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« Employment vulnerability in Europe: Is there a migration effect? »

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Abstract:

One of the most salient evolutions of labour markets in Europe is the increasing number of atypical job contracts (fixed-term contracts, temporary work) and an augmentation of job turnover. These phenomena weaken the relationship between employers and employees. The concept of employment vulnerability may be accurate to describe current evolutions. Our paper provides a set of new indicators of employment vulnerability for European countries. In the context of an important mobility of workers between European countries, emigration could be seen as a way of escaping from employment vulnerability in the country of origin. In this paper, we would like to test this hypothesis by comparing individual levels of employment vulnerability between migrants and native workers. We implement propensity score matching methods on the European Social Survey (2008). Overall, we show that migrants face the same level of employment vulnerability as natives, all other things being equal. But there are strong differences by skill-level. Low-skilled migrants have a lower level of vulnerability mainly because of a lower level of *employer* vulnerability. On contrary, high-skilled migrants face a higher level of vulnerability mainly explained by a higher *job* vulnerability.

Key words: labour market, vulnerability, migration, Europe

JEL codes: F22, R23

Vulnérabilité de l'emploi en Europe: Existe-t-il un Effet Migration?

Résumé :

Une des évolutions importantes du marché du travail en Europe est la hausse du nombre de contrats de travail atypiques (contrats à durée déterminée, travail temporaire) et une hausse de la rotation dans l'emploi. Ces phénomènes affaiblissent la relation entre employeurs et employés. Le concept de vulnérabilité de l'emploi peut être adapté pour décrire ces évolutions. Notre article propose une série d'indicateurs de vulnérabilité de l'emploi pour les pays européens. Dans un contexte de mobilité importante entre travailleurs au sein de l'Union Européenne, l'émigration peut être perçue comme un moyen d'échapper à la vulnérabilité de l'emploi dans son pays d'origine. Nous proposons de tester cette hypothèse en comparant les niveaux individuels de vulnérabilité de l'emploi entre migrants et travailleurs natifs. Nous utilisons la méthode d'appariement par score de propension et les données de *l'European Social Survey* (2008). Nous trouvons que les migrants ont un niveau de vulnérabilité dans l'emploi comparable aux natifs, toutes choses égales par ailleurs. Par contre, nous identifions des différences importantes par niveau de qualification. Les migrants faiblement qualifiés ont un niveau plus faible de vulnérabilité, principalement du fait d'une plus faible vulnérabilité *de l'employeur*. Les migrants qualifiés ont un niveau de vulnérabilité plus élevée du fait d'une vulnérabilité *de l'emploi* plus élevée.

Mots-clefs: Marché du travail, vulnérabilité, migration, Europe

JEL codes: F22, R23

1. INTRODUCTION

Labour market institutions are deeply rooted in long-term historical processes and cultures and thus strongly differ among countries. Despite these differences, during the last decades, a common trend has been observed all around Europe in response to social and economic factors. Among the most salient evolutions on European labour markets, we can cite the increasing number of atypical job contracts and the augmentation of job turnover. The traditional case of an all-life long, full-time and permanent job becomes more and more limited. Possibilities of employment have become much more heterogeneous such as fixed-term contracts, part-time work, temporary work or two part-time jobs.

In this context, the concept of *employment vulnerability* may be accurate to describe current evolutions. If the concept of vulnerability has mainly been developed to analyze vulnerability towards poverty (Cheli and Lemmi 2005, Qizilbash 2003, Ligon and Schechter 2003), increased levels of labour insecurity justify its use for studying the evolution of European labour markets.

In 2004, with the European Union enlargement, migration restrictions decreased. Free workers' mobility is a fundamental principal of the European Union. However, most member states, who feared the consequences of massive immigration, maintain migration restrictions for workers coming from new member states. But other countries such as the United Kingdom, Ireland or Sweden immediately opened their labour markets to workers from new member states. As a consequence, 1.2 million workers migrated between 2004 and 2007 from Eastern Europe (mostly from Slovakia, Poland, Latvia and Lithuania) to these countries (Elsner 2011).

In that context of increased mobility of workers between European countries, emigration can be seen as a way to escape from employment vulnerability at home. Our objective in this paper is to provide an appropriate measurement of employment vulnerability in Europe and to compare individual levels of employment vulnerability between migrants and local workers.

The literature on employment vulnerability is mainly focused on developing countries. The International labour organization (ILO) focuses on own account workers and contributing family workers (ILO, 2010a). Bocquier et al. (2010) propose different indicators of employment vulnerability for seven economic capitals of West Africa. Job insecurity is identified as one major concern for the poor and linkages with poverty are numerous (World Bank 2001).

In developed countries, different reports are focused on various aspects of employment vulnerability and adverse treatment at work. Huston (2006), Pollert and Charlwood (2009) and the TUC commission on vulnerable employment (2008) mainly focus on the level of wages. O'Reagan et al. (2005) and Taylor (2008) analyze labour market's evolution based on the notion of "risk and capacity". Sanders (2003) proposes a multidimensional approach of labour market vulnerability in the Canadian context. Using also a multidimensional approach, Bewley and Forth (2010) argue that the

prevalence of adverse treatment and vulnerable employment have a cyclical component since vulnerability was found to be related to an employee's ease of re-employment. In a recent paper, Bardhan and Tong (2010) focus on occupation vulnerability, defined as the vulnerability of jobs due to adverse economic shocks. But this approach focuses on occupations rather than workers. More generally, this literature can also be related to the one on *quality of employment*¹. The main difference between these two literatures is that the literature on employment quality is more focused on working conditions and the literature on employment vulnerability is more related to job security and unemployment risk.

Very few studies analyze the relationship between migration and employment vulnerability. Some articles mention working conditions as a possible motivation for migration. In a theoretical paper, Stark and Fan (2011) show how workers can choose to migrate and engage in degrading work in order to escape from relative deprivations at home. Baudassé and Bazillier (2010, 2011) show empirically how trade union rights or gender discrimination at home may affect migration. At the institutional level the ILO adopted in 2004 a resolution on a “fair deal for migrant workers in the global economy” calling for a plan of action for labour migration². The ILO multilateral framework on labour migration recognizes as a priority “*the promotion of opportunities for all men and women of working age, including migrant workers, to obtain decent and productive work in conditions of freedom, equity, security and human dignity*” (ILO 2006). The ILO also states that “*many migrant workers do not enjoy decent work, but instead suffer from low wages, unsafe working environments, non-payment of wages, a virtual absence of social protection, denial of freedom of association and workers' rights, discrimination and xenophobia*” (ILO 2010b). Our paper proposes to test if this hypothesis of unsafe working environments for migrants is verified among European countries.

Our paper has several contributions. The first contribution is to propose an extended definition of employment vulnerability and new indicators for European countries, using the European Social Survey (2008). Using multiple correspondence analyses, we identify a factor related to the employer vulnerability and another factor related to the job vulnerability. The combination of these two indexes allows us to define an aggregate index of employment vulnerability available at the individual level.

The second contribution is the comparison of employment vulnerability of migrants and native workers. Propensity score matching techniques are used in order to compare the employment vulnerability of workers with similar individual characteristics, the only difference between them being that some of them are native workers and others are migrants. First, we compare the employment vulnerability between migrants and native workers whatever their country of origin. We find that, all other things being equal, migrants are affected in the same way by employment

¹ See Green (2006), Fernández-Macías and Hurley (2008), Guergoat-Larrivière (2011) for a survey of different approaches and Lavoine et al. (2008) for an analysis of European indicators of work quality.

² Available at http://www.ilo.org/public/english/protection/migrant/download/ilcmig_res-eng.pdf

vulnerability as natives. But this result is very different by level of qualification. In average, we find that low-skilled migrants have a lower level of employment vulnerability than native workers while we find the opposite for high-skilled workers. Second, we want to compare employment vulnerability of workers between the ones that have migrated and the other working in their origin countries. We find comparable results. Low skilled migrants seem to have a lower level of employment vulnerability than similar individuals who work in their origin country. This result is mainly explained by a lower level of *employer* vulnerability. On the contrary, high-skilled migrants face a similar level of the *overall* employment vulnerability than their counterparts in their origin countries. Nevertheless, job vulnerability is higher for migrants.

The following section deals with the measurement of employment vulnerability in Europe. The third section presents the relationship between employment vulnerability and migration. First, we study individual characteristics of migrants in Europe. Second, we compare employment vulnerability of migrants with the one of other workers whatever their country of origin. Third, we compare the situation of workers coming from similar countries, between the ones that have migrated and the other working in their origin countries. Finally, the fourth section concludes the analysis.

2. EMPLOYMENT VULNERABILITY IN EUROPE: MEASUREMENT AND OVERVIEW

a) A brief overview of the concept of employment vulnerability

Vulnerability can be defined as the difficulty for individuals “to manage the risks or cope with the losses and costs associated with the occurrence of risky events or situations” (Bocquier et al. 2010). “Risk” is considered to be related to the likelihood that an individual is exposed to an adverse treatment, whilst “capacity” is considered to be related to their ability to protect themselves from it (O’Regan et al. 2005, Taylor 2008). *Employment* vulnerability is therefore the *risk* of working under inadequate conditions, or “*the risk of lacking decent employment*” (Sparreboom and de Gier 2008, p. 13). The remaining question is how to capture such phenomena.

Three main approaches are used to define employment vulnerability. The first one is developed by the ILO (2010a) and focuses on the population of own-account and unpaid family workers. The second approach focuses on the low level of income and the third approach captures multidimensional aspects of vulnerability at work.

The ILO proposes to measure it through the sum of own-account workers and contributing family workers (ILO 2010a). The ILO however acknowledges the limitation of such index, observing that “*they might be people that carry a high economic risk despite the fact they have a wage and salary*

jobs, and the latter should not be equated to decent work (...) and there can be people in the two vulnerable groups who do not carry a high economic risk, especially in developed economies” (ILO 2010a, p. 18). Sparreboom and de Gier (2008) propose to overcome this limitation by including other dimensions such as illiteracy rates³. The ILO chief of the Employment Trends Unit in 2010, Lawrence Jeff Johnson gives three main characteristics to define vulnerable employment: *“inadequate earnings, low productivity, difficult working conditions that undermine fundamental rights at work”*⁴. Our approach will thus be based on this broader definition.

The second approach focuses on the low level of income. For instance, Hudson (2006) defines vulnerable workers as workers who earn below one third of the median hourly wage and do not have their terms and conditions negotiated by a trade union. Pollert and Charlwood (2009) adopted a similar approach identifying vulnerable workers as those earning below the median hourly earnings and who do not have the support of a trade union. According to this definition, vulnerability is associated with a risk of becoming poor. We will instead focus on the risk of working under inadequate working conditions.

The most satisfying approach is therefore a multidimensional one. Vulnerable employment can be identified by reference to certain employment characteristics related to the risk of lacking decent employment.

According to Bewley and Forth (2010), these characteristics could be grouped into five categories: external labour market, external product market, employer, job and employee. The most informative for the vulnerability of workers are the presence of a written contract, the general climate of employment relations at workplace, the employment contract on limited or unlimited duration. They found that individuals working for family-owned firms or charities were 5.3 percentage points more likely to experience an adverse treatment than those working for private firms or the public sector, while employees of small firms were 12.0 percentage points less likely to report an adverse treatment.

According to Saunders (2003), the most vulnerable individuals are low-paid, “non-standards”, non unionized workers, excluded from collective bargaining, employment protection rights and the national insurance system.

Chaykowski (2005) states that full-time workers are expected to be less vulnerable, all other things being equal, than individuals with non-standard work arrangements (part time, self-employed, and contract workers). The latter also differ in terms of the degree of employment stability they have. The

³ See Sparreboom and Shahnaz (2007) for an application to Pakistan.

⁴ See “Vulnerable employment and poverty on the rise, Interview with ILO chief of Employment Trends Unit”, Lawrence Jeff Johnson, 26 January 2010, available at: http://www.ilo.org/global/about-the-ilo/press-and-media-centre/insight/WCMS_120470/lang--en/index.htm

combination of these two dimensions (ie. type of arrangement and degree of employment stability) defines their overall level of employment vulnerability.

The Commission on vulnerable employment (2008) defines individuals "at high risk of being in vulnerable work" as those who are paid less than £6.50 per hour and who either have no academic qualifications, have non-permanent contracts or work at home, plus all undocumented migrant workers and those working in the informal economy. They thus combine this latter approach related to risks and capacity with the former one related to the level of income.

Here, our analysis will be based on two assumptions. First, we focus on vulnerability of working under inadequate conditions, rather than vulnerability of becoming poor. Our approach will therefore not include characteristics linked to the level of income. Second, this employment vulnerability will be identified through certain employment characteristics that may affect such vulnerability. A multidimensional approach using data analysis will therefore be used.

b) Measuring employment vulnerability

We will use the European Social Survey (ESS) of 2008 to construct vulnerability indices. The ESS is a face-to-face survey conducted systematically, every two years since 2002, among a representative sample of people aged 16 or more, living in European countries as well as in Israel and in the Russian Federation. In the ESS 2008, 56,752 individuals were interviewed. Country frequencies are presented in Appendix 1.

The ESS database includes many useful indicators such as risk factors and individual characteristics (gender, age, marital status, educational background, country of origin, emigration status) and indicators related to work.

To construct the indicator of vulnerability, we retain only individuals with a paid work in the last seven days, hence 27,585 respondents. We select 8 variables according to the characteristics identified by Bewley and Forth (2010): the employment relation, the type of employment contract, the establishment size, the type of organization, the responsibility for supervising other employees, the capacity to decide how is organized the daily work, the capacity to influence policy decisions about activities of the organization and the type of occupation. All variables included in our analysis have between 2 and 10 modalities and each modality has a frequency greater than 1.5%⁵. Variables are described in Appendix 2.

⁵ Excepting for the modality "Armed forces" of the occupation variable.

In order to have a suggestive representation of the interrelations between all these variables, a multiple correspondence analysis (MCA) is applied. MCA is a technique used to reduce multidimensional data sets to lower dimensions, when all the variables used are qualitative. MCA is mathematically defined as an orthogonal linear transformation that projects the data to a new coordinate system (which is made by principal components) in order to obtain the greatest variance explained by this projection of the data.

The projection of data on the first two components preserves 75.5% of the total inertia (51.4% for the first axis and 24.1% for the second axis; Figure 1). On the first axis, the variables that discriminate the most are those linked to the employer (employment contract, employment relation, organization type, establishment size, allowed to influence policy decisions about activities of organization⁶). On the second axis, the variables which discriminate the most are mostly linked directly to the job characteristics (occupation, responsible for supervising other employees, allowed to decide how daily work is organized).

Table 1 - Model Summary

Dimension	Cronbach's Alpha	Variance Accounted For	
	Total (Eigenvalue)	Inertia	Total (Eigenvalue)
1	0.865	4.115	0.514
2	0.550	1.928	0.241
Total		6.043	0.755
Mean	0.765(a)	3.022	0.378

Source: ESS, 2008, authors' calculations.

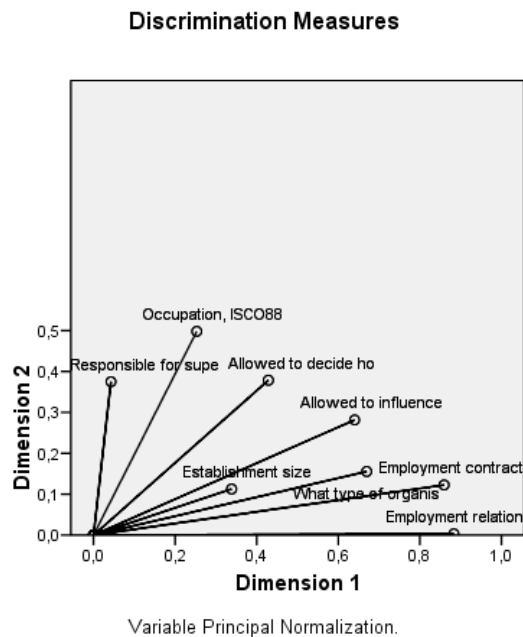
Field: Individuals with a paid work in the last seven days.

Note: a - Mean Cronbach's Alpha is based on the mean Eigenvalue.

⁶

See appendix 2.

Figure 1 - Measures of discrimination



Source: ESS, 2008, authors' calculations.

Field: Individuals with a paid work in the last seven days.

By analyzing the projection of the categories of variables on the first two axes (Figure 2), we observe that self employed and individuals working in their families, as well as employees in establishments with less than 10 employees are represented on the positive side of the first axis. While individuals with limited or unlimited working contracts, working in private or public firms, working in establishments with more than 10 employees are represented on the negative side of the first axis. On the negative side of the second axis there are projected the elementary occupations, plant and machine operators, service workers, shop and market sales, individuals who are not allowed to decide how to organize their daily work, and who are not responsible for supervising other people. On the positive side of the second axis are represented professionals, technicians, people working in the armed forces, allowed to decide how to organize their daily work and responsible for supervising other people.

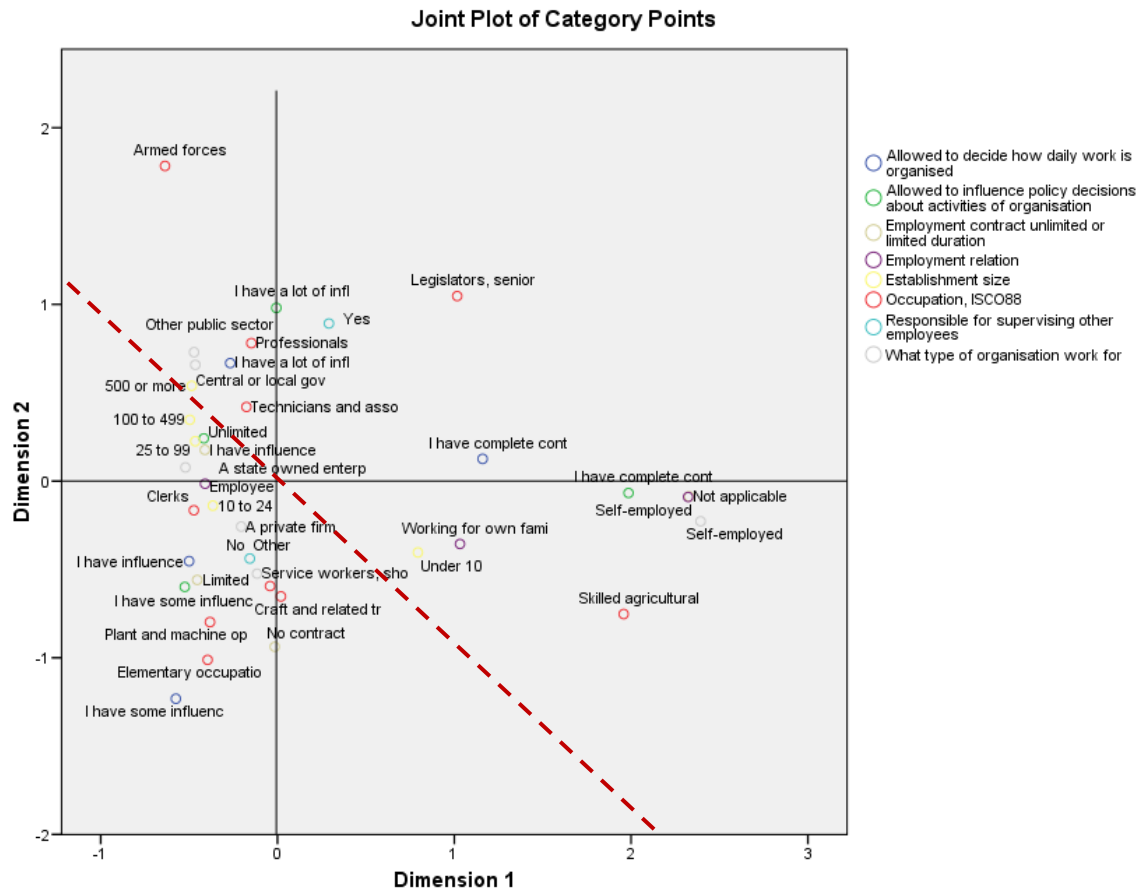
It is worth to notice that the first axis is relatively similar to the employment vulnerability index used by the ILO. Individuals with high coordinates on the first axis are more likely to be own-account workers, and thus considered as vulnerable workers according to the ILO definition. This can be seen as a confirmation of the result of Sparreboom and de Gier (2008) who show that the ILO approach measuring employment vulnerability by the status of employment (own-account and unpaid workers) is relevant. However, we also show that this first index focusing on the employer characteristics

explains 51% of all the information contained in the data. That is why we propose to use a second index related to job characteristics (occupation, level of responsibility, power of decision).

The first axis will be used to construct our EMPLOYER_VULNERABILITY_INDEX. It is defined as the projection on this first axis. The higher is this index, the stronger is employer vulnerability. The variables which contribute the most to the EMPLOYER_VULNERABILITY_INDEX are the *employment relation*, followed by the *employment contract* and by the *type of organization*. This appears since the modality "self employed" of the variables *employment relation* and *type of organization* is associated with the modality "not applicable" of the variable *employment contract*. Being self employed or working in a family business is associated with a small business (with less than 10 individuals).

On the second axis, the degree of vulnerability increases when the value of the projection decreases. In order to get a comparable index, we construct the JOB_VULNERABILITY_INDEX as minus of the projection on the second axis (it is mainly determined by the job characteristics). Therefore, the higher is the value of this index, the stronger is job vulnerability. The variables which contribute the most to this index are "*responsible for supervising other employees*" and "*occupation*". The jobs which imply supervising other employees and occupations such as jobs in armed forces or legislators, managers, professionals, technicians have a vulnerability level close to zero. These are secure jobs, with high salaries and a lot of protective clauses.

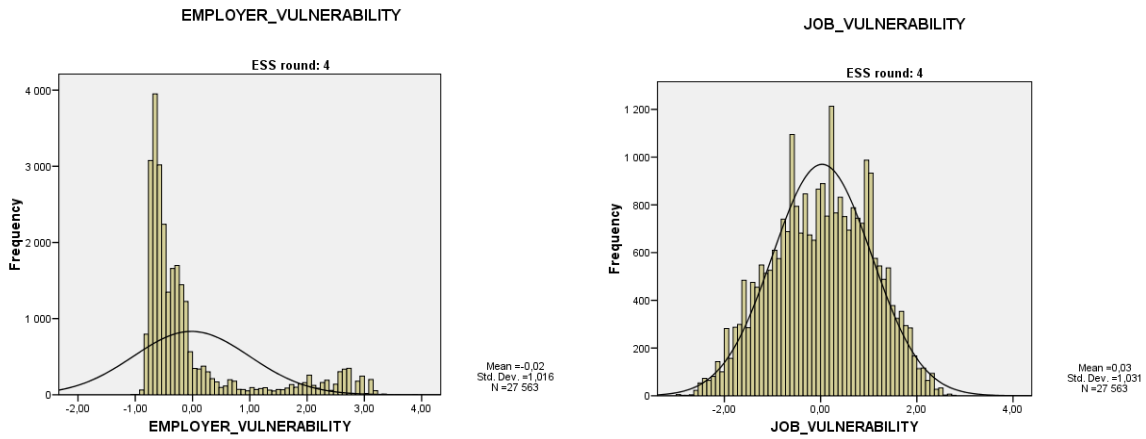
Figure 2 - The projection of the categories of variables on the first two axes



Source: ESS, 2008, authors' calculations.
 Field: Individuals with a paid work in the last seven days.

In order to test the robustness of these two indexes we have plotted their distributions. We observe that the JOB_VULNERABILITY_INDEX has a distribution approaching to the normal distribution and the EMPLOYER_VULNERABILITY_INDEX has a bimodal distribution with the mean approaching zero and the standard deviation approaching 1 (Figure 3).

Figure 3 - Histograms of vulnerability indexes (2008)



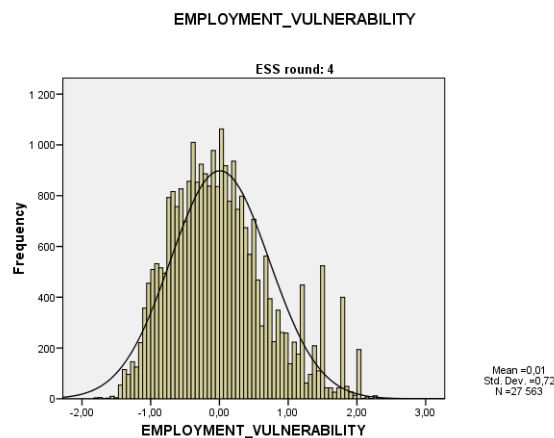
Source: ESS, 2008, authors' calculations. Field: Individuals with a paid work in the last seven days.

In order to obtain a vulnerability index associated to job and employer characteristics, we have projected each modality on the second diagonal. Therefore we obtain the EMPLOYMENT_VULNERABILITY_INDEX:

$$EMPLOYMENT_{VULNERABILITY_INDEX} = \frac{EMPLOYER_{VULNERABILITY_INDEX} + JOB_{VULNERABILITY_INDEX}}{2}$$

The vulnerability increases with the value projected on this new axis. Generally individuals with positive values are vulnerable and those with negative values non-vulnerable. The distribution of this new variable is very close to the normal distribution, with a mean very close to zero and a standard deviation of 0.72 (Figure 4).

Figure 4 - Histograms of the employment vulnerability index (2008)



Source: ESS, 2008, authors' calculations.
Field: Individuals with a paid work in the last seven days.

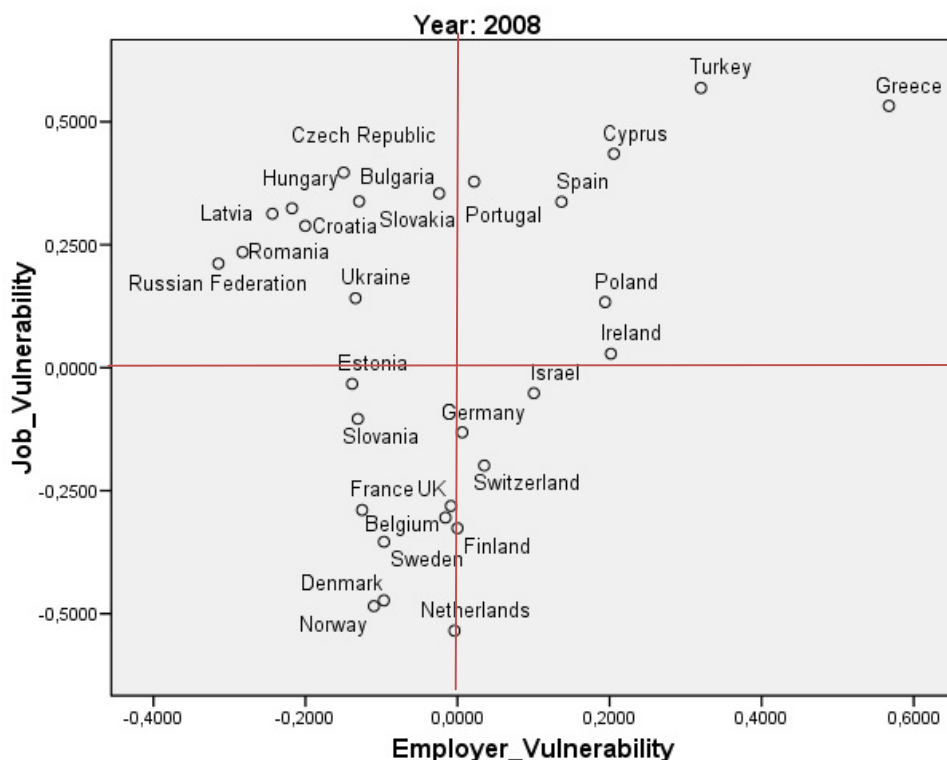
By representing the distributions of the employment vulnerability index for each country and by calculating the mean and the standard deviation, we observe that there are high disparities between countries (Appendix 3). Greece is the country with the highest level of employment vulnerability (an index of 0.55), followed by Turkey (an index of 0.44). These two countries have a very developed touristic industry with a high proportion of employed people in this sector. In general, jobs in the touristic industry are temporary or seasonal; many of people working in this sector work in a family business. This explains the high degree of vulnerability for these countries. On the other hand, Nordic countries have the lowest levels for the employment vulnerability index (Norway with -0.30, Denmark with -0.29, the Netherlands with -0.27 and Sweden with -0.23). These countries are highly industrialized, and the family business or small firms are not very developed. Usually people work in big private or state owned firms.

Figure 5 shows the coordinates on the two axes by country for the years 2008 and 2010. We can distinguish three main groups of countries. The first group is composed by Eastern and Central European countries, with a relatively high level of job vulnerability but a relative lower level of employer vulnerability. This can be explained by the former communist system with rigid labour market institutions. The transition has lead to more flexible labour markets but the structure of jobs is more persistent, which can explain this relatively low level of vulnerability related to the employer.

The second group is characterized by a low level of vulnerability for both job and employer vulnerability. We find in this group all Nordic countries and some continental European countries.

The level of job and employer vulnerability is high in the third group of countries. We find most Mediterranean countries, but also Poland and Ireland.

Figure 5 – Employment vulnerability by country (2008)



Source: ESS, 2008, authors' calculations.
Field: Individuals with a paid work in the last seven days.

3. ARE THERE DIFFERENCES IN EMPLOYMENT VULNERABILITY BETWEEN MIGRANTS AND NATIVES?

In this section, we analyze the relationship between migration and employment vulnerability. We will firstly present descriptive statistics of migrants and native workers. Then, the goal will be to compare native workers and migrants using matching techniques. In order to define matching criteria, we will firstly estimate the determinants of being a migrant.

a) Descriptive statistics on migrants and natives

In order to analyze the relationship between migration and individual employment vulnerability, we use the ESS of 2008. As in the previous section, we retain only individuals with a paid work in the last seven days, hence 27,585 respondents. A migrant is defined as an individual living in another country than his or her country of birth. By including in our analysis only the complete respondents, we work with a sample containing 1,025 migrants and 22,260 natives.

According to previous studies of Elsner (2011) and Davoine *et al.* (2008), we build a classification of countries of birth into three groups :

- *developed European countries*: the old members of the EU (Belgium, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, the Netherlands, Portugal, Sweden, Switzerland and Norway);

- *EU new members* (Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Slovenia, Slovakia)

- *Non EU countries* (Croatia, Israel, Russian Federation, Turkey and Ukraine).

Table 2 presents the characteristics of individuals in our sample. We observe that the most discriminating variables between migrants and natives are the country of birth, the highest level of education, the place of residence and the fact of not being member of a trade union.

Table 2 – Individuals’ characteristics

Characteristics		Migrants	Natives
<i>N° of observations</i>		1,025	22,260
<i>Gender</i>	<i>Female</i>	48.8%	47.7%
<i>Marital status</i>	<i>Married</i>	60.1%	59.7%
<i>Place of residence</i>	<i>Town</i>	75.7%	66.0%
<i>Highest level of education</i>	<i>Low skilled workers</i>	16.4%	18.2%
	<i>Medium skilled workers</i>	35.0%	44.5%
	<i>High skilled workers</i>	48.6%	37.3%
<i>Ever unemployed and seeking work for a period more than three month?</i>	<i>Yes</i>	32.8%	28.3%
<i>Member of trade union or similar organization</i>	<i>Yes, currently</i>	23.6%	26.1%
	<i>Yes, previously</i>	12.9%	16.8%
	<i>No</i>	63.5%	57.1%
<i>Children living at home</i>	<i>Respondent lives with children</i>	47.0%	50.0%
<i>Age of respondent</i>	<i>Less than 25 years old</i>	6.9%	7.6%
	<i>25-44 years old</i>	51.0%	49.9%
	<i>44-64 years old</i>	38.0%	40.5%
	<i>More than 64 years old</i>	4.1%	2.0%
<i>Country of birth</i>	<i>Developed European countries</i>	43.9%	54.8%
	<i>New EU members</i>	22.2%	29.8%
	<i>Other countries</i>	33.9%	15.4%

Source: ESS, 2008, authors’ calculations.

Field: Individuals with a paid work in the last seven days.

Table 3 presents vulnerability indexes for migrants and natives. Overall there are no statistical differences between migrants and natives for the three indexes of vulnerability. In the following section, we study more in depth the differences between migrants and natives.

Table 3 - Vulnerability indexes for migrants and natives

Employment Vulnerability	Emigrants		Natives		Tstat for mean differences
	<i>Mean</i>	<i>Standard deviation</i>	<i>Mean</i>	<i>Standard deviation</i>	

<i>EMPLOYER_VULNERABILITY</i>	-0.055	0.932	-0.003	1.038	-58,05
<i>JOB_VULNERABILITY</i>	0.065	1.083	0.034	1.021	-26,03
<i>EMPLOYMENT_VULNERABILITY</i>	0.005	0.698	0.015	0.726	20,04

Source: ESS, 2008, authors' calculations.

Field: Individuals with a paid work in the last seven days.

b) Econometric strategy

In this paper we implement propensity score matching techniques. Individuals who choose to migrate can make the object of a non-random selection process concerning the emigration phenomenon. This induces a selection bias. To circumvent the selection bias, we estimate evaluation models with matching estimators. They were initially developed by Rubin (1974) in order to study the efficiency of medical treatments. These models were mobilized in economy, in particular to test the efficiency of job training programs.

Let us note T , a binary variable indicating if the individual received or not a treatment ($T = 1$ if the individual is treated, $T = 0$ if not). The efficiency of the treatment is measured through the result Y_i . Thus each individual, has two potential results: y_0 (if $T = 0$) and y_1 (if $T = 1$). y_0 and y_1 are never observed simultaneously, since an individual either is treated, or untreated, but never both at the same time. In other words, only the true health of the individual, noted Y , is observed: $Y = y_1T + y_0(1 - T)$. Only the couple (Y, T) is observed for each individual. Rubin (1974) defines the average treatment effect as the difference between what would be the health of an individual if he was treated and what it would be if he was not: $C = y_1 - y_0$. The average treatment effect is unobservable and individual, and consequently its distribution is not identifiable. If property of independence is respected $(y_0, y_1) \perp T$, there would be no selection bias.

In the majority of cases, the property of independence is not valid. A solution would be to compare the “health” of each individual who received the treatment with the “health” of an identical counterfactual who did not receive the treatment. To identify statistically the counterfactual, an approach consists in building a counterfactual population for which the distribution of a number of observable characteristics (X – matching variables) is the same as for the group receiving the treatment. Consequently, the property of independence is respected conditionally to observed matching criteria $(y_0, y_1) \perp T | X$. When many matching criteria must be taken into account, finding a counterfactual can be problematic. Rubin and Rosenbaum (1983) solved this problem by showing that conditional independence with the X variables was equivalent to the independence compared to the propensity score. The propensity score constitutes a one-dimension summary of the matching variables and it estimates the probability of being exposed to the treatment, conditionally to these

variables. In this work, we use the kernel estimator of Heckman, Ichimura and Todd (1998)⁷. More precisely, we use an Epanechnikov kernel estimator. For the calculation of the kernel estimator for the treated, each non-treated individual takes part in the construction of the counterfactual of the treated individual. The weight of the non-treated in the constitution of the counterfactual is given according to the distance between their score and the score of a treated individual. In order to calculate the standard error for the kernel estimator we implement a bootstrap technique (50 draws).

In this paper we work with two categories of individuals: those who choose to migrate and those who choose to stay in their country of birth. The group of “treatment” contains individuals who migrate and the control group contains natives. Formally, the treatment variable (*migration*) is written:

$$migration = \begin{cases} 1, & \text{if an individual is established in another country than country of birth} \\ 0, & \text{otherwise} \end{cases}$$

Our performance variables (*EMPLOYMENT_VULNERABILITY*, *EMPLOYER_VULNERABILITY* and *JOB_VULNERABILITY*) represent the individuals’ vulnerability on the labour market (see section 2).

Two estimations are performed. First, we compare the employment vulnerability of migrants and natives all over Europe whatever the country of origin for migrants. In this case, we take into account the following matching criteria (the matrix X): gender, age, education level, marital status, number of children in household, unemployment experience, being member of trade union or similar organization and the place of residence. Variables of interest are chosen according to the literature (Pollert, 2008; Chaykowski, 2005; Bewley and Forth, 2010; Saunders, 2003).

Second, we introduce dummy variables for the countries of birth of individuals in order to get a comparison of migrants with similar workers who have decided not to migrate. Therefore we compare individuals who migrated with similar individuals (according to matching criteria) from the group of countries where they were born. Therefore, migrants are compared with identical counterfactuals from the corresponding country group of origin.

⁷ There are several propensity score matching estimators. They differ not only in the way the neighbourhood for each treatment individual is defined and the common support is handled, but also with respect to the weights assigned to these neighbours. Excepting kernel estimators we have globally the following matching methods: nearest neighbour matching, calliper and radius matching and stratification and interval matching. The performance of different matching estimators varies case-by-case and depends largely on the data structure at hand (Zhao, 2000).

These two estimations are performed on three samples: the global sample (23,285 individuals), a subsample containing only low-skilled individuals (4,229 individuals) and a subsample containing high-skilled individuals (8,795 individuals).

c) Differences of employment vulnerability between migrants and native workers all over Europe

In the first step of the econometric strategy, we use a probit model for estimating the probability of being a migrant. Table 4 presents estimates on the global sample. This estimation is necessary to calculate a propensity score for each individual and allows as well the construction of counterfactuals. Excepting for gender, all variables are statistically significant. We note a positive correlation between the age and the probability of being a migrant: Young individuals (i.e. less than 25 years old) have the lowest probability of being migrants and on the contrary, elderly individuals (i.e. more than 64 years old) have the highest probability of being migrants. An interesting result is that high-skilled workers have a higher probability of being migrants in comparison with medium-skilled workers but low-skilled workers have a similar probability of being migrants than medium-skilled individuals. People without children are more mobile than those with children. Being married increases the probability of migration. The unemployment experience seems to have a “positive impact” on migration: individuals with an unemployment experience have a higher probability to be migrants than those without such an experience. Living in an urban area also increases the probability of being a migrant. Finally, individuals who are members of a trade union have a lower probability of being migrants in comparison with people who are not members of a trade union.

Table 4 – The determinants of being an emigrant (probit model)

Variable	Estimation	Standard Error	Significance Level
Intercept	-1.56	0.09	***
Gender (Female)	0.01	0.03	NS
Highest level of education			
- Low skilled workers	0.05	0.04	NS
- Medium skilled workers		Ref.	
- High skilled workers	0.22	0.03	***
Age of respondent			
- <i>Less than 25 years old</i>	-0.42	0.10	***
- <i>25-44 years old</i>	-0.38	0.09	***
- <i>44-64 years old</i>	-0.37	0.09	***
- <i>More than 64 years old</i>		Ref.	
Children living at home (Yes)	-0.06	0.03	*
Ever unemployed (Yes)	0.13	0.03	***
Member of trade union or similar organization			
- <i>Yes, currently</i>	-0.12	0.04	***
- <i>Yes, previously</i>	-0.20	0.04	***
- <i>No</i>		Ref.	
Marital status (Married)	0.06	0.03	*

Place of residence (Town)	0.19	0.03	***
N° observations	23,285		

Field: Individuals with paid work, ESS, 2008

Note: Probit coefficients estimates. * indicates significance at 10%, ** indicates significance at 5%, *** indicates significance at 1% and NS indicates non-significance at 10%.

Table 5 presents the result of the estimation of our performance variables. This is the second step of the model. The comparison between the vulnerability on the labor market of migrants with the employment vulnerability of native workers, releases the following results:

Table 5 – Estimates of the migration effect on employment vulnerability with kernel propensity score estimators

Sample	Performance variable	Number of treated (Migrants)	Number of control (Natives)	Estimator	Std. Error	Sign. level
Global sample	<i>EMPLOYER_VULNERABILITY</i>	1,025	22,260	-0.049	0.032	NS
	<i>JOB_VULNERABILITY</i>	1,025	22,260	0.043	0.034	NS
	<i>EMPLOYMENT_VULNERABILITY</i>	1,025	22,260	-0.003	0.019	NS
Low skilled sample	<i>EMPLOYER_VULNERABILITY</i>	168	4,061	-0.195	0.079	**
	<i>JOB_VULNERABILITY</i>	168	4,061	0.017	0.054	NS
	<i>EMPLOYMENT_VULNERABILITY</i>	168	4,061	-0.089	0.047	*
High skilled sample	<i>EMPLOYER_VULNERABILITY</i>	498	8,297	-0.046	0.040	NS
	<i>JOB_VULNERABILITY</i>	498	8,297	0.187	0.045	***
	<i>EMPLOYMENT_VULNERABILITY</i>	498	8,297	0.070	0.029	**

Field: Individuals with paid work, ESS Round 4, 2008

Matching variables: Gender, Highest level of education, Age, Children living at home, Ever unemployed, Member of Trade Union, Place of residence, Marital status.

Note: * indicates significance at 10%, ** indicates significance at 5%, *** indicates significance at 1% and NS indicates non-significance at 10%.

Overall, on the global sample, results are not statistically significant. If the sample is split in high-skilled and low-skilled workers, some differences appear. While for high-skilled workers employment vulnerability is higher for migrants than for natives, for low-skilled workers, natives are more vulnerable in employment than migrants. Migrants are more likely to be outsiders on the labour market of their destination country. Because of this, they have a lower probability to find a good and permanent job. The result for the employer vulnerability index is not significant at 10% for high-skilled workers. For low-skilled workers, employer vulnerability is lower for migrants than for natives with a significance level of 5%. Differences of expectations between high-skilled and low-skilled workers may explain this result. Employment vulnerability may be a more important factor for low-skilled workers while other conditions may have a stronger impact in the decision of high-skilled workers.

In this section, we find differences of employment vulnerability between native workers and migrants. One cannot exclude that these differences are explained by different migrants' choices of destination countries and differences of vulnerability in these countries. The goal of the next section is to take into

account the origin countries as an additional matching criteria to define “similar workers”. The goal is to compare the situation of migrants with similar workers who have stayed in their origin countries.

d) Differences of employment vulnerability between migrants and similar workers in their origin countries

As for the previous section, in the first step of the econometric strategy, we use a probit model for estimating the probability of being a migrant. Table 6 presents estimates on the global sample. Results are very similar to those presented in table 4. We note that the probability to be a migrant is lower for workers from new EU countries and from old EU countries than for individuals from the category “other countries”.

Table 6 – The determinants of being an emigrant (probit model)

Variable	Estimation	Standard Error	Significance Level
Intercept	-1.14	0.10	***
Country of Birth			
- <i>Developed European countries</i>	-0.46	0.04	***
- <i>New EU members</i>	-0.47	0.04	***
- <i>Other countries</i>	Ref.		
Gender (Female)	0.01	0.03	NS
Highest level of education			
- Low skilled workers	0.06	0.04	NS
- Medium skilled workers	Ref.		
- High skilled workers	0.19	0.03	***
Age of respondent			
- <i>Less than 25 years old</i>	-0.46	0.10	***
- <i>25-44 years old</i>	-0.36	0.09	***
- <i>44-64 years old</i>	-0.35	0.09	***
- <i>More than 64 years old</i>	Ref.		
Children living at home (Yes)	-0.08	0.03	**
Ever unemployed (Yes)	0.13	0.03	***
Member of trade union or similar organization			
- <i>Yes, currently</i>	-0.11	0.04	***
- <i>Yes, previously</i>	-0.23	0.05	***
- <i>No</i>	Ref.		
Marital status (Married)	0.03	0.03	NS
Place of residence (Town)	0.14	0.03	***
N° observations	23,285		

Field: Individuals with paid work, ESS, 2008

Note: Probit coefficients estimates. * indicates significance at 10%, ** indicates significance at 5%, *** indicates significance at 1% and NS indicates non-significance at 10%.

Table 7 presents the result of the estimation of our performance variables. This is the second step of the model. On the global sample, once considering the country of origin as a matching criteria, we find

significant differences only for the employer vulnerability index between migrants and similar workers in their origin countries. More precisely, migrants have a lower employer vulnerability.

The results prove that the employment vulnerability decreases for low-skilled individuals while for the high-skilled individuals, there is no statistical difference in terms of employment vulnerability between migrants and natives. In case of low-skilled workers, the improvement in the situation on the labour market is coming from the employer. Employers are less vulnerable and therefore the individual vulnerability will decrease. In case of high-skilled workers, only job vulnerability increases. But the overall impact on employment vulnerability is not significant.

Table 7 - Estimate of the migration effect on employment vulnerability with kernel propensity score estimators

Sample	Performance variable	Number of treated (Emigrants)	Number of control (Natives)	Estimator	Std. Error	Sign. level
Global sample	<i>EMPLOYER_VULNERABILITY</i>	1,025	22,260	-0,050	0.029	*
	<i>JOB_VULNERABILITY</i>	1,025	22,260	0.036	0.029	NS
	<i>EMPLOYMENT_VULNERABILITY</i>	1,025	22,260	-0.007	0.023	NS
Low skilled sample	<i>EMPLOYER_VULNERABILITY</i>	168	4,061	-0.191	0.079	**
	<i>JOB_VULNERABILITY</i>	168	4,061	-0.048	0.071	NS
	<i>EMPLOYMENT_VULNERABILITY</i>	168	4,061	-0.119	0.038	***
High skilled sample	<i>EMPLOYER_VULNERABILITY</i>	498	8,297	-0.048	0.049	NS
	<i>JOB_VULNERABILITY</i>	498	8,297	0.143	0.056	***
	<i>EMPLOYMENT_VULNERABILITY</i>	498	8,297	0.047	0.032	NS

Field: Individuals with paid work, ESS Round 4, 2008

Matching variables: Country of birth; Gender, Highest level of education, Age, Children living at home, Ever unemployed, Married, Place of residence, Married

Note: * indicates significance at 10%, ** indicates significance at 5%, *** indicates significance at 1% and NS indicates non-significance at 10%.

These results suggest that employment vulnerability in source countries may be a factor of emigration, but only for low-skilled migrants. As employment vulnerability is lower in destination countries for this category of migrants, migration may be seen as a rational strategy to reduce the individual level of vulnerability. It is worth to notice that the main effect is related to the characteristics of the employer. In other words, their probability to find a job with a formal contract is higher than in source countries where their probability to get an informal job is higher. This may explain the lower level of vulnerability.

On the contrary, for high-skilled workers, reducing employment vulnerability cannot be seen as an explanation of migration. The main problem of high-skilled workers in some countries is a limited number of skilled jobs available in the economy. High-skilled workers may decide to migrate in order to find a job more in accordance with their qualification, *even if job vulnerability is higher*. They are ready to accept jobs with more vulnerable characteristics than what they would have found in their

origin countries, if these jobs are more related to the real qualification of the workers. Relative deprivation in source countries may be an alternative explanation of this result. As showed by Stark and Simon Fan (2011), migrants may be willing to accept poor working conditions in destination countries because of relative deprivations. If high-skilled workers believe that all other skilled workers will choose to accept “bad jobs” in destination countries, this belief will be self-fulfilling. The main explanation is that these workers do not want to feel deprived if they decide to not migrate if all similar workers make the other choice. In that case, they may *choose* to migrate, even if they know that their employment vulnerability will be higher in their destination country.

Another explanation of the result is that high-skilled migrants are concerned by long-term achievements while low-skilled workers are more likely to be influenced by present outcomes. Highly qualified people are interested in stable jobs, future career and professional performance, while unskilled migrants are interested in income no matter what work they carry on. Therefore the risks associated with the emigration decision depend on the level of education and socio-economic environment: the employment risk is inversely proportional to the level of qualification and the living condition risk is directly proportional to the level of qualification.

CONCLUSION

We propose in this paper new indexes measuring employment vulnerability. When defining such jobs, ILO focuses only on own-account and unpaid jobs. However, the ILO characterizes vulnerable employments by “*inadequate earnings, low productivity, difficult working conditions that undermine fundamental rights-at-work*”. Following this approach, we argue that vulnerability at work is fundamentally a multidimensional phenomenon. That’s why we propose to measure it through different dimensions, such as the type of contract, the labour relation, the type of firm or the occupation. Doing so, we identify two main characteristics of vulnerability. The first one relates to employer characteristics. This dimension is close to the definition given by the ILO as self-employed workers who are more likely to be vulnerable according to this dimension. The second dimension is related to job characteristics.

The second main contribution of the study is linkage between employment vulnerability and migration. First, we show that there is no significant difference between employment vulnerability in destination countries than the one of similar workers coming from similar countries. In other words, because source countries are more likely to have an overall higher level of employment vulnerability, migrants do not see many changes when they migrate. But in case of high skilled workers, we show that migrants are more likely to be vulnerable workers than local workers. This can be explained by their situation of outsiders on such labour markets which impedes them to find good and permanent jobs.

But this latter result hides one important difference linked to the skill-level of migrants. We find that low-skilled workers face a lower level of employment vulnerability when they migrate while we observe the contrary for high-skilled workers. This result shows that migration can be seen as a rational strategy to decrease individual level of employment vulnerability for low-skilled workers. For high-skilled workers, migration tends to increase the observed level of job vulnerability. The limited number of skilled jobs in source countries or the fear of relative deprivation may explain why skilled migrants decide to migrate, knowing that they will have higher level of job vulnerability in their destination country.

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Appendix 1 - Country frequencies

Country	Frequency Total sampled population	Frequency Subsample: individuals with a paid work
Belgium	1,760	883
Bulgaria	2,230	997
Switzerland	1,819	1,003
Cyprus	1,215	685
Czech Republic	2,018	1,099
Germany	2,751	1,415
Denmark	1,610	911
Estonia	1,661	885
Spain	2,576	1,348
Finland	2,195	1,169
France	2,073	1,050
United Kingdom	2,352	1,192
Greece	2,072	1,174
Croatia	1,484	571
Hungary	1,544	632
Ireland	1,764	780
Israel	2,490	1,198
Latvia	1,980	896
Netherlands	1,778	920
Norway	1,549	971
Poland	1,619	760
Portugal	2,367	955
Romania	2,146	917
Russian Federation	2,512	1,314
Sweden	1,830	1,112
Slovenia	1,286	584
Slovakia	1,810	823
Turkey	2,416	588
Ukraine	1,845	753
Total	56,752	27,585

Source: ESS, 2008, authors' calculations.

Appendix 2 - Variables used in the construction of employment vulnerability measure

Variable	Frequency	Percent	Valid percent
<i>Employment relation</i>	27585	100	100
- Employee	23365	84.7	85.0
- Self employed	3700	13.4	13.5
- Working for own family business	438	1.6	1.6
- Missing values	82	0.3	-
<i>Employment contract unlimited or limited duration</i>	27585	100	100
- Unlimited	18394	66.7	67.4
- Limited	3191	11.6	11.7
- No contract	2031	7.4	7.4
- Not applicable	3678	13.3	13.5
- Missing values	291	1.1	-
<i>Establishment size</i>	27585	100	100
- Under 10	9212	33.4	34.6
- 10 to 24	5087	18.4	19.1
- 25 to 99	5953	21.6	22.3
- 100 to 499	3825	13.9	14.4
- 500 or more	2563	9.3	9.6
- Missing values	945	3.4	-
<i>What type of organization work for?</i>	27585	100	100
- Central or local government	2699	9.8	10.2
- Other public sector (such as education and health)	3353	12.2	12.6
- A state owned enterprise	1876	6.8	7.1
- A private firm	15205	55.1	57.3
- Self employed	2788	10.1	10.5
- Other	624	2.3	2.4
- Missing values	1040	3.8	-
<i>Responsible for supervising other employees</i>	27585	100	100
- Yes	8395	30.4	30.6
- No	19036	69.0	69.4
- Missing values	154	0.6	-
<i>Allowed to decide how daily work is organized (scale from 0 to 10)</i>	27585	100	100
- I have no influence (0)	2680	9.7	9.9
- I have some influence (1-3)	3265	11.8	12.0
- I have influence (4-6)	4853	17.6	17.9
- I have a lot of influence (7-9)	9831	35.6	36.2
- I have complete control (10)	6553	23.8	24.1
- Missing values	403	1.5	-
<i>Allowed to influence policy decisions about activities of organization (scale from 0 to 10)</i>	27585	100	100
- I have no influence (0)	5931	21.5	22.1
- I have some influence (1-3)	5885	21.3	21.9
- I have influence (4-6)	5715	20.7	21.3
- I have a lot of influence (7-9)	5512	20.0	20.5
- I have complete control (10)	3813	13.8	14.2
- Missing values	729	2.6	-
<i>Which occupation do you have? (ISCO88)</i>	27585	100	100
- Armed forces (100)	80	0.3	0.3
- Legislators, senior officials and managers (1000)	2679	9.7	9.9
- Professionals (2000)	4702	17.0	17.4
- Technicians and associate professionals (3000)	4641	16.8	17.2
- Clerks (4000)	2515	9.1	9.3
- Service workers, shop, market sales workers (5000)	4024	14.6	14.9
- Skilled agricultural and fishery workers (6000)	709	2.6	2.6
- Craft and related trades workers (7000)	3388	12.3	12.6
- Plant and machine operators and assemblers (8000)	2121	7.7	7.9
- Elementary occupations (9000)	2119	7.7	7.9
- Missing	607	2.2	-

Source: ESS, 2008, authors' calculations.
 Field: Individuals with a paid work in the last seven days.

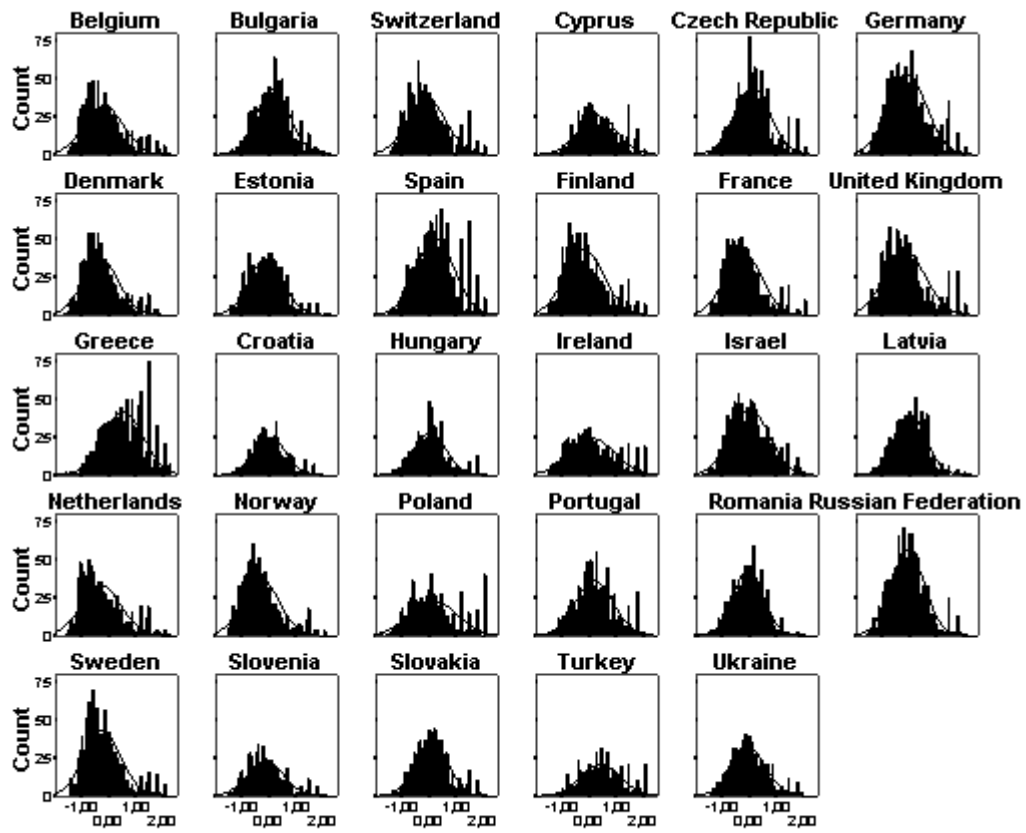
Appendix 3 - EMPLOYMENT_VULNERABILITY_INDEX by country

A. Descriptive statistics of EMPLOYMENT_VULNERABILITY_INDEX by country

Country	Mean	Standard deviation
Belgium	-0.174	0.725
Bulgaria	0.165	0.612
Switzerland	-0.082	0.708
Cyprus	0.32	0.71
Czech Republic	0.123	0.654
Germany	-0.06	0.720
Denmark	-0.285	0.657
Estonia	-0.086	0.631
Spain	0.237	0.708
Finland	-0.163	0.722
France	-0.207	0.679
United Kingdom	-0.145	0.754
Greece	0.549	0.750
Croatia	0.044	0.595
Hungary	0.053	0.609
Ireland	0.115	0.844
Israel	0.026	0.724
Latvia	0.035	0.594
Netherlands	-0.269	0.733
Norway	-0.297	0.675
Poland	0.164	0.865
Portugal	0.200	0.696
Romania	-0.024	0.555
Russian Federation	-0.051	0.622
Sweden	-0.225	0.685
Slovenia	-0.117	0.663
Slovakia	0.104	0.602
Turkey	0.444	0.733
Ukraine	0.004	0.644
Total	0.01	0.72

Source: ESS, 2008, authors' calculations.
 Field: Individuals with a paid work in the last seven days.

B. Distribution of EMPLOYMENT_VULNERABILITY_INDEX by country



Source: ESS, 2008, authors' calculations.
Field: Individuals with a paid work in the last seven days.