window for men in the South stretches to one year. This means that the four weeks exogenously set by the ILO may be a criterion too strict. If we let the time interval be endogenously set by our test on transition probabilities, we would be led to broaden the unemployment pool. This would have caused an upward revision of the Italian unemployment rate in 2000 by 2 percentage points.

It is not our intention to suggest that the ILO standardised definitions should be abandoned, nor revised. Agreed international standards are indisputably needed to ensure comparability of labour market indicators across countries. Nonetheless, the results of this paper warn that this standardisation may distort our portrait of European labour markets by exaggerating the size of non-participation as well as by wrongly excluding a sizeable part of job seekers from the unemployment pool. The integration of statistics on unemployment as defined by the ILO with internationally agreed statistics on the potential labour force—independently of the method used to measure search intensity—seems a fruitful way to enhance our understanding of labour market dynamics.

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Figures and Tables

Figure 1: Distribution of the number of months since last search step.

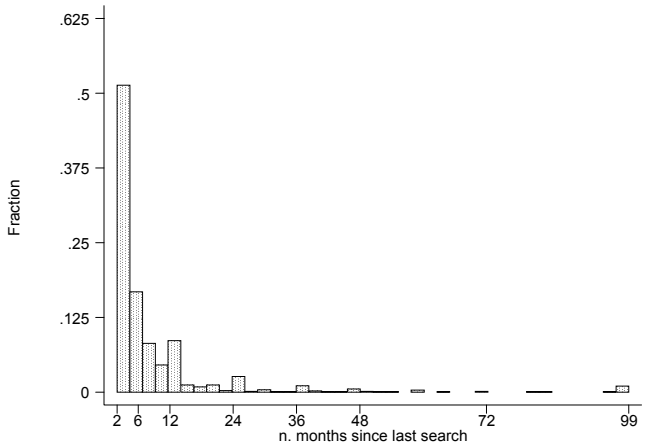

Figure 2: Transition probabilities by search intensity.

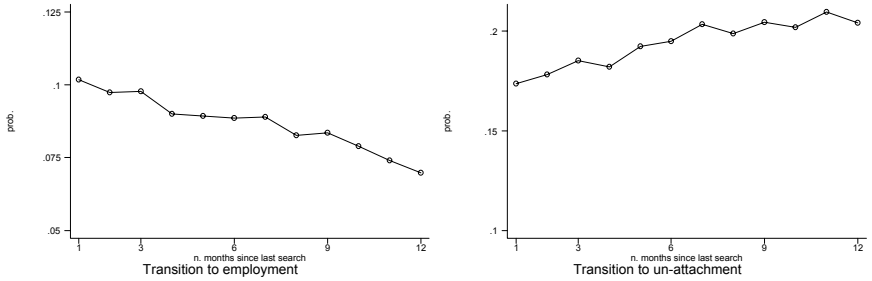

Table 1: Percentage composition of the working-age population by labour market status.

	Employed	Unemployed	Potentials	Discouraged	Unattached	Total
Germany (1996)	70.1	4.4	1.2	0.1	24.2	100.0
Denmark (2000)	81.3	2.5	2.0	0.2	14.0	100.0
Netherlands (2000)	75.8	1.9	0.7	–	21.6	100.0
Belgium (2000)	66.0	2.9	0.9	0.3	29.9	100.0
Luxembourg (1996)	63.7	2.4	0.3	0.1	33.5	100.0
France (2000)	65.8	5.1	1.5	–	27.6	100.0
United Kingdom (1996)	74.5	5.4	0.8	0.1	19.2	100.0
Ireland (2000)	68.3	2.8	0.4	0.4	28.1	100.0
Italy (2000)	55.7	8.1	1.9	0.6	33.7	100.0
Greece (2000)	59.0	5.2	0.9	0.7	34.2	100.0
Spain (2000)	55.3	8.3	1.0	0.1	35.3	100.0
Portugal (2000)	72.6	2.3	1.0	0.5	23.6	100.0
Austria (2000)	71.8	1.9	0.5	0.3	25.5	100.0
Finland (2000)	72.3	5.7	1.2	0.4	20.4	100.0
Sweden (2000)	78.3	7.7	2.7	0.9	10.4	100.0

Source: authors' elaboration on ECHP data.

Table 2: Potentials and discouraged as percentage of total unemployment.

	Potentials			Discouraged		
	Men	Women	Total	Men	Women	Total
Germany (1996)	21.2	29.9	26.4	3.4	1.9	2.5
Denmark (2000)	70.0	87.4	79.3	1.2	12.6	7.3
Netherlands (2000)	26.8	41.7	36.3	–	–	–
Belgium (2000)	27.1	32.5	30.1	10.9	12.3	11.7
Luxembourg (1996)	6.1	21.7	13.6	0.0	7.7	3.7
France (2000)	18.9	35.0	28.4	–	–	–
United Kingdom (1996)	9.0	21.7	14.1	2.2	3.2	2.6
Ireland (2000)	9.2	21.0	14.0	17.3	8.3	13.6
Italy (2000)	18.3	27.3	23.1	5.8	9.8	7.9
Greece (2000)	17.7	16.2	16.8	4.5	20.7	14.1
Spain (2000)	10.9	13.7	12.6	2.4	1.0	1.6
Portugal (2000)	31.7	52.7	42.7	14.8	26.1	20.7
Austria (2000)	17.8	33.1	25.4	15.8	12.4	14.1
Finland (2000)	25.6	17.6	21.0	4.9	7.1	6.2
Sweden (2000)	32.3	38.9	35.5	12.5	9.4	11.0

Source: authors' elaboration on ECHP data.

Table 3: Transition probabilities to employment (per cent).

	Unemployed	Potentials	Other inactive
Germany	38.7	35.3	14.5
Denmark	48.0	32.5	20.7
Netherlands	45.1	46.6	14.5
Belgium	38.0	24.2	8.3
Luxembourg	45.4	32.1	6.6
France	31.5	25.6	10.2
United Kingdom	43.2	32.7	14.5
Ireland	35.7	33.3	15.6
Italy	25.2	15.5	5.3
Greece	35.0	20.7	8.6
Spain	35.1	22.0	8.1
Portugal	46.5	34.8	13.9
Austria	46.7	34.3	12.2
Finland	41.4	28.1	16.5
Sweden	73.7	70.5	74.6

Source: authors' elaboration on ECHP data.

Table 4: Test for the hypothesis $P = N$.

	P-values			
	Men		Women	
	Age group 16-34	Age group 35-64	Age group 16-34	Age group 35-64
Germany	0.000	0.000	0.000	0.000
Denmark	0.000	0.000	0.040	0.000
Netherlands	0.038	0.000	0.000	0.000
Belgium	0.000	0.000	0.000	0.000
France	0.000	0.000	0.000	0.000
United Kingdom	0.048	0.032	0.044	0.000
Ireland	0.000	0.000	0.000	0.000
Italy	0.000	0.000	0.000	0.000
Greece	0.000	0.000	0.000	0.000
Spain	0.000	0.000	0.000	0.000
Portugal	0.000	0.000	0.000	0.000
Austria	0.000	0.000	0.000	0.000
Finland	0.000	0.000	0.035	0.000
Sweden	0.000	0.285	0.000	0.835
	Bootstrap critical values			
	Men		Women	
	Age group 16-34	Age group 35-64	Age group 16-34	Age group 35-64
Germany	0.005	0.000	0.000	0.000
Denmark	0.000	0.000	0.015	0.000
Netherlands	0.000	0.000	0.000	0.000
Belgium	0.000	0.000	0.000	0.000
France	0.000	0.000	0.000	0.000
United Kingdom	0.000	0.000	0.000	0.000
Ireland	0.003	0.000	0.000	0.000
Italy	0.000	0.000	0.000	0.000
Greece	0.000	0.000	0.000	0.000
Spain	0.000	0.000	0.000	0.000
Portugal	0.000	0.000	0.000	0.000
Austria	0.000	0.000	0.000	0.000
Finland	0.016	0.000	0.008	0.000
Sweden	0.172	0.914	0.128	0.978

Source: authors' elaboration on ECHP data.

Table 5: Test for the hypothesis $U = P$.

	P-values			
	Men		Women	
	Age group 16-34	Age group 35-64	Age group 16-34	Age group 35-64
Germany	0.060	0.074	0.000	0.000
Denmark	0.110	0.000	0.003	0.000
Netherlands	0.635	0.112	0.822	0.735
Belgium	0.005	0.502	0.000	0.035
France	0.601	0.000	0.000	0.000
United Kingdom	0.882	0.000	0.212	0.099
Ireland	0.101	0.099	0.512	0.665
Italy	0.000	0.000	0.000	0.000
Greece	0.035	0.855	0.000	0.000
Spain	0.000	0.000	0.000	0.000
Portugal	0.028	0.515	0.000	0.691
Austria	0.113	0.791	0.000	0.063
Finland	0.000	0.000	0.000	0.000
Sweden	0.000	0.595	0.192	0.112
	Bootstrap critical values			
	Men		Women	
	Age group 16-34	Age group 35-64	Age group 16-34	Age group 35-64
Germany	0.078	0.108	0.000	0.000
Denmark	0.074	0.000	0.004	0.000
Netherlands	0.526	0.142	0.790	0.794
Belgium	0.004	0.302	0.000	0.034
France	0.480	0.000	0.002	0.000
United Kingdom	0.860	0.000	0.212	0.110
Ireland	0.150	0.122	0.302	0.592
Italy	0.000	0.000	0.000	0.000
Greece	0.016	0.868	0.002	0.002
Spain	0.002	0.000	0.000	0.000
Portugal	0.028	0.358	0.002	0.662
Austria	0.112	0.786	0.000	0.082
Finland	0.005	0.000	0.002	0.000
Sweden	0.000	0.514	0.140	0.080

Source: authors' elaboration on ECHP data.

Table 6: Test for the hypotheses $P = U$ and $P = N$ on Italian Labour Force Survey data.

	P-values			
	Men		Women	
	Age group 15-34	Age group 35-64	Age group 15-34	Age group 35-64
	$P = U$			
North-Centre	0.000	0.000	0.000	0.000
South	0.000	0.000	0.001	0.095
	$P = N$			
North-Centre	0.000	0.000	0.000	0.000
South	0.000	0.000	0.000	0.000
Source: authors' elaboration on Italian LFS data.				

Table 7: Test for the hypotheses $P = U$ and $P = N$ by search intensity on Italian Labour Force Survey data.

	P-values			
	Men		Women	
	Age group 15-34	Age group 35-64	Age group 15-34	Age group 35-64
	$P = U$			
	North-Centre			
2 Months	0.001	0.653	0.025	0.410
4 Months	0.000	0.086	0.000	0.112
6 Months	0.000	0.081	0.000	0.005
12 Months	0.000	0.001	0.000	0.001
24 Months	0.000	0.000	0.000	0.000
	South			
2 Months	0.001	0.184	0.050	0.575
4 Months	0.000	0.112	0.047	0.635
6 Months	0.001	0.178	0.002	0.588
12 Months	0.000	0.107	0.005	0.212
24 Months	0.000	0.025	0.005	0.195
	$P = N$			
	North-Centre			
2 Months	0.000	0.000	0.000	0.000
4 Months	0.000	0.000	0.000	0.000
6 Months	0.000	0.000	0.000	0.000
12 Months	0.000	0.000	0.000	0.000
24 Months	0.000	0.000	0.000	0.000
	South			
2 Months	0.000	0.000	0.000	0.000
4 Months	0.000	0.000	0.000	0.000
6 Months	0.000	0.000	0.000	0.000
12 Months	0.000	0.000	0.000	0.000
24 Months	0.000	0.000	0.000	0.000
Source: authors' elaboration on Istat, Italian LFS longitudinal data.				

Table 8: ILO and re-estimated unemployment rates in Italy, April 2000.

	Men		Women		Total		Total
	Age group 15-34	Age group 35-64	Age group 15-34	Age group 35-64	Age group 15-34	Age group 35-64	
	ILO rates						
North-Centre	7.5	2.2	13.0	5.6	10.0	3.5	6.7
South	30.0	7.8	47.6	16.4	36.6	10.4	21.0
Italy	18.8	5.0	30.3	11.0	23.3	7.0	10.8
	Re-estimated rates						
North-Centre	7.5	2.7	13.0	7.4	10.0	4.6	7.3
South	30.0	10.4	52.3	25.9	38.9	15.6	25.1
Italy	18.8	6.6	32.7	16.7	24.4	10.1	12.7

Source: authors' elaboration on Istat, Italian LFS longitudinal data.

Appendix 1. Sample size

	ECHP							
	Men		Women		Men		Women	
	Age 16-34	Age 35-64	Age 16-34	Age 35-64	Age 16-34	Age 35-64	Age 16-34	Age 35-64
	Germany				Denmark			
ILO Unemployed	187	239	297	415	273	274	351	311
Potentials	33	36	66	99	89	99	218	157
Other inactive pop.	699	1,150	959	2,570	479	774	902	1,453
	Netherlands				Belgium			
ILO Unemployed	264	263	412	573	278	216	439	336
Potentials	84	42	137	161	73	74	136	153
Other inactive pop.	1,018	2,231	1,994	5,983	1,340	1,456	1,747	3,646
	Luxembourg				France			
ILO Unemployed	31	20	43	29	1,183	674	1,550	1,035
Potentials	6	5	15	9	190	136	360	336
Other inactive pop.	188	353	375	786	3,414	3,457	4,787	7,119
	United Kingdom				Ireland			
ILO Unemployed	462	408	278	234	779	596	557	302
Potentials	36	44	66	66	87	84	85	74
Other inactive pop.	309	915	1,015	2,229	1,741	1,456	2,793	6,075
	Italy				Greece			
ILO unemployed	2,982	845	3,390	1,199	982	479	1,645	607
Potentials	521	146	935	542	68	29	171	106
Other inactive pop.	4,422	4,620	6,709	13,138	2,696	2,434	4,686	8,883
	Spain				Portugal			
ILO unemployed	2,542	1,601	3,351	1,708	518	326	732	388
Potentials	231	116	430	299	133	98	314	196
Other inactive pop.	4,386	3,342	6,503	11,558	2,511	2,155	3,846	6,922
	Austria				Finland			
ILO unemployed	203	131	236	207	455	478	461	573
Potentials	46	34	90	82	167	100	195	156
Other inactive pop.	1,082	1,746	1,663	3,886	1,335	1,306	1,743	1,527
	Sweden							
ILO unemployed	487	471	572	485				
Potentials	153	28	187	70				
Other inactive pop.	554	299	602	451				

	Italian LFS			
	Men		Women	
	Age group 15-34	Age group 35-64	Age group 15-34	Age group 35-64
	North-Centre			
ILO unemployed	1,578	762	2,289	1,334
Potentials	542	271	994	859
Other inactive pop.	8,365	11,856	10,923	26,357
	South			
ILO unemployed	3,897	4,003	1,781	1,727
Potentials	1,621	712	2,319	1,162
Other inactive pop.	7,430	4,803	11,896	17,693