UNIVERSITY OF AMSTERDAM

# POSTED WORKERS: COMPLEMENTS OR SUBSTITUTES FOR LOCAL EMPLOYMENT? EMPIRICAL EVIDENCE FROM THE EU

Lucia Dalla Pellegrina

Margherita Saraceno

Amsterdam Law School Legal Studies Research Paper No. 2013-34

Amsterdam Center for Law & Economics Working Paper Paper No. 2013-08

Paolo Baffi Centre Research Paper No. 2013-136

Università Commerciale
Luigi Bocconi

**“Paolo Baffi” Centre on Central Banking and Financial Regulation**

“Paolo Baffi” Centre Research Paper Series No. 2013-136

# Posted workers: complements or substitutes for local employment? Empirical evidence from the EU

By
Lucia Dalla Pellegrina
and
Margherita Saraceno

# Posted workers: complements or substitutes for local employment?
## Empirical evidence from the EU

Lucia dalla Pellegrina[♣] and Margherita Saraceno[♠]

**June, 2013**


## Abstract

This paper investigates the effects of the intra-European posting of workers on domestic labour markets in the years 2007-2009. Instrumental variables related to migrant labour and neighbouring countries' populations are used to address the endogeneity between posting and labour market features. Contrary to conventional wisdom, we find that an intensification of posting inflows is not likely to displace domestic workers. Instead, an increase in posting from abroad may rise both domestic labour costs and productivity. Results point toward the complementarity between domestic and posted workers, so that posting can actually improve labour efficiency and put upward pressure on labour costs.


*JEL classification:* K31, K33.

*Keywords:* Posting of Workers Directive, employment, displacement, labour cost, productivity.

♣ DEMS, University of Milano-Bicocca and "Paolo Baffi" Center, Università Bocconi. Piazza dell'Ateneo Nuovo 1, Ed. U6, 20126 Milano, Italy. lucia.dallapellegrina@unibocconi.it

♠ DEMS, University of Milano-Bicocca and Amsterdam Center for Law and Economics, University of Amsterdam. Roetersstraat 11, 1018 WB Amsterdam, Netherlands. Phone: +31 (0)20 525 7164 Fax: +31 (0)20 525 5318; m.saraceno@uva.nl

This research was supported by a Marie Curie Intra European Fellowship within the 7th European Community Framework Programme and by "Paolo Baffi" Center, Università Bocconi. We are grateful to Filippo Belloc, Paolo Mariani, Ismeri Europa, participants at the ISLE-Conference (Torino, 2011) and at seminars at the Department of Statistics, University of Milano-Bicocca. The usual disclaimer applies.

## 1. Introduction

Every year across the European Union, around one million workers are posted by their employers to other member countries, where they provide their labour services on a temporary basis. Posted workers represent a vital factor in the development of the cross-border provision of services.

The European Directive 96/71/EC, also known as the "Posting of Workers Directive", regulates this phenomenon and was introduced with the primary aim of fostering the transnational provision of services, while providing a core of protection for the workers being posted.

Although the Directive sought to enhance workers' protection, criticism has been expressed mainly by trade unions about posting as it is currently regulated (see ETUC, 2010). In fact, current opinion postulates that this transnational legal tool is exerting downward pressure on wages and working conditions in receiving countries and, above all, adverse displacement effects for domestic workers (Barnard 2000; Cremers 2010; Kvist 2004). In particular, posting from low-labour cost countries to high-labour cost economies, is alleged to reduce domestic employment.

Although posting favours the development of the European single market of services and finally supports economic growth at the European level with positive spillovers on consumption and employment, social conflicts have emerged around the issue of competition for jobs between posted and indigenous workers – e.g. the well-known case of posting to the Lindsey oil refinery in the UK (Barnard 2009a and 2009b) and other cases filed in front of the European Court of Justice such as the *Rush Portuguesa* (1990), *Arblade* (1999), *Portugaia Construções* (2002).

The debate between scholars, social partners (labour unions and employers' associations), and policymakers on posting has raged again vividly when, since the Single Market Act of April 2011, the European Commission has renewed efforts to frame the phenomenon.[i] Furthermore, in March 2012, the European Commission has publicly released a number of new proposals concerning the posting of workers at the EU level[ii]. Understanding posting and its actual effects is particularly important since these proposals are substantially aimed at reinforcing the regulatory framework as provided by the Directive 96/71/EC.

In particular, while the positive effects of posting in terms of market integration and business development are unquestionable, measuring the effects of posting on the domestic labour market of receiving countries needs further investigation in order to clarify whether it actually has a negative effect by displacing domestic workers, or, conversely, it has a positive effect on receiving labour markets, or it has a non-significant effect.

We provide an empirical study based on data collected for the years 2007-2009 from EUROSTAT and the EC Reports on E101 certificates issued by member states. We estimate the effect of increasing incoming posted workers from abroad on the local employment rate, as well as on hourly labour costs and workers' productivity. We initially estimate our model by means of Fixed-Effects Least Squares. However, identification problems arise due to the presence of possible non-measurable features common to the inflow of posted workers and labour market variables. Such type of endogeneity is addressed by using instrumental variables related to both the stock of migrants settled in each receiving country, and the relative dimension of neighbouring countries as measured by population.

We find that, in general, workers posted from other EU member states are not associated with a decrease in employment rate of receiving countries, whereas posted workers are likely to stimulate local workers' productivity and increase labour cost. Drawing from the literature on the effects of migrant workers on local labour markets, we interpret this evidence by arguing that in several cases posted workers are likely to represent a complementary factor with respect to the domestic labour force. Therefore, in our specific case, complementarity between posted and local workers can actually improve labour force allocation and efficiency. Such findings oppose to the anecdotal view that portrays posting as a threat to domestic workers. In fact, to some extent they provide support for the continuation of policy actions facilitating intra-European posting.

The next Section frames the phenomenon and its regulation. Section 3 provides descriptive evidence on posting and gives an overview of the dataset used for the empirical analysis. Section 4 presents the empirical analysis on the effects of posting on employment and other labour market indicators in receiving countries. Section 5 discusses the econometric results. Section 6 contains our conclusions in terms of policy implications.

## 2. The posting of workers

A posted worker is a worker who temporarily carries out her work in a member state other than the one in which she normally works. Therefore the definition of a posted worker does not include migrants. Posted workers typically provide their services to another country on a temporary basis, while being regularly employed in their home country, whereas migrants usually move to another country in order to seek a new job. Therefore migrants are included in the labour force of the country where they decide to seek permanent employment and, when they hold a job, in the number of employed people of the country where they work.

Finally, the difference between migrants and posted workers is that the former are permanently employed at the conditions of native workers, while the latter works temporarily in a given country, while being employed in another county. Such asymmetry makes posting a sensitive issue, because, as they provide transnational services, posted workers are in fact participating in the labour market of the receiving country, without actually "belonging" to it.

### 2.1 The Directive 1996/71/EC

On a normative ground, policymakers were aware of the necessity of regulating intra-European posting on the basis of the "correct" balance between strengthening the Single Marker and protecting the rights of workers (both domestic and posted). The Posting of Workers Directive has been introduced with the explicit aim of reconciling the fundamental freedom to provide cross-border services as per Article 56 TFEU, while ensuring the adequate protection of the rights of workers who are temporarily posted abroad (van Hoek & Houwerzijl 2011).

Before the introduction of the Posting of Workers Directive (1996/71/EC) in 1996, most member states required the full application of their national labour law to posted workers. Although the territorial application of labour law ensured equality of treatment for employees working within a country, this system obviously resulted in serious obstacles for non-national European firms operating in the transnational provision of services.

The Directive, instead, establishes a common regulatory framework which favours the transnational supply of services across the EU by allowing posting firms to apply their national labour laws to posted workers, provided that posted workers are protected by a core of minimum provisions applicable in the receiving country where posting occurs, as long as such rules provide better conditions than those warranted in the sending country (Art. 3.7). This was the compromise reached between the need to facilitate the transnational provision of services and the need to protect workers, so as to avoid a "race to the bottom" with respect to working conditions (Davies 2002; Giese 2003; Kolehmainen 1999; Pallini & Pedersini 2010).

The Directive regulates different situations involved in the posting of workers. According to article 1.3, posting occurs when, under the framework of the transnational provision of services, firms established in a member state post workers to the territory of another member state under a contract signed between the posting firm and the party for whom the service is provided (Art. 1.3 (a)), or to an establishment or a firm which is owned by the group and is located in a member state different form the country where employees usually work (Art. 1.3(b)). Posting occurs also when temporary employment firms or placement agencies located in a certain country hire out workers to a user firm established or operating in another member state (Art. 1.3(c)).

While the Directive establishes the "country of origin principle" for firms temporarily providing cross-border services, Art. 3.1 defines a nucleus of mandatory rules for minimum protection to be observed in the host country by employers posting workers. In addition, in some specific cases, Art. 3.10 allows member states to enlarge this core of mandatory rules. However the *Luxembourg* decision (319/06) has strongly restricted the applicability of this provision.

Although the Directive helps to identify the legal definition of posting and protects posted workers, intra-European posting remains controversial. European Court rulings[iii] show that posting and its regulation are hotly debated issues, since it is critical to strike the right balance between the need to favour the transnational provision of services and the intention of preserving labour laws and industrial relations as established in receiving countries.

In fact, the Directive has created a grey area of legal uncertainty (Pallini & Pedersini 2010) that can easily lead to violations of posted workers' rights, resulting in social dumping against domestic workers. In addition, implementation and enforcement of the Directive – though supported by several actions taken by the European Commission like Communications and Recommendations[iv] – remain wanting due to the lack of monitoring tools and sanctions in case of abuse. This can lead to practices that both undermine rights of posted workers and create unfair competition between domestic firms and posting firms operating on the same market (Cremers 2010; van Hoek & Houwerzij 2011). Unions often denounce these situations and are concerned by the not fully effective protection of posted workers' rights.

These difficulties have projected a negative image of the posting of workers. Therefore the legislative interventions recently proposed by the Commission go towards improving implementation and enforcement, so as to reduce abuses related to posting and increase protection for workers.[v] However, the perception of posting – even when legal and "fair" – as undermining domestic employment and working conditions in receiving countries may well be an enduring image in the mind of the public.

### 2.2 The economics of posting

From an economic perspective, the posting of workers abroad is fundamental to guarantee the transnational activity of service providers. Although there is dearth of systematic information on EU postings (on workers' skills, duration, education, gender, age, etc.), according to the European Commission posting is usually used for short-term projects. Obviously, activities involving labour mobility at the transnational level typically engage posted workers. Transport and shipping, for instance, represent around 25% of total postings in Europe (EC 2010). However, posting of workers is frequent in other sectors such as construction (26% of total posting in Europe in 2007), financial services (10% of posting in 2007) and in health care and social work (4% of posting in Europe in 2007).[vi]

As a way of providing transnational services, posting represents an opportunity for business expansion and market entry for sending firms. According to Idea Consult (2011) and Ismeri Europa (2012),

posting is strongly correlated with the economic cycle. As a matter of fact, a constant decrease in the total number of posted workers is observable during the economic recession of 2007-2009.

According to European Commission statistics, there are relatively few European workers posted across the Union: on average they account for 2.27% of employment in the industry and services of sending countries. From a recipient country's perspective, intra-European posting represents an even smaller phenomenon compared to the size of local population (0.42% on average) and local labour force (0.90% on average). Nonetheless, the assumptions on the implications of the impact of posting on local labour markets are questionable.

On the one hand, posting can represent a solution for skill and labour shortages in receiving countries (Idea Consult 2011; Ismeri Europa 2012). Posting can also increase the efficiency of firms demanding posted workers' services. In particular, domestic enterprises buying services from foreign firms that are posting their workers can benefit from skills which would be lacking otherwise. They may also take advantage of possibly lower labour costs and a higher degree of flexibility. At the same time, since employment creation in the European Union heavily relies on the development of the market for services, posting may effectively contribute to support job creation in such sector (Arnold & Wörgötter 2009; Bertola & Mola 2010; de Bruijna et al. 2008; El Khoury & Savvides 2006; Monti 2010).

On the other hand, when domestic workers can be substituted by posted ones, posting may cause displacement effects in recipient labour markets and can make the proverbial "fear of the Polish plumber"[vii] a real concern.

Displacement issues related to the posting of workers are similar to those rising in the debate about immigration effects on the labour market. Although posting and migration are very different phenomena, the literature on migrant workers provides a useful framework to discuss potential displacement effects of posting. However, the insights provided by this strand of literature should be adapted carefully to our framework, since in the case of posting working conditions of domestic and posted workers are not necessarily the same and cannot be easily equalized.

For example, as highlighted by Friedberg and Hunt (1995) in their comprehensive overview, theoretical predictions concerning the impact of immigration on domestic labour markets strongly depend upon the degree of substitutability between immigrant and native workers. The degree of substitutability becomes relevant in models where factor price equalization among countries is somehow hampered, so that barriers make economies not perfectly open. Although the European Union has a high degree of integration among economies, factor price equalization is far from being realized. Therefore, both labour costs and working conditions still exhibit significant cross-country differences.

In this kind of models, migrants can displace domestic workers only if they are perfect substitutes. Such a phenomenon puts downward pressure on domestic labour standards. On the other hand, if they are imperfect substitutes, migrants have an ambiguous effect on both domestic employment and factor prices. Finally, migrant workers can raise domestic employment and local working conditions when they are complements to local workers. Typically, skills (including education and work experience) are the most important elements influencing the degree of substitutability among workers (see among others Card 2001 and Borjas 2003). In fact, different levels of education and/or work experience make workers imperfect substitutes or even complements in activities where both skilled and unskilled workers are necessary (Longhi et al. 2006).

Another important feature affecting employment is unquestionably the business cycle through its impact on the demand of production factors. However, the impact of booms and busts on labour demand largely depends on the substitutability of required skills. In particular, suppose that one country engages in the production of some innovative services involving the massive use of skilled workers, whereas another country operates in mature industries where ordinary skills are required. Given a general and identical increase in labour demand, worker inflows from abroad are likely to imply more displacement in the latter country since substitutability between incoming and domestic workers is typically higher compared to the former country.

To our knowledge, no theoretical contribution provides models that specifically address the posting of workers. However, drawing from the insights described above we may conclude that the law of supply

and demand has ambiguous implications also for the effects of posting on short-run labour market conditions. A very simple and parsimonious labour supply-demand framework can be therefore outlined to grasp the main factors driving the expected effects of posting on domestic employment.

We assume that production takes place using only labour. Without posting, in equilibrium, we expect that production (*gdp*) would be a good proxy for labour demand, while employment reflects actual supply in the receiving country. Now, suppose that in the receiving country posted workers represent an additional source of labour supply (note that the output directly produced by them contributes to the GDP of their own country and not to the GDP of the receiving one). When domestic and posted workers are substitutes, given the labour demand, we expect a negative impact of posting on domestic employment. When instead the demand of labour/production is expanding there might be an ambiguous impact of posting on domestic employment. Conversely, when domestic and posted workers are complements we always expect a positive influence on domestic employment. This effect should be larger, the larger the increase in labour demand.

Summarizing, the simple conceptual framework guiding our empirical analysis is as follows: $D(gdp) = S(empl, posting)$, where $D$ is labour demand which positively depends upon *gdp*, while labour supply $S$ combines domestic employment and posting as factors that can be either perfect/imperfect substitutes or complements. In particular, the empirical analysis focuses on domestic employment as the dependent variable, therefore:

$$empl = f(gdp, posting)$$

where $\frac{\partial empl}{\partial gdp}$ is expected to take positive sign, while $\frac{\partial empl}{\partial posting}$ depends on how the local and posted labour forces combine as production factors. A negative sign of the derivative would indicate displacement due to substitution effects. A positive coefficient would suggest that posting sustains employment by being a complement for domestic workers. At the aggregate level, then, in the absence of detailed information about the degree of substitutability between local and posted workers, controlling for workers' skills becomes particularly important.

The arguments above suggest that the effects of posting on employment in receiving countries must be closely analysed in order to evaluate its potential and limits. In light of the discussion above, the issue becomes entirely empirical. In the next sections we provide a descriptive and econometric investigation of the effects that posting has on employment in receiving EU countries. In order to have a more complete framework of the general effects of posting on receiving labour markets, our empirical analysis also devotes attention to the effects of posting on labour costs and productivity.

Since labour cost includes non-wage components and varies significantly across countries (Babecký & Dybczak 2012), it is a determinant of international competitiveness. Labour cost is typically perceived as the most threatening displacement element for domestic workers who fear the competition of workers posted from relatively low-labour-cost countries. In addition, posting is often accused by workers and trade unions to undercut labour standards of local employees.

Productivity is investigated for several reasons. First of all, it is a revealing indicator of welfare since it represents a dynamic measure of economic growth, competitiveness, and living standards within an economy (Freeman 2008). In addition, although labour cost and productivity are positively correlated, we investigate them under the reliable hypothesis that the labour market is not competitive in all sectors and that non-wage costs are quite volatile across countries. Finally, productivity can also be interpreted as a measure of efficiency in labour force allocation. Figure A1, A2, and A3 in Appendix show respectively the employment rate, the labour cost in industry and services, and the productivity across EU (average for years 2007-2009).

## 3. Description of the dataset

The dataset consists of a panel containing yearly information on the 27 EU countries for the 2007-2009 period. The number of observations is 81. Data have been collected from different sources, mostly EUROSTAT and the Reports of the European Commission on E101 certificates issued in 2007, 2008, and 2009.

Concerning posting, the main statistical source of information is represented by E101 certificates. These are collected by the European Commission (EC 2010 and 2011). E101 forms are not directly

linked to the implementation of the Posting of Workers Directive, since in principle they were conceived in order to preserve social security coordination between member states. According to the EU regulation, posted workers should normally apply for a E101. However, E101 certificates almost certainly underestimate the overall number of posted workers since many employers do not comply with the obligation of communication for social security purposes and thus not fill in the E101. Nevertheless, we have reason to suspect that the number of certificates (postings, hereafter) is a good proxy of the actual number of posted workers although there are no reliable evaluations regarding the exact percentage they correspond to.

Despite these limitations, E101 forms provide the only available portrait of the distribution of posting across European countries. Data on E101 certificates by country (sending and receiving) are available from 2005 to 2009, but their reliability seems to be limited to 2007-2009 data (EC 2010). No other data are available for comparative purposes, especially at a more disaggregated level. In fact, only in a limited number of countries[viii], data on postings are collected at a national level. National data, in particular, are non-comparable across countries because they are collected according to different criteria and for different purposes. As matter of fact, in each of these countries, comparisons between E101 certificates and national data on posting show discrepancies of a different extent (see Idea Consult 2011).

Details on yearly postings from each EU country to other member states in years 2007-2009 are reported in Table 1. As one can see, for instance, a representative EU member state received on average 535 yearly postings from Austria, 1799 from Belgium, 168 from Bulgaria, etc.

Figure 1 shows the average number of postings for every 100 inhabitants sent in the 2007-2009 three-year period by each given country to all other member states. Data show cross-country variability although posting represents a small share of population, averaging 1.03 (0.34 excluding Luxembourg), and ranging from 0.01 per cent (Cyprus) to 1.35 per cent (Slovenia). Figure 2, instead, illustrates total posted workers received by each country for every 100 inhabitants. The number of yearly incoming postings in the period 2007-2009 is on average 0.42 per cent of population (0.22 excluding Luxembourg), ranging from 0.04 per cent of Poland to 0.96 per cent of Belgium.

It is interesting to compare the information provided by Figure 1 and Figure 2. On the one hand, there are countries, such as Poland, which for reasons of sheer size post many workers while receiving few of them compared to the size of their own labour market. On the other hand, active economies, such as France and Germany, are characterized by substantial dynamics inflows and outflows of posted employees. Therefore, the mere fact that a country posts many workers has little to do with the extent to which received workers have an effect on domestic employment and vice versa. Finally, note that Luxembourg does not appear in the figures because it is a major outlier, since it sends and receives an impressive number of workers compared to its population (18.99% and 5.49%, respectively).

**[INSERT TABLE 1]**

**[INSERT FIGURE 1]**

**[INSERT FIGURE 2]**

In the empirical analysis that follows we focus on the effects of received postings on domestic labour markets. In particular, we evaluate the impact of posting from other EU countries on domestic employment, as measured by the share of employed individuals on total labour force (*empl*). It is worth stressing that, for a given country, our measure of domestic employment includes foreign and migrant workers who are regularly employed in that country. As alternatives to the employment rate, other labour market indicators such as hourly labour costs in industry and services (*lc*) and productivity per hour worked (*prod*) are considered as dependent variables.

For the sake of reliability, in the empirical analysis we need to control for other relevant elements affecting employment, in addition to the effect of the intensity of posting. [ix]

According to the discussion in Section 2 one set of covariates is represented by measures of countries' aggregate production. We first consider real GDP (*gdp_defl*) at 2000 constant prices. Then we consider country population (*pop*) as a scale factor. We also use per capita GDP (*gdp_pop*) as a traditional measure of a country's welfare.

Another important covariate is an indicator of educational attainment by the population in employment. The level of education of the labour force is measured by the percentage of employed

workers having attained tertiary education (*edu*).[x] The latter corresponds to levels 5-6 of ISCED (1997). In our context, the education of labour force represents a proxy of a country's stock of skills. In particular, the "stock of skills" existing in receiving countries should capture the degree of substitutability between domestic and posted workers. For example, countries with relatively high levels of education compared to other EU members should be characterized by larger high-skill-intensive sectors. In countries exhibiting high levels of education, average-skilled workers posted from abroad should represent mainly complements – or at least imperfect substitutes – for the local labour force.

Finally, since we carry out our analysis considering the period where the effects of financial crisis on the real economy were at their highest, we account for the possible incidence of the recession on labour market outcomes by including a time trend (*year*). Country fixed-effects are always used.

Summary statistics concerning the variables described above are reported in Table 1. Sources and description of all variables are reported in the Appendix (Table A1).

## 4. Empirical analysis

### 4. 1 Estimation techniques

We estimate the following equation:

$$empl_{it} = \alpha_1 + \beta_1\ posting_{it} + \gamma_1\ X_{it} + \delta_{1i} + \varepsilon_{it} \qquad (1)$$

where $empl_{it}$ corresponds to the employment rate (employment/ labour force ratio) in country *i* and year *t*. Notice that employment only concerns domestic workers, since posted workers pertain to the sending countries' labour force. In addition, we consider domestic labour costs (*lc*) and productivity (*prod*) as dependent variables.

$posting_{it}$ describes workers posted from all other member states to country *i* on population of country *i* in year *t*.[xi] $X_{it}$ is a vector of covariates portraying the economic and institutional setting of each country as described in the previous section, while $\delta_{1i}$ are country fixed-effects. In order to avoid

having some observations relative to few specific countries driving estimation results (e.g. Luxembourg, Belgium, Netherlands, Sweden, and Malta) all variables are taken in logs.[xii] Finally, we assume that $\varepsilon$ is an independent normally distributed error term.

We are particularly interested in parameter $\beta_1$, which measures the occupational effects associated with posting from all other EU countries. Specifically, there might be three options. First, conditional on all available information a positive and significant $\beta_1$ would suggest that an increasing flow of posting from abroad is associated with average increasing local employment in country *i*. Second, a negative and significant $\beta_1$ would suggest that increasing posting towards country *i* is associated with displacement of domestic workers. Third, a non-significant parameter means that there are no systematic effects of posting on local employment. Similar considerations hold for the variables measuring labour cost and productivity.

### 4.2 Instrumental variables

The estimation technique illustrated in the previous sub-section may raise problems of identification due to the endogenous nature of posting with respect to labour market outcomes. Here we propose possible solutions that rely on the use of instrumental variables. We draw from the literature dealing with the effects of migration on local labour markets which, to some extent, can be adapted to the issues related to the posting of workers.

The literature investigating the impact of migration on labour market characteristics, in fact, identifies a number of potential sources of endogeneity stemming from unmeasurable characteristics which may simultaneously affect both workers' inflows from abroad and labour market outcomes. We find here common features with econometric studies on the impact of immigration. For example, it is claimed that workers endogenously select where to migrate based on destination countries' labour market conditions, so that spurious relations between the variables at stake might be observed (Friedberg & Hunt 1995; Borjas 2003; Card 2001; Longhi et al. 2006).

Similar arguments may be easily applied to the posting of workers. In other words if, for whatever reason, firms post workers − or workers ask to be posted − to high employment countries, then a positive − although misleading − relationship between posting and employment may be observed.

Under some conditions, these situations can be at least partially circumvented by using panel data, while instead much of the debate in the literature on migration concerns analyses conducted in cross-sectional environments (see for example Goldin 1994 and Altonji & Card 1991).

Using data on two or more time periods, in fact, allows ruling out the possibility that systematic differentials in countries' labour market conditions contribute to the explanation of the effects of changes in the number of posted workers on local labour market variables. For instance, if workers are posted basing on differentials in the *level* of foreign employment (rather than, say, on expected changes), this is not likely to produce biased estimates.

Still, however, we can neither exclude the event that firms account for employment variations nor disregard the presence of other possible specific unmeasurable country characteristics that may be subject to changes in the short-run. Thus, the possible bias originating from such possibilities needs to be addressed through specific econometric tools such as instrumental variables.

We propose an instrument based on the ratio of the stock of migrants two years prior to the posting of workers relative to the population of the receiving country (*migr_pop*), in order to explain the incoming flow from abroad. Similarly to Bartel (1989) who explains that migrants tend to move to places where their relatives and neighbours previously settled, our logic is that foreign firms will favour (and/or allow) postings to countries where their employees already have networks and relations. In addition, workers may be willing to be posted to areas where they wish to permanently settle as immigrants, and it would not be surprising that such places are those where there is a significant presence of fellow nationals (Idea Consult 2011). In addition, it is worth considering that workers with a higher propensity towards labour mobility (i.e. those who more readily accept to be posted) are likely to have weak family ties in their home country, perhaps due to previous migration of other family members. Finally, countries where many migrants have settled are probably more open towards services provided by foreigners.

As for the usual properties a valid instrument must have in terms of exogeneity, it is important to observe that the stock of existing migrant workers is not likely to directly affect changes in labour market variables, especially in the very short run. In particular, according to some influential contributions dealing with the impact of migrants on labour market conditions in Europe (Pischke & Velling 1997; Friedberg & Hunt 1995)[xiii], we exploit the fact that most labour market outcomes, including the employment rate and level of wages, do not seem influenced by the stock of migrant workers.

The second instrument we use is the ratio of the average population of neighbouring countries to the local population (*neigh_pop*). First, we consider bordering countries since it is documented that distance has an important role on posting flows (Idea Consult 2011). Second, the rationale of our choice is to account for the exogenous probability of receiving foreign workers, which reflects the pressure exerted by the relative size of close-by countries. On the one hand, in fact, we assume that the larger the neighbour's labour force compared to local labour force, the higher the pressure is. For instance, if a large country like France posts 5 per cent of its workers, it puts greater pressure on its neighbours compared to the pressure exerted by a 5 per cent posted by Luxembourg. On the other hand, the presence of the denominator is justified by the fact that, for a given number of workers posted from neighbouring countries, France is likely to feel less pressure than Luxembourg does.

Finally, this instrument should be sufficiently correlated with changes in the flow of posted workers without directly influencing labour outcome variables. In fact, measures such as the employment rate and the labour cost should respond to conditions of the labour market of sending countries relative to host countries, regardless of their respective size.

In order to account for the presence of instrumental variables we use a Two-Stage model with Fixed-Effects. The first-stage equation is specified as follows:

$$posting_{it} = \alpha_0 + \beta_0 Z_{it} + \gamma_0 X_{it} + \delta_{0i} + \varepsilon_{it} \quad (2)$$

where $Z_{it}$ is the vector including both *migr_pop* and *neigh_pop*. As standard practice when using instrumental variables, the predicted value of $posting_{it}$ replaces the actual value in (1).

## 5. Results

The estimated effects of the posting of workers on the local employment rate are reported in Table 2. In particular, columns (1), (4), (7), and (10) refer to Least Squares Fixed-Effects (LS-FE) regressions performed on equation (1). These are followed by estimates for the first and second stage of the Two-Stage procedure (2SLS-FE), in columns (2)-(3), (5)-(6), (8)-(9), and (11)-(12), respectively.

In columns (1)-(3) results of the most parsimonious specification are displayed. According to the discussion in Section 2 this includes posting inflows, GDP, education, and population as a scale measure. Then, we alternatively add either per capita GDP (columns (4)-(6)) or the trend variable *year* (columns (7)-(9)) since, even in our restricted time span, both may capture the effects of the economic cycle, and in particular the effects of the financial crisis. In columns (10)-(12) results of a fully-comprehensive specification are reported.

Looking at LS-FE estimates there seems to be some significant contribution of workers posted from foreign countries on domestic employment. Thus, at first glance one may naively conclude that an increasing flow of workers posted from abroad on average leads to an increase of employment in receiving countries.

However, although robust to changes in the set of covariates, the effect of incoming posted workers reveals some endogenous features such as those described in the previous section. In fact, when performing the same regressions through 2SLS-FE, we find that the parameter associated with the variable *empl*, although positive, is no more significant in any of the columns ((3), (6), (9), and (12)) in Table 2. Such evidence confirms that endogeneity concerns can be relevant for employment. It is suggested, in particular, that firms tend to post workers to areas where employment is higher.

Summarizing the results regarding the effect of posting on domestic employment, we can conclude that, contrary to what is commonly perceived, workers posted from foreign countries are not likely to displace local labour force. As opposite, it is worth noticing that even when using instrumental variables parameters are positive and not considerably far from being significant. This may suggest that posting is closer to raise employment in receiving countries rather than displacing it.

Next, results referring to the estimation of the effects of the posting of workers on hourly labour cost and productivity are reported in Tables 3 and 4 respectively. Regression output is displayed following the same structure as in Table 2, although first-stage estimates are not reported since identical to parallel regressions on employment.

In this context it is possible to draw fairly robust conclusions regarding the effect of incoming posting on domestic labour market characteristics. First, both labour cost and productivity are likely to positively respond to an increase of the inflow of workers posted from foreign countries, which seems plausible given the well-known relation between labour cost and productivity.

Second, this result looks also encouraging. In fact, besides providing further evidence in terms of complementarity between posted workers and local labour force, our estimates show that labour cost increases *with* productivity. Hence, even if the effects on labour cost may appear as a threat for local enterprises, posting does not seem to reduce their earnings.

As for local workers, increasing labour costa seems to smooth any "race to the bottom" concerns.

In fact, although in principle an increase in the labour cost may be caused by both higher wage and non-wage components − such as labour taxation and social security contributions − it seems rather implausible that non-wage components can be significantly influenced by a phenomenon like posting which is external to local institutional features.

Furthermore, we estimate that a one per cent increase in the inflow of posted workers on every hundred inhabitants increases labour cost by almost one per cent. Similar results are obtained on productivity, namely a one per cent increase of the posting inflow results, on average, in a one per cent increase in productivity. In fact, the averages of the estimated parameters associated with posting in 2SLS-FE regressions in Tables 3 and 4, suggest that productivity gains and the increase of the labour cost are almost of the same magnitude. Such evidence suggests that the benefits of a posting inflow are equally distributed between workers and employers (i.e. under the hypothesis that posting does not affect domestic non-wage components, estimates imply that the ratio between wages and productivity remains unchanged).

As for first-stage regressions, instruments are significant at 1 and 5 per cent level in predicting the flow of incoming posted workers. In particular, estimates reported in columns (2), (5), (8), and (11) of Table 2 indicate that the stock of migrants to total population (*migr_pop*) is expected to attract more workers posted from other EU member states. In addition, it seems that the relative dimension of neighbour countries' population (*neigh_pop*) exerts positive pressure in terms of incoming posting. The hypothesis that the instruments are not weak is supported by the Kleibergen-Paap Wald F statistic in Table (2).

First-stage estimates also suggest that countries receiving higher worker flows from abroad are the richest and the largest, as highlighted by the positive sign of both per capita GDP (*gdp_pop*) and population (*pop*). In addition, the Hansen J statistic relative to the test on overidentifying restrictions always suggests that the joint hypothesis that the instruments are valid and that the model is correctly specified is never rejected.

**[INSERT TABLE 2]**

Concerning the other factors associated with labour market outcomes (second-stage regressions), an overview of the output in Tables (2)-(4) provides additional noteworthy evidence. First, one can notice that highly educated labour force is associated with high productivity and labour cost, while showing a weak negative relationship with employment. Real GDP is positively correlated with both productivity and labour cost, although being negatively correlated with labour cost. The reason may be due to the fact that labour cost is the only nominal variable. Thus, although real GDP decreases during the crisis, labour cost still increases due to nominal rigidities. This evidence is also confirmed by the signs of the parameters associated with the time-trend. The other parameters, when significant, do not provide any unexpected evidence.

**[INSERT TABLE 3]**

**[INSERT TABLE 4]**

## 6. Conclusions

In this paper, we have tested the extent to which the inflow of posted workers from other member countries can affect domestic labour market conditions in the EU. We have used country data for all 27 EU member states in the years 2007-2009.

In particular, we have observed the effects of posting on the employment rate to verify whether displacement of domestic workers is likely to take place. Then, we have also investigated the influence of posting on labour cost, which can be seen as a measure of working conditions. Finally, we have considered the possibility that posting increases productivity which we interpret as a proxy for generalized welfare improvement.

In order to address potential endogeneity stemming from unmeasurable characteristics common to both worker flows and labour market outcomes, we have employed instrumental variables related to migrants and neighbouring countries' populations.

At first glance, our empirical results seem to suggest a positive relationship between posting and the employment rate. After accounting for endogeneity, however, this relation becomes non-significant. The second important finding is that both labour cost and productivity are increased by almost the same percentage as a consequence of an increase in the inflow of posted workers, and this outcome is robust to the use of instrumental variables.

Therefore, similar to the literature on immigration and labour − which provides a number of contributions assessing the lack of relevant displacement effects of migrants on domestic workers – our empirical results seem to be inconsistent with the general view held by some institutions − notably trade unions − regarding the possibility that posted workers undercut the labour standards of existing domestic workers. Rather, we provide evidence that labour market integration is likely to lead to positive welfare effects which can be summarized in productivity increases, along with improvements of existing domestic workers' welfare in terms of higher labour costs.

The latter result, however, should not worry European policymakers unduly. Normally, higher labour costs translate into higher unemployment and lower competitive conditions for domestic firms in the near future. But in the case of posting, our estimates suggest that the increase in labour cost stems

from productivity growth rather than from other non-wage components. Moreover, according to our estimates, there does not seem to be any redistributional effect as a consequence of the increase in productivity, since workers and employers equally share the associated benefits.

In conclusion, we believe that all the policies undertaken so far by the EU in order to enhance the posting of workers − along with a set of regulatory tools increasingly aimed at protecting posted workers in order to deter any form of abuse − should be definitely welcome.

## Notes

[i] On the political intention of revising the Posting of Workers Directive, see Monti (2010), p.69. See also the documents of the Conference on Fundamental Social Rights and the Posting of Workers in the Framework of the Single Market available in the section "Related Documents" in the European Commission's Events Archive (http://ec.europa.eu/social/main.jsp?langId=en&catId=471&eventsId=347&furtherEvents=yes).

[ii] See the legislative initiatives COM (2012) 131 "Proposal for a Directive of the European Parliament and of the Council on the enforcement of Directive 96/71/EC concerning the posting of workers in the framework of the provision of services" and COM (2012) 130 "Proposal for a Council Regulation on the exercise of the right to take collective action within the context of the freedom to provide services".

[iii] See *Laval*, *Rüffert* and *Viking* Cases in Bucker & Wiebke (2010), *Luxembourg* Case (319/06), and, in general the European Court of Justice's jurisprudence on the posting of workers.

[iv] EC Communications/Recommendations on posting include "The implementation of Directive 96/71/EC in the member states" (COM 458/2003), "Guidance on the posting of workers in the framework of the provision of services" (COM 159/2006), "Benefits and potential of the posting of workers while guaranteeing the protection of workers" (COM 304/2007) and the "Recommendation on enhanced administrative cooperation in the context of the posting of workers in the framework of the provision of services" (2008).

[v] See the Press Release of the Commission IP/12/267 21/03/2012: "Commission to boost protection for posted workers" and the legislative initiatives COM (2012) 130 and COM (2012) 131.

[vi] For the few information on posting (approximated by E101 certificates) at sectoral level, see Idea Consult (2011) and EC (2010).

[vii] During the European Union enlargement in 2004, the "Polish plumber" became the caricatured symbol of the widespread fear of job losses, especially in France.

[viii] Data on posting at national levels are collected in Germany (Soka Bau system), France (French Labour Inspectorate), Belgium (LIMOSA system), and Denmark (RUT-Register). However, national data are non-comparable across countries because in each individual country they are collected according to different criteria and for different purposes. For example, LIMOSA is based on a national mandatory register system and includes only employees and not self-employed workers. Concerning French data, according to the departmental directorate of labour very few enterprises that post workers in France make a declaration. SOKA-Bau data is limited to the construction sector and to blue-collar workers. RUT-register of Denmark was introduced only in May 2008 and there is the general notion that the system is still not comprehensive regarding content and coverage (Ismeri Europa 2012).

[ix] On the strategy of inclusion of some specific variables as controls see Angrist & Krueger (1999). See also Kerr & Kerr (2011) who provide a broad overview of the empirical literature focusing on displacement effects of migrant workers.

[x] We also carried out the analysis using other educational levels, such as primary and secondary education, but obtained no additional insights apart from a lower significance of the educational variable in the regression analysis. Problems of collinearity emerge during estimation if more than one educational level is introduced.

[xi] We have also performed estimations using 27 variables each one reporting the flow of workers posted from one country to each of the remaining ones. Unfortunately, however, this makes difficult to detect common features for countries bringing same-sign contribution. In addition, the large number of parameters that need to be estimated relative to the number of available observations raises substantial estimation problems.

[xii] To avoid negative peaks of the log variables we followed the standard practice of adding 1 to all ratios.

[xiii] As for the US, Altonji &Card (1991) find no significant impact of migrant workers on the employment to population ratio and little effect on weekly earnings between 1970 and 1980.

**References**


Altonji, J.G., Card, D. (1991) *The Effects of Immigration on the Labor Market Outcomes of Less-Skilled Natives*, in Abowd J.M. and Freeman R.B., Eds., Immigration, Trade, and the Labour Market. Chicago: University of Chicago Press, 1991, 201-234.

Arnold, M., Wörgötter, A. (2009) Structural Reforms and the Benefits of the Enlarged EU Internal Market: Still Much to be Gained. *OECD Economics Department Working Paper* No. 694.

Angrist, J., Krueger A. (1999) Empirical strategies in labor economics, in Ashenfelter O. and Card D.(eds.). *The Handbook of Labor Economics*, Vol. III, North Holland.

Babecký, J., Dybczak, K. (2012) Real Wage Flexibility in the European Union: New Evidence from the Labour Cost Data. *Czech National Bank, Research Department*.

Barnard, C. (2000) Social dumping and the race to the bottom: some lessons for European union from Delaware? 25 *European Law Review*, 57-78.

Barnard, C. (2009a) The UK and Posted Workers: The Effect of Commission v Luxembourg on the Territorial Application of British Labor Law. 38 *Industrial Law Journal*, 122-132.

Barnard, C. (2009b) British Jobs for British Workers: The Lindsey Oil Refinery Dispute and the Future of Local Labor Clauses in an Integrated EU Market. 38 *Industrial Law Journal*, 245-277.

Bartel, A. (1989) Where Do the New U.S. Immigrants Live? 7 *Journal of Labor Economics*, 371-391.

Bertola G. and Mola L. (2010) Services Provision and Temporary Mobility: Freedoms and Regulation in the EU". 2010 *World Economy*, 633-654.

Borjas, G.J. (2003) The Labor Demand Curve is Downward sloping: Re-examining the Impact of Immigration on the Labor Market. 118 *The Quarterly Journal of Economics*, 1335-1374.

Bucker, A., Wiebke, W. (2010) Viking – Laval – Rüffert: Consequences and policy perspectives. ETUI Report, No. 111, Brussels.

Card, D. (2001) Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration. 19 *Journal of Labor Economics*, 22–64.

Cremers J. (2010) In search of cheap labor in Europe. CLR European Institute for Construction Labor Research.

Davies, P. (2002) The posted workers directive and the EC Treaty. 31 *Industrial Law Journal*, 298-306.

de Bruijna R., Kox H., Lejoura A. (2008) Economic benefits of an Integrated European Market for Services. 30 *Journal of Policy Modeling*, 301-319.

El Khoury A., Savvides A. (2006) Openness in services trade and economic growth. 92 *Economic Letters*, 277–283.

European Commission (2011) Posting of workers in the European Union and EFTA countries: Report on E101 certificates issued in 2008 and 2009. Available on: http://ec.europa.eu.

European Commission (2010) Administrative data collection on E101 certificates issued in 2007. Available on: http://ec.europa.eu.

ETUC (2010) The Posting of Workers Directive: proposals for revision. Resolution adopted at the ETUC Executive Committee on 9-10 March 2010.

Freeman, R. (2008). Labour productivity indicators. Comparison of two OECD database productivity. OECD statistics directorate division of structural economic statistics.

Friedberg, R. M., Hunt, J. (1995) The Impact of Immigrants on Host Country Wages, Employment and Growth. 9 *The Journal of Economic Perspectives*, 23-44.

Giese, R. (2003) Posting: social protection of workers vs. fundamental freedoms? 40 *Common Market Law Review*, 143-158.

Goldin, C. (1994) *The Political Economy of Immigration Restriction in the United States*, *1890-1921*, in Goldin, C., Libecap, G. Eds., The Regulated Economy: A Historical Approach to Political Economy. Chicago: University of Chicago Press, 1994, 223-257.

Idea Consult (2011) Study on the economic and social effects associated with the phenomenon of posting of workers in the EU. Report on behalf of the European Commission. Available on: http://ec.europa.eu.

Ismeri Europa (2012) Preparatory study for an Impact Assessment concerning the possible revision of the legislative framework on the posting of workers in the context of the provision of services. Report on behalf of the European Commission. Available on: http://ec.europa.eu.

Kerr S.P., Kerr W.R. 2011. Economic Impacts of Immigration: A survey. *NBER WP* no. 16736 (Jan.).

Kolehmainen, E. (1999) The directive concerning the posting of workers: synchronization of the functions of national legal systems. 89 *Comparative Labor Law and Labor Policy Journal*, 71-104.

Kvist, J. (2004) Does EU enlargement start a race to the bottom? Strategic interaction among EU member states in social policy. 14 *Journal of European Social Policy*, 301-318.

Longhi, S., Nijkam, P., Poote, J. (2006) The Impact of Immigration on the Employment of Natives in Regional Labour Markets: A Meta-Analysis. IZA Discussion Paper No. 2044.

Monti, M. (2010) A New Strategy for the Single Market- At the service of the Europe's economy and society. Report to the President of the European Commission.

Pallini, M., Pedersini, R. (2010) Posted workers in the European Union. European Foundation for the Improvement of Living and Working Conditions, Dublin.

Pischke , J.S., Velling, J. (1997) Wage and Employment Effects of Immigration to Germany: An Analysis Based on Local Markets, 79 *Review of Economics and Statistics*, 594-604.

van Hoek A., Houwerzij M. (2011) Comparative study on the legal aspects of the posting of workers in the framework of the provision of services in the European Union. European Commission. Available on: http://ec.europa.eu.

**Appendix**

**[INSERT TABLE A1]**

**[INSERT FIGURE A1]**

**[INSERT FIGURE A2]**

**[INSERT FIGURE A3]**

## Tables and Figures

### Table 1 – Summary statistics

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| *empl* | 0.92792 | 0.0287857 | 0.8188453 | 0.972886 |
| *lc* | 18.07576 | 10.95124 | 1.89 | 34.98 |
| *prod* | 27.14198 | 16.82953 | 4.3 | 65 |
| *gdp_defl* | 130.0025 | 19.36337 | 101.2 | 180.9 |
| *pop* (th) | 18428.19 | 23002.68 | 407.81 | 82314.91 |
| *edu* | 28.13457 | 7.909791 | 14 | 43.1 |
| *gdp_pop* | 23.74519 | 15.6382 | 4.007141 | 81.94312 |
| *migr_pop* | 0.03017 | 0.0644489 | 0.0002775 | 0.346383 |
| *neigh_pop* | 6.9787 | 20.35262 | 0 | 109.582 |
| *posting* | 0.41576 | 1.06998 | 0.03808 | 5.49095 |
| Postings received by a representative EU member state from: | | | | |
| Austria | 535.1111 | 1231.982 | 0 | 7817 |
| Belgium | 1798.691 | 4492.672 | 0 | 19604 |
| Bulgaria | 167.5968 | 420.5371 | 0 | 2412 |
| Cyprus | 3.024691 | 7.219722 | 0 | 31 |
| Czech Republic | 564.0370 | 737.2582 | 0 | 4414 |
| Denmark | 151.3827 | 234.6288 | 0 | 1028 |
| Estonia | 301.7621 | 1404.564 | 0 | 7768 |
| Finland | 132.3951 | 216.1727 | 0 | 1172 |
| France | 6893.506 | 9505.337 | 0 | 42129 |
| Germany | 5827.877 | 8214.402 | 0 | 33738 |
| Greece | 100.3333 | 346.0219 | 0 | 2329 |
| Hungary | 1414.099 | 4563.252 | 0 | 26952 |
| Ireland | 45.53086 | 85.90359 | 0 | 444 |
| Italy | 490.0000 | 939.8382 | 0 | 5445 |
| Latvia | 46.20988 | 118.0809 | 0 | 729 |
| Lithuania | 98.46914 | 190.2572 | 0 | 858 |
| Luxembourg | 1978.951 | 7272.321 | 0 | 40489 |
| Malta | 4.604938 | 10.30859 | 0 | 69 |
| Netherland | 344.0864 | 709.0678 | 0 | 3352 |
| Poland | 7925.519 | 21791.07 | 0 | 119779 |
| Portugal | 1725.247 | 5106.481 | 0 | 35558 |
| Romania | 509.7381 | 1665.936 | 0 | 11898 |
| Slovakia | 986.4074 | 1973.629 | 0 | 10769 |
| Slovenia | 577.1852 | 1236.916 | 0 | 6806 |
| Spain | 1129.901 | 2264.381 | 0 | 11685 |
| Sweden | 129.2222 | 155.0310 | 0 | 524 |
| United Kingdom | 1264.568 | 2585.317 | 0 | 13907 |

Source: EUROSTAT; EC (2010), and EC (2011). Data refer to years 2007-2009. Observations: 81.

**Table 2 –Effect of posting inflow on local employment rate**

| | LS-FE | 2SLS-FE First stage | 2SLS-FE Second stage | LS-FE | 2SLS-FE First stage | 2SLS-FE Second stage | LS-FE | 2SLS-FE First stage | 2SLS-FE Second stage | LS-FE | 2SLS-FE First stage | 2SLS-FE Second stage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9 ) | (10 ) | ( 11) | (12 ) |
| *posting* | 0.027*** | | 0.012 | 0.026** | | 0.007 | 0.021** | | 0.010 | 0.020* | | 0.007 |
| | (0.010) | | (0.011) | (0.012) | | (0.014) | (0.009) | | (0.009) | (0.011) | | (0.012) |
| *gdp_defl* | 0.083*** | 0.038 | 0.068*** | 0.087*** | 0.108 | 0.073*** | 0.060*** | -0.022 | 0.035* | 0.063*** | 0.054 | 0.043** |
| | (0.019) | (0.122) | (0.019) | (0.020) | (0.110) | (0.020) | (0.019) | (0.126) | (0.018) | (0.019) | (0.115) | (0.019) |
| *pop* | 0.003 | -0.028 | 0.001 | 0.004 | 0.151*** | 0.004 | 0.002 | -0.027 | -0.000 | 0.003 | 0.146*** | 0.002 |
| | (0.002) | (0.025) | (0.003) | (0.004) | (0.046) | (0.004) | (0.002) | (0.025) | (0.002) | (0.004) | (0.046) | (0.004) |
| *edu* | -0.021** | -0.212 | -0.019** | -0.021** | -0.070 | -0.017* | -0.011 | -0.139 | -0.008 | -0.011 | -0.014 | -0.007 |
| | (0.009) | (0.182) | (0.009) | (0.010) | (0.079) | (0.009) | (0.009) | (0.093) | (0.008) | (0.009) | (0.087) | (0.009) |
| *gdp_pop* | | | | 0.247 | 59.391*** | 1.180 | | | | 0.237 | 57.624*** | 0.743 |
| | | | | (1.210) | (13.545) | (1.243) | | | | (1.121) | (13.429) | (1.088) |
| *year* | | | | | | | -0.005*** | -0.011 | -0.006*** | -0.005*** | -0.010 | -0.005*** |
| | | | | | | | (0.001) | (0.007) | (0.001) | (0.001) | (0.006) | (0.001) |
| *migr_pop* | | 0.042** | | | 0.102*** | | | 0.042** | | | 0.100*** | |
| | | (0.021) | | | (0.023) | | | (0.020) | | | (0.022) | |
| *neigh_lf* | | 4.131*** | | | 1.633** | | | 4.164*** | | | 1.729** | |
| | | (0.613) | | | (0.798) | | | (0.605) | | | (0.792) | |
| _cons | 0.290*** | 0.882 | 0.378*** | 0.264** | -1.697* | 0.314** | 10.122*** | 23.473 | 11.812*** | 9.963*** | 17.668 | 11.445*** |
| | (0.112) | (0.808) | (0.112) | (0.128) | (0.928) | (0.126) | (2.749) | (14.454) | (2.892) | (2.755) | (13.136) | (2.885) |
| Kleibergen-Paap rk Wald F statistic | | 78.169 | | | 51.624 | | | 107.887 | | | 106.499 | |
| Hansen J statistic Chi-sq(1) P-val | | | 0.1191 | | | 0.1193 | | | 0.1635 | | | 0.1371 |
| R2 | 0.74 | 0.27 | 0.75 | 0.74 | 0.27 | 0.74 | 0.57 | 0.27 | 0.57 | 0.58 | 0.27 | 0.58 |
| *N* | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 |

Dependent variable is employment rate (*empl*) except for First-Stage estimates in columns (2), (5), (8), (11) where it is the share of posted workers on local population (*posting*).
* $p<0.1$; ** $p<0.05$; *** $p<0.01$. Robust standard errors in parenthesis. All variables are in logs except *year*. Country Fixed-Effects are always included.

**Table 3 –Effect of posting inflow on local hourly labour cost**

| | LS-FE | 2SLS-FE Second stage | LS-FE | 2SLS-FE Second stage | LS-FE | 2SLS-FE Second stage | LS-FE | 2SLS-FE Second stage |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *posting* | 0.911*** | 0.903*** | 0.964*** | 0.948*** | 0.964*** | 0.948*** | 1.004*** | 0.960** |
| | (0.213) | (0.277) | (0.250) | (0.345) | (0.221) | (0.317) | (0.258) | (0.380) |
| *gdp_defl* | -1.066*** | -1.168*** | -1.130*** | -1.228*** | -0.744** | -0.773** | -0.812** | -0.856** |
| | (0.320) | (0.323) | (0.330) | (0.333) | (0.328) | (0.331) | (0.339) | (0.342) |
| *pop* | 0.153** | 0.148** | 0.119 | 0.111 | 0.161** | 0.159** | 0.134 | 0.134 |
| | (0.060) | (0.061) | (0.099) | (0.098) | (0.063) | (0.067) | (0.105) | (0.106) |
| *edu* | 0.542*** | 0.534*** | 0.528*** | 0.520*** | 0.342 | 0.349 | 0.346 | 0.359 |
| | (0.203) | (0.198) | (0.204) | (0.200) | (0.238) | (0.236) | (0.238) | (0.236) |
| *gdp_pop* | | | -11.527 | -12.425 | | | -9.378 | -7.532 |
| | | | (28.229) | (30.862) | | | (29.630) | (33.650) |
| *year* | | | | | 0.034* | 0.033* | 0.033* | 0.031 |
| | | | | | (0.019) | (0.019) | (0.019) | (0.020) |
| _cons | 4.571** | 5.137** | 5.263** | 5.844** | -65.388* | -63.014 | -61.906 | -57.910 |
| | (2.101) | (2.111) | (2.433) | (2.425) | (38.089) | (38.711) | (38.738) | (39.463) |
| Hansen J statistic Chi-sq(1) P-val | | 0.2484 | | 0.2884 | | 0.1737 | | 0.1569 |
| R2 | 0.60 | 0.62 | 0.62 | 0.64 | 0.54 | 0.55 | 0.56 | 0.57 |
| *N* | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 |

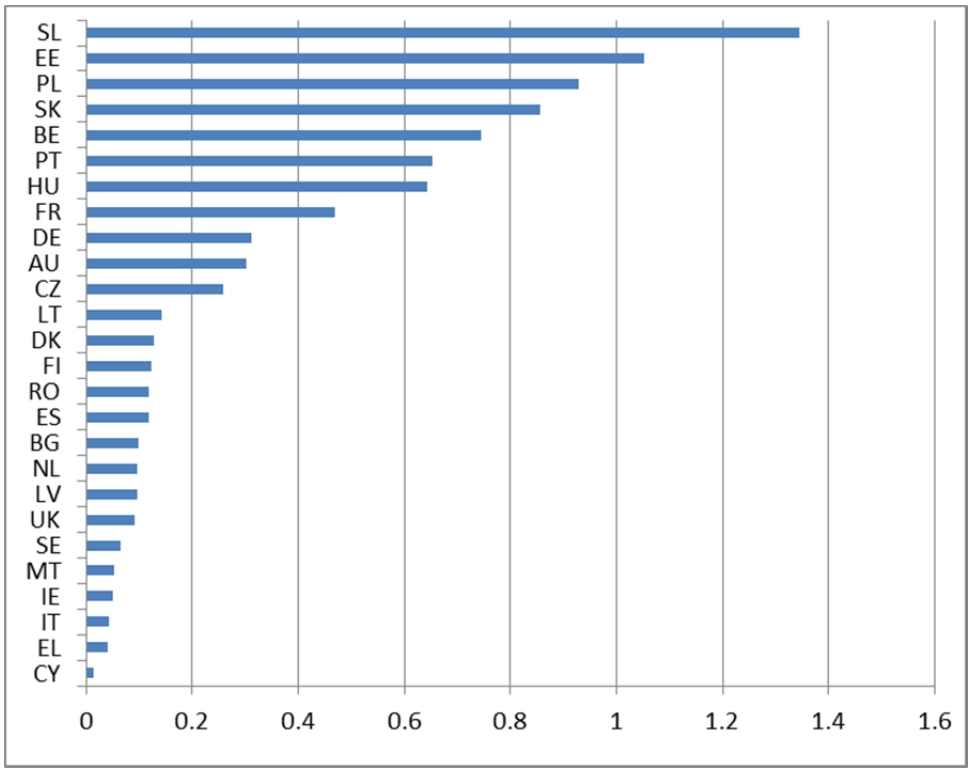
Dependent variable is local hourly labour cost (*lc*). * $p<0.1$; ** $p<0.05$; *** $p<0.01$. Robust standard errors in parenthesis. All variables are in logs except *year*. Country Fixed-Effects are always included.

**Table 4 –Effect of posting inflow on the productivity of local workers**

| | LS-FE | 2SLS-FE Second stage | LS-FE | 2SLS-FE Second stage | LS-FE | 2SLS-FE Second stage | LS-FE | 2SLS-FE Second stage |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *posting* | 0.275*** | 1.072** | 0.239*** | 0.866** | 0.292*** | 1.275* | 0.252*** | 0.896** |
| | (0.093) | (0.496) | (0.092) | (0.439) | (0.092) | (0.770) | (0.089) | (0.436) |
| *gdp_defl* | 0.247*** | 0.166 | 0.265*** | 0.186 | 0.239*** | 0.119 | 0.259*** | 0.163 |
| | (0.087) | (0.142) | (0.085) | (0.132) | (0.086) | (0.159) | (0.082) | (0.132) |
| *pop* | 0.104 | 0.197* | 0.314*** | 0.283** | 0.116 | 0.229** | 0.362*** | 0.313*** |
| | (0.072) | (0.112) | (0.110) | (0.118) | (0.072) | (0.117) | (0.110) | (0.117) |
| *edu* | 0.164** | 0.336* | 0.204*** | 0.320** | 0.289*** | 0.585** | 0.371*** | 0.534*** |
| | (0.074) | (0.189) | (0.073) | (0.126) | (0.105) | (0.261) | (0.104) | (0.170) |
| *gdp_pop* | | | 66.256** | 33.992 | | | 76.893*** | 39.120 |
| | | | (26.997) | (37.507) | | | (26.803) | (36.961) |
| *year* | | | | | -0.009* | -0.016* | -0.011** | -0.015** |
| | | | | | (0.005) | (0.010) | (0.005) | (0.008) |
| _cons | 0.307 | -0.897 | -2.028 | -1.791 | 17.179* | 29.969 | 19.391** | 28.239* |
| | (0.894) | (1.707) | (1.287) | (1.523) | (10.216) | (18.459) | (9.724) | (15.117) |
| Hansen J statistic Chi-sq(1) P-val | | 0.1942 | | 0.1811 | | 0.2419 | | 0.1889 |
| R2 | 0.19 | 0.39 | 0.21 | 0.39 | 0.22 | 0.42 | 0.24 | 0.37 |
| *N* | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 |

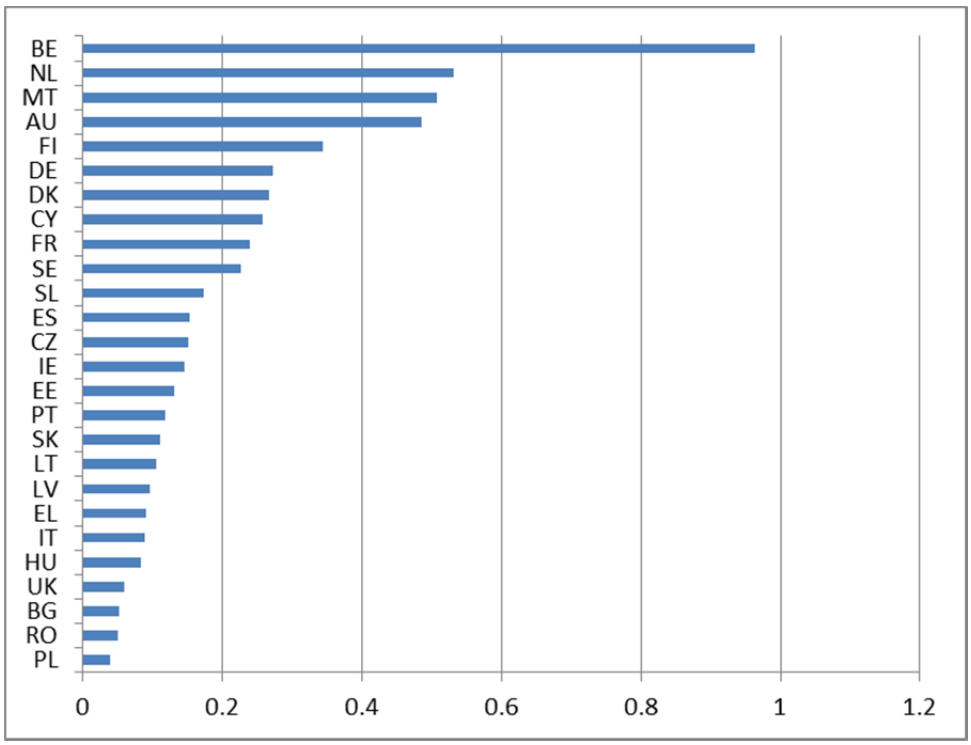
Dependent variable is productivity of local workers (*prod*). * $p<0.1$; ** $p<0.05$; *** $p<0.01$. Robust standard errors in parenthesis. All variables are in logs except *year.* Country Fixed-Effects are always included.

**Figure 1 – Posted worker outflow every 100 sending country's inhabitants**




Source: EUROSTAT; EC (2010) and EC (2011). Data refer to the average for years 2007-2009. Luxembourg (18.99%) is omitted.

**Figure 2 – Incoming posted workers every 100 receiving country's inhabitants**

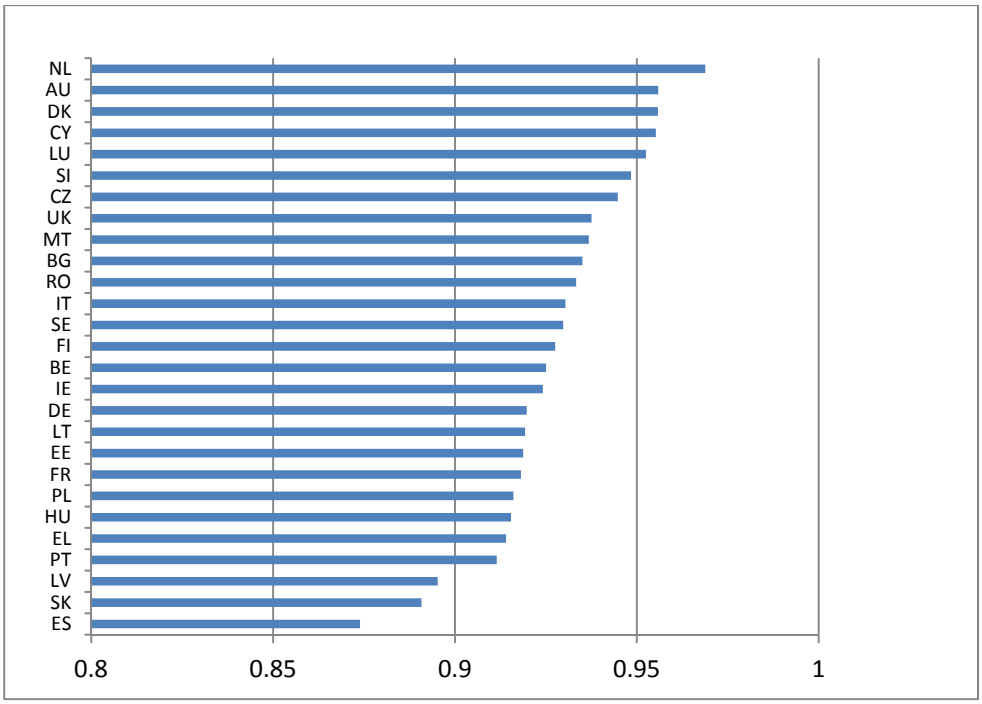



Source: EUROSTAT; EC (2010) and EC (2011). Data refer to the average for years 2007-2009. Luxembourg (5.49%) is omitted.

**Table A1 – Description of the Variables and Sources**

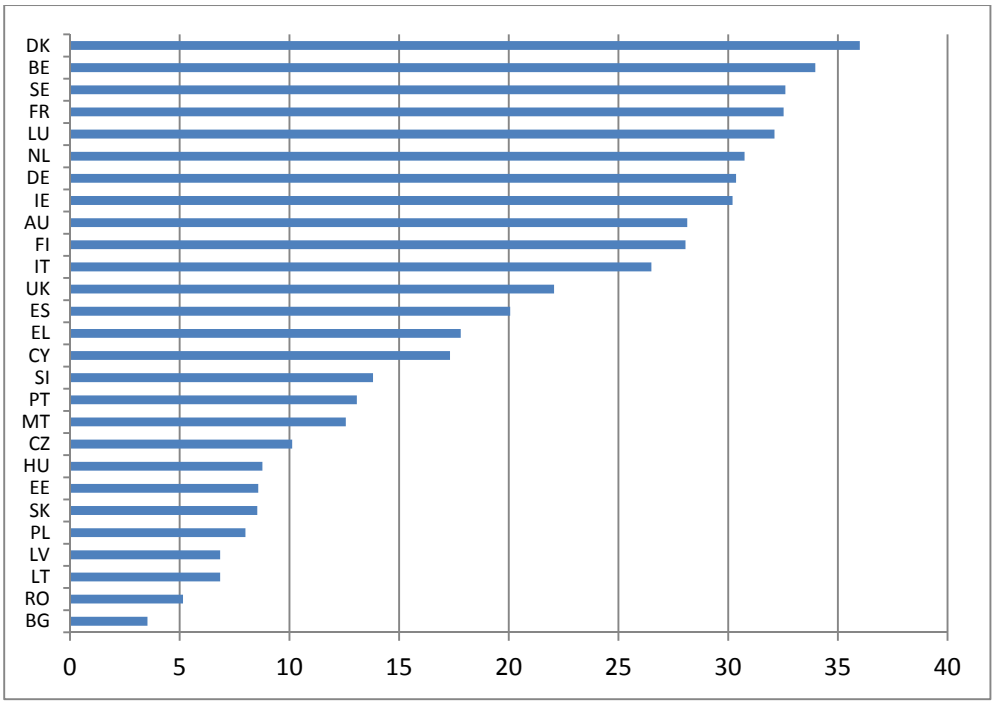
| | | |
|---|---|---|
| *posting* | E101 certificates for workers from all other EU member states every 100 receiving country's inhabitants | EC (2010) and (2011); Eurostat. |
| *empl* | Employed people (all NACE) / domestic labour force | Eurostat |
| *lc* | Hourly labour cost in Industry and services (except public admin. and community services; households activ. and extra-territorial organizations) - Euro | Eurostat |
| *prod* | Real labour productivity per hour worked - Euro | Eurostat |
| *gdp_defl* | Gross domestic product at constant prices (index 2000=100) | Eurostat |
| *edu* | Employees with Tertiary education - levels 5-6 (ISCED 1997) - Age 15-64 - Total - all NACE activities (%) | Eurostat |
| *pop* | Total population (thousands) | Eurostat |
| *gdp_pop* | Per-capita domestic product at market current prices (th. Euro) | Eurostat |
| *migr_pop* | Two-year lagged migrants / total population | Eurostat |
| *neigh_pop* | Average neighbour countries' population/domestic population | Eurostat |

**Figure A1 – Average employment rate (years 2007-2009, %)**



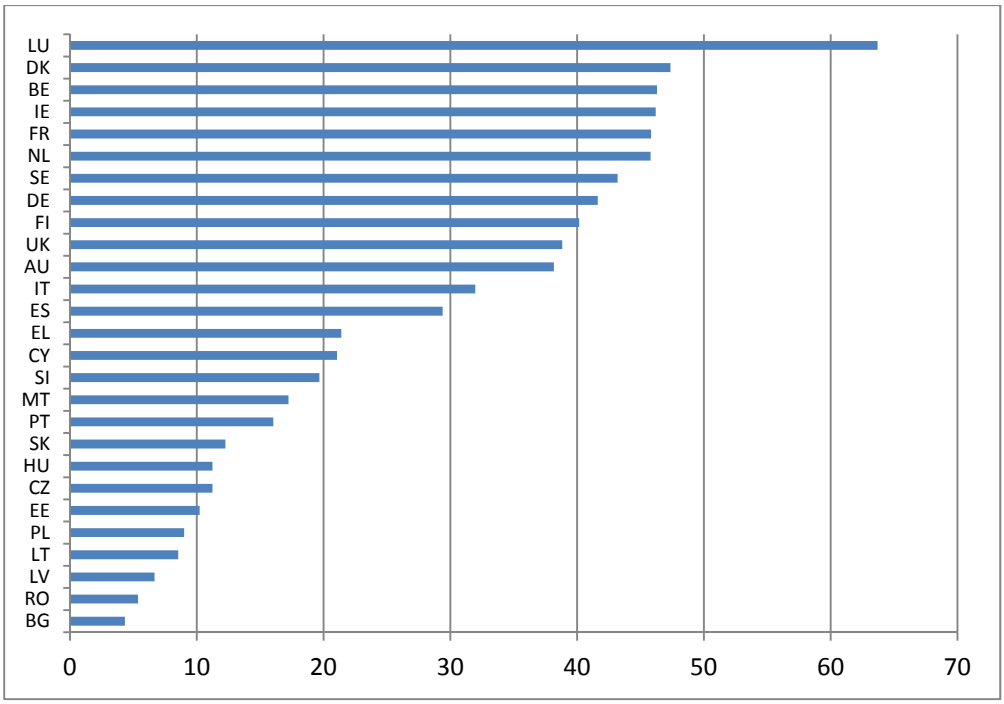

Source: EUROSTAT.

**Figure A2 – Average hourly labour cost in industry and services (years 2007-2009, euros)**




Source: EUROSTAT.

**Figure A3 – Average productivity (years 2007-2009, euro)**




Source: EUROSTAT.