CSEF

Centre for Studies in Economics and Finance

# WORKING PAPER NO. 460

# *Interregional Migration, Human Capital Externalities and Unemployment Dynamics: Evidence from Italian Provinces*

**Roberto Basile, Alessandro Girardi, Marianna Mantuano, and Giuseppe Russo**

**December 2016**

University of Naples Federico II

University of Salerno

Bocconi University, Milan

**CSEF - Centre for Studies in Economics and Finance**
**DEPARTMENT OF ECONOMICS – UNIVERSITY OF NAPLES**
**80126 NAPLES - ITALY**
**Tel. and fax +39 081 675372 – e-mail: csef@unina.it**

CSEF
Centre for Studies in Economics and Finance

# WORKING PAPER NO. 460

# *Interregional Migration, Human Capital Externalities and Unemployment Dynamics: Evidence from Italian Provinces*

**Roberto Basile[*], Alessandro Girardi[**], Marianna Mantuano[***], and Giuseppe Russo[****]**

**Abstract**
The role of labour mobility on regional disparities is at the core of a heated debate: while standard competitive models posit that mobility works as an equilibrating device and reduces the unemployment, models featuring externalities lead to opposite conclusions. Against this backdrop, we present a simple two-region model adapted to the main features of the Italian North-South dualism that illustrates the effects of labour mobility with and without human capital externalities. We show that, when externalities are introduced, regional mobility may exacerbate regional unemployment disparities. Using longitudinal data over the years 2002- 2011 for 103 NUTS-3 Italian regions, we document that net outflows of human capital from the South to the North have increased the unemployment rate in the South and decreased the unemployment rate in the North. Our conclusions support the literature that finds an important role of regional externalities, and suggest that reducing human capital flight from Southern regions should be a priority.

**JEL Classification**: C23, R23, J61

**Keywords**: Unemployment, Migration, Human capital, Externalities, Italian regions

[*] Seconda Università di Napoli. E-mail: roberto.basile@unina2.it

[**] ISTAT, Istituto Nazionale di Statistica. E-mail: agirardi@istat.it

[***] ISTAT, Istituto Nazionale di Statistica. E-mail: mantuano@istat.it

[****] Università di Salerno and CSEF. E.mail: grusso@unisa.it

# Table of contents

# 1 Introduction

The question whether interregional migration equilibrates regional labour market performances is an issue fraught with controversy both theoretically and empirically. According to basic models without externalities, labour mobility equalises wages across regions and eliminates unemployment. By contrast, when the possibility of externalities is taken into account, the effect of interregional labour migration on regional unemployment can be reversed and labour mobility may magnify regional disparities. We contribute to this body of research by assessing the effect of interregional migration on regional unemployment by using Italian data at the NUTS-3 territorial level (103 provinces) over the period 2002-2011. In simple competitive models, emigration from low-wage to high-wage areas continues until wages converge and unemployment disappears. Within this framework, long-run regional unemployment disparities can only be determined by wage rigidity and by factors that hamper or reduce regional mobility, such as frictional effects of distance, transaction costs, regional amenities that compensate for lower wages or for a higher risk of unemployment (Marston, 1985).

The empirical literature has devoted a great deal of work to these issues, and the available evidence is not clear-cut. Blanchard and Katz (1992) find that labour mobility has been crucial in achieving regional convergence of unemployment rates in the US; by contrast, Decressin and Fatàs (1995) argue that this adjustment mechanism is ineffective in the EU, where labour mobility seems not able to absorb asymmetric regional shocks. More recently, Partridge and Rickman (2006) challenge the conclusions of Blanchard and Katz for the US, while Baddeley et al. (2000) question the findings of Decressin and Fatàs for the EU. Wrage (1981) and Groenewold (1997) document that interregional mobility exerts weak (if any) equalizing effects on regional unemployment rates in Canada and in Australia. Inconclusive evidence also emerges for Germany, where some authors suggest that labour mobility reduces regional unemployment disparities (Bayer and Jüssen, 2007) and others find constrasting results (Möller, 1995; Südekum, 2004).

These heterogeneous findings have fostered theoretical explanations based on Kaldorian-like cumulative causation effects originated by selective migration (Burda and Wyplosz, 1992; Feser and Sweeney, 2003; Südekum, 2004; Kanbur and Rapoport, 2005) or New Economic Geography-

style agglomeration effects activated by labour inflows (Epifani and Gancia, 2005; Südekum, 2005; Francis, 2009).

The case of Italy is particularly interesting for assessing the effects of regional mobility. As a matter of fact, the long-term Italian dualism has generated a permanent outflow of workers towards the Northern regions since the so called 'economic miracle', namely the period of intense economic growth following the Second World War. Though the intensity of this flow has been changing over time, South-North mobility never reversed. As shown by Faini et al. (1997), mobility was reduced from the mid 1970s to the mid 1990s because of several socio-economic factors, like expectations of North-South wage convergence (in line with the "option value of waiting" approach sketched by Burda, 1995), large-scale job creation in the public sector, transaction costs connected with transfers and job-matching failures (Attanasio and Padoa-Schioppa, 1991).

The sudden arrest of State transfers to the Southern economy in 1992 after the crisis of the "*intervento straordinario*" (extraordinary intervention) and the fiscal consolidation required to join the Euro area have stimulated a renewal of migration flows.[1] It seems plausible that Southern unemployed workers have changed their expectations on the option value of migrating to the wealthier and more industrialised areas of the country (Basile and Causi, 2007). However, the consequences of this new wave of South-North migration on regional unemployment have not been analysed yet.

With respect to the previous decades, the wave of interregional migration started in 1995 is characterised by a higher share of workers with high levels of schooling (both at the secondary and at the tertiary level) (Mocetti and Porello, 2010; Bonasia and Napolitano, 2012).[2] To the extent that human capital generates externalities, this brain drain might be detrimental not only for local labour market performances but also for long-run local growth. Therefore, testing for the existence

[1] Public sector employment growth in the South was 2% per year over the 1980-92 period. From 1992 the trend is reversed: in 2006 public employment was 5% lower than in 1992. To evaluate the importance of this switch, consider that public employment accounts for 22% of total employment in the South and for 16% in the North. The share of public expenditure for the Mezzogiorno falls by 10% with respect to the previous decade (Chiri, 2006). Chiri (2006, p. 340) also argues that "the threat of discontinuing public intervention has affected the Southern economy more than any conventional policy".

[2] This is true especially for regions like Molise, Campania, Puglia, Basilicata, Calabria, Sicilia and Sardegna. For instance, according to Mocetti and Porello (2010), the Calabria's net migration rate of people holding a degree was -2.3 in the period 1991-1995 and -11.4 in the period 2001-2005.

of externalities becomes a very important research question.

A simple two-region model adapted to the main features of the Italian dualism provides the theoretical underpinnings of our empirical analysis. The model shows intuitively when migration reduces or intensifies regional unemployment disparities. In our framework, a lower physical capital endowment reduces the labour demand of Southern firms, and a minimum wage generates job-rationing. This creates an incentive to migrate to the North, where the minimum wage is not binding. Migration occurs for all individuals whose migration cost is covered by the Northern wage. In this simple setting without human capital externalities, migration reduces the North-South unemployment gap. However, when we take human capital externalities into account, this result is put into question and migration may well exacerbate the North-South divide. The final effect becomes therefore an empirical issue. This outcome is in line with other studies, as those by Südekum, (2004), Kanbur and Rapoport (2005), and Epifani and Gancia (2005).

The empirical evidence, based on the estimation of dynamic panel data models over the 2002-2011 period, documents that human capital net outflows from the South to the North have increased the unemployment rate in the South and have decreased it in the North. Thus, migration seem to have exacerbated local labour market disparities within Italy over the 2002-2011 decade. Our findings therefore support the existence of important externalities at the regional level in Italy, and suggest that human capital flight is detrimental for the South.

The rest of the paper is organised as follows. Section 2 reports the theoretical model. Section 3 presents some stylised facts on unemployment dynamics and human-capital augmented migration flows. Section 4 discusses the empirical results. Conclusions follow.

## 2 Theoretical framework

The dualism of the Italian economy dates back to centuries. At the moment of Italian unification in 1861, a large gap between the North and the South was already present (Daniele and Malanima, 2007; 2011). In the recent history, an early attempt to fill this gap by taking into account the productivity differential across regions was partitioning the country into 14 macro-areas, the so-called *gabbie salariali* (wage cages). In the poorest areas, wages were 29% lower. However, in 1972

the wage cages were dismantled and, since then, uniform sector-specific wages were adopted (*Statuto dei Lavoratori*). The 1970s were characterised by the centralization of the industrial relations and the introduction of special measures for the South (*intervento straordinario*), including the creation of State-owned industries and the expansion of the public sector within this area. In addition, a generous pension system was adopted country-wide. The structure of industrial relations set up in the 1970s survived basically unchanged until now. Centralised negotiations between unions and entrepreneurs' representatives (*Confindustria*) are still the cornerstone of the national labour market regulation. The result of the negotiation is carried out in the National Labour Contract (*Contratto Nazionale di Lavoro*), which specifies uniform wages all over the country. This contract defines wages with respect to industrial sectors, as well as skill levels and seniority. In the 1990s the introduction of partial labour market reforms has significantly increased the flexibility for newly hired workers.[3] However, the Italian labour market has been heavily regulated until 2015, when the *jobs act* has been enacted.

Imposing a uniform regulation on a dual economy like the Italian one has important effects. Regional adjustment is hindered by regulations and by the existence of a large public sector that sustains reservation wages. These features of the Italian labour merket ultimately foster South-North migration, and can be easily sketched by a two-region model where a minimum wage is binding in the South.

Our model illustrates the conditions under which interregional migration reduces or intensifies regional unemployment disparities. In the absence of externalities, out-migration flows from the South would tend to re-equilibrate the North-South unemployment differential (Burridge and Gordon, 1981). When human capital externalities are introduced into the model, our findings indicate that out-migration may exacerbate the North-South unemployment divide, as pointed out, for instance, by Burda and Wyplosz (1992), Feser and Sweeney (2003), Südekum (2004), Kanbur and Rapoport (2005), and Epifani and Gancia (2005).

[3]See Jimenez-Rodriguez and Russo (2008 and 2012) for a survey of the labour market reforms in Italy and in the EU.

## 2.1 A simplified model of regional disparities

We want to depict how labour market institutions and regulations affect the unemployment in a dual economy where a Southern region ($S$) lags behind a Northern region ($N$). To this aim, we adopt the simplest possible example of a dual labour market with a minimum wage $\tilde{w}$ that is binding in the South but not in the North. This generates unemployment in the South and fosters migration to the North. We can intuitively summarise this situation as follows: let $w^*_{r,p}$ be the market-clearing wage in region $r$ ($r = N, S$) and province $p$ ($p = 1, ...p_N$; $1, ...p_S$, with $p_N$ and $p_S$ being the number of provinces in the North and in the South respectively). The unemployment in region $S$ and province $p$ depends on the gap between the minumum wage $\tilde{w}$ and $w^*_{Sp}$ :

$$u_{Sp} = f(\tilde{w} - w^*_{Sp}(A, K_{Sp}, M_{Sp})) \tag{1}$$

The market-clearing wage depends on the total factor productivity $A$, on the capital stock $K_{rp}$, and on net in-migration $M_{rp}$ (namely, the difference between inflows and outflows). These parameters summarise the supply and demand conditions of the labour market in the province $rp$. For the moment, the total factor productivity is considered uniform across the country.[4] The partial derivatives of the market-clearing wage follow standard intuitions:

$$\frac{\partial w^*_{rp}}{\partial A} > 0; \tag{2}$$

$$\frac{\partial w^*_{rp}}{\partial K_{rp}} > 0; \tag{3}$$

$$\frac{\partial w^*_{rp}}{\partial M_{rp}} < 0. \tag{4}$$

Derivatives (2) and (3) state that the equilibrium wage increases as the total factor productivity or the capital stock increase. Derivative (4) depicts the effect of the in-migration, and simply states that as labour supply increases, the equilibrium wage decreases. These assumptions are quite standard and fit a wide class of production functions.

In order to depict the North-South dualism in Italy, we simply assume $K_{Np} > K_{Sp}$ for any $p$. This implies that, other things being equal, market-clearing wages in the North are higher than market-clearing wages in the South.

[4] This assumption is not important in the model without externalities. It will be relaxed in the next section, where we analyze the effect of externalities.

## 2.2 The decision to migrate

Migration of Southern workers occurs when the Northern wage equals the equilibrium wage $w^*_{Sp}$ that would prevail in the absence of a minumum wage, plus a fixed migration cost $c_i \in [\underline{c}, \bar{c}]$ that varies across individuals according to the continuous distribution $f(c)$. Unemployed Southern workers move to the North if and only if

$$w^*_{Np}(A, K_{Np}, M_{Np}) \geq w^*_{Sp}(A, K_{Sp}, M_{Sp}) + c_i. \tag{5}$$

where $w^*_{Np}$ is the market-clearing wage in the North. Since migration is observed, we assume that condition (5) holds for some Southern workers, thus that there exists $c^* \in [\underline{c}, \bar{c}]$ such that (5) is satisfied. In such a case, the immigrants are given by the integral $\int_{\underline{c}}^{c^*} f(c)dc$. Note that the existence of job rationing in the South implies that in our model migration is driven by the opportunity of finding a job, rather than by wage differentials. This is in line with the Italian experience, where South-North mobility mainly concerns unemployed workers, rather than workers benefiting from wage differentials.

## 2.3 Migration and unemployment without externalities

In order to simplify our exposition, and without loss of generality, we depict the unemployment in the South through a linear form of equation (1)

$$u_{Sp} = \tilde{w} - w^*_{Sp}(A, K_{Sp}, M_{Sp}). \tag{6}$$

We can therefore compute the effect of out-migration from a Southern province where $\tilde{w} > w^*_{Sp}$ by the simple derivative $\partial u_{Sp}/\partial M_{Sp}$. We have

$$\frac{\partial u_{Sp}}{\partial M_{Sp}} = -\left[\frac{\partial w^*_{Sp}}{\partial M_{Sp}}\right] < 0. \tag{7}$$

In other words, net out-migration ($\Delta M_{rp} < 0$) reduces the labour supply in the province, which causes an increase in the equilibrium wage and reduces the gap between the minimum wage and the market-clearing wage. As a consequence, the unemployment decreases as well.

In our stylised model, the North does not suffer from unemployment. This rests on the simplifying assumptions that, in the North, the minimum wage $\tilde{w}$ is not binding and the market is

frictionless. However, if we allow for some market imperfection in the North (due for example to search frictions or efficiency wages), unemployment appears and we can illustrate how it is affected by regional mobility. In the light of the above, suppose that the actual wage is higher than the market-clearing wage, namely that $w_{Np} > w^*_{Np}$. In this case, we can depict unemployment in the North as we do for the South in equation (6):

$$u_{Np} = w_{Np} - w^*_{Np}(A, K_{Np}, M_{Np}). \tag{8}$$

Now, we can easily compute the effect of in-migration ($\Delta M_{rp} > 0$) in a Northern province by means of the following derivative:

$$\frac{\partial u_{Np}}{\partial M_{Np}} = -\left[\frac{\partial w^*_{Np}}{\partial M_{Np}}\right] > 0. \tag{9}$$

Equations (7) and (9) summarise the equilibrating effect of migration in models without externalities. In the next Section we generalise our model in order to allow for the existence of production externalities.

## 2.4 Migration and unemployment with externalities

Since Fujita and Thisse (2002), the existence of regional externalities is well-documented in the literature. We analyze their consequences on the regional divide by following Shukla and Stark (1990) and Stark and Fan (2008). We use a simple textbook approach, and let externalities work through total factor productivity $A$. We now let $A$ depend on human capital, which in our empirical analysis is proxied by human-capital augmented labour. Net out-migration of skilled workers reduces human capital. In-migration of skilled workers has of course the opposite effect. We can write

$$A_{rp} = G(M_{rp}), \qquad \text{with} \qquad \frac{\partial G}{\partial M_{rp}} > 0. \tag{10}$$

Equations (6) and (8) become now

$$u_{Sp} = \tilde{w} - w^*_{Sp}(G(M_{Sp}), K_{Sp}, M_{Sp}) \tag{11}$$

and

$$u_{Np} = w_{Np} - w^*_{Np}(G(M_{Np}), K_{Np}, M_{Np})$$

respectively. The effect of out-migration ($\Delta M_{Sp} < 0$) from a Southern province formerly given by equation (7) modifies to

$$\frac{\partial u_{Sp}}{\partial M_{Sp}} = -\left[\underbrace{\frac{\partial w^*_{Sp}}{\partial M_{Sp}}}_{+} + \underbrace{\frac{\partial w^*_{Sp}}{\partial G}\left(\frac{\partial G}{\partial M_{Sp}}\right)}_{-}\right] \gtreqless 0, \tag{12}$$

where the term $\frac{\partial w^*_{Sp}}{\partial M_{Sp}}$ measures the effect of net in-migration on labour supply, and the term $\frac{\partial w^*_{Sp}}{\partial G}\left(\frac{\partial G}{\partial M_{Sp}}\right)$ measures the effect of net in-migration on the externality. These terms have opposite signs, and the final outcome is undetermined. Analogously, the effect of net in-migration ($\Delta M_{Np} > 0$) into Northern provinces will be

$$\frac{\partial u_{Np}}{\partial M_{Np}} = -\left[\underbrace{\frac{\partial w^*_{Np}}{\partial M_{Np}}}_{-} + \underbrace{\frac{\partial w^*_{Np}}{\partial G}\left(\frac{\partial G}{\partial M_{Np}}\right)}_{+}\right] \gtreqless 0 \tag{13}$$

It is evident that the effect of emigration on the two regions can now take any sign. The equilibrating effect we have seen in the former Section is no longer assured. The final impact of labour mobility on the unemployment cannot be determined *ex-ante*, and it becomes an empirical issue.

# 3 Unemployment dynamics and human-capital augmented migration: some stylised facts

To empirically assess the effect of (human-capital augmented) labour migration on regional unemployment dynamics in Italy, we use longitudinal yearly data for 103 NUTS-3 Italian regions (i.e. provinces) over the period 2002-2011. When not differently indicated, all data are taken from the Italian National Institute for Statistics (ISTAT). [5]

[5] Migration data are derived from a survey ("*Indagine sui trasferimenti di residenza*") carried out by ISTAT. In keeping with the new methodological standards of the EU Regulation 862/2007, ISTAT revised the entire data set from 1995 onward. The more efficient control and correction system guarantees the robustness of the data. With regards to the information on the level of schooling of the migrants, the series have been revised and the data concerning migrants with Italian citizenship have been estimated starting from 2002.

From the mid-90s, the ongoing process of labour market deregulation has contributed to a reduction of the nation-wide unemployment rate coupled to a slight reduction in the North-South divide (see, among others, Prasad and Utili, 1998; Brunello et al., 2001, Kostoris-Padoa-Schioppa and Basile, 2002 for the Italian case; and Jiménez-Rodríguez and Russo, 2008 and 2012). At the same time, a widening of the unemployment disparities among Southern provinces and a resurgence of South-North out-migration flows can be observed (Attanasio and Padoa-Schioppa, 1991; Faini et al., 1997; Basile and Causi, 2007).

Over the period covered by our database, the nation-wide unemployment rate dropped from 8.6 percent in 2002 to 6.1 in 2007, then it grew during the crisis returning to 8.4 in 2011 (Figure 1). The North-South gap has been declining from 2002 to 2009, while remaining stable during the last three years of the sample.[6] As it is well known, the South is characterised by a marked interregional heterogeneity, so that conclusions from Figure 1 are, at least, partial.

*Fig.1*

A more granular inspection using information at the province level indicates that a concentration of higher levels of unemployment occurs within the most disadvantaged Southern areas, as shown in Figure 2, where the univariate density estimate of provincial unemployment rates (computed as arithmetic differences from the national average) in 2002 (dotted line), 2007 (dashed line) and 2011 (bold line) are reported. It emerges an unimodal right-skewed distribution of provincial unemployment rates in 2002, with a higher density for values below the national average. In contrast, the distributions of provincial unemployment in 2007 and 2011 appear markedly different. In both cases we observe a strong tendency towards polarization, with the main peak much more pronounced than in 2002 and a second lower peak at around 4 percent above the national average. The change in the distribution reflects the effect of the Great Recession: unemployment rates started growing in the Northern provinces and, subsequently, in the rest of Italy.

*Fig.2*

[6] In the Italian case it is customary to distinguish between South or Mezzogiorno (including the following NUTS-2 regions: Campania, Abruzzo, Molise, Basilicata, Calabria, Puglia, Sicilia and Sardegna) and Center-North or simpler North (including the following NUTS-2 regions: Valle d'Aosta, Piemonte, Lombardia, Trento, Bolzano, Friuli Venezia Giulia, Veneto, Liguria, Emilia Romagna, Marche, Toscana, Lazio and Umbria).

Figures 3a and 3b show the map of the decile distribution of annual averages (for 2002-2007 and 2007-2011 periods respectively) of provincial unemployment growth rates. We observe a diffused tendency towards the reduction of unemployment rates in 2002-2007. On the other hand, there is broad evidence of positive growth rates of unemployment in the subsequent period. The highest growth rates appear in the North, while in the South we observe a strong heterogeneity across provinces.

*Fig.3a* and *Fig.3b*

As for human capital-augmented migration flows, we compute the average educational level of migrants. Specifically, we adopt the following formula:

$$migr_h = \sum_k migr_k D_k \times 100 \tag{14}$$

where $migr_k = M_k/P_k$ is the net migration rate of people with the *k-th* level of schooling and $D_k$ is the duration in years of the *k-th* level.[7] The net migration rate $M_k$ is the balance between the number of registrations and cancellations of people aged 15 and over (working-age population) from the municipality registry divided by the total residential population aged between 15 and over. Moreover, in order to better isolate migration based on economic grounds, we select South-North migration flows, i.e. those originated from Southern to Northern provinces and *viceversa*. All Southern provinces have recorded negative values during the period 2002-2011, with higher values (higher out-migration and/or lower in-migration) in 2007-2011. The opposite holds for Northern provinces, as the maps in Figures 4a and 4b show.

*Fig.4a* and *Fig.4b*

Overall, the evidence from the maps of Figures 3 and 4 suggests that the relationship between unemployment dynamics and migration flows is quite intricate and calls for a more in-depth investigation. Accordingly, the following Section provides compelling evidence on the effect of interregional labour mobility on local labour performances.

[7]We consider four education levels: 1) up to the primary school, 2) lower secondary school, 3) upper secondary school and 4) tertiary education level. The duration of each level is 3, 8, 13, and 18 years, respectively.

# 4 Empirical analysis

## 4.1 Econometric framework

To analyze the effect of migration on provincial unemployment disparities in Italy, we rely on the following dynamic panel data model specification:

$$u_{i,t} = \tau u_{i,t-1} + \sum_j \gamma_j X_{j,i,t} + \eta_i + \lambda_t + \varepsilon_{i,t} \tag{15}$$

where $i = 1, ..., N$ indexes provinces, $t = 1, ..., T$ denotes time periods, and $\varepsilon_{i,t} \sim MA(0)$ is the error term. In model (15), the current annual regional unemployment rate ($u_{i,t}$) is a function of its lagged value in order to account for persistence effects, and of a set of $j$ explanatory variables ($X_{j,i,t}$) which may include endogenous regressors.

The key explanatory variable in the present context is the human-capital augmented net migration rate ($migr_h$). In the empirical setup we also consider possible asymmetric effects of in-migration and out-migration by including separately the (the human-capital augmented) in-migration rate ($in - migr_h$) and out-migration rate ($out - migr_h$).

In keeping with the existing literature (e.g. Molho, 1995; Partiridge and Rickman, 1997; Overman and Puga, 2002), the regional unemployment rate is likely to depend on factors that affect labour supply and demand. Accordingly, we include in the set of regressors the following variables: *i*) the employment growth rate ($\Delta emp$), *ii*) the participation rate ($part$), and *iii*) the share of employment in services ($ser$) and in manufacturing ($man$) on total employment. The fixed regional effects ($\eta_i$) allow us to control for unobserved regional heterogeneity (such as regional producer and consumer amenities affecting both regional unemployment and labour migration), while the fixed temporal effects ($\lambda_t$) capture possible un-modeled factors (such as business cycles developments).[8]

In order to account for regional disequilibrium labour market dynamics, the employment growth rate ($\Delta emp_{i,t}$) in percentage terms is included in the set of explanatory variables. It is expected to have a negative effect on the unemployment, net of the partial absorption of new jobs by new immigrants. This is not surprising because the change in employment directly affects the unemployment. Wages or unit labour costs are another variable capturing disequilibrium effects. Unfortunately,

[8]The role of labour mobility is likely to be stronger in good times than in bad times.

these data are only available at the NUTS-2 level, and they have been excluded from the analysis.

The effect of the labour force participation rate ($part_{i,t} = 100 \times \frac{LF_{i,t}}{Workpop_{i,t}}$), defined as the ratio between total labour force and the working population (population aged between 15 and over), is ambiguous. On the one hand, a positive effect may occur if a faster growth of the labour force (i.e., young people) is not compensated by an equally fast growth of new jobs (or vacancies). On the other hand, its expected effect might be negative when factors determining low participation rates in a region also reflect relatively low investments in human capital and low commitment to working life, resulting in higher risks of unemployment for people with these characteristics.

Finally, differences in the industrial mix may affect regional unemployment dynamics. Provinces specializing in growing sectors, such as services, are expected to exhibit lower unemployment rates than those based on declining industries (such as agriculture). As in previous works (Overman and Puga, 2002, among others), we use the employment shares of the two main industries, with an expected negative effect for $ser_{i,t}$ and a positive sign for $man_{i,t}$.[9]

We use the System-GMM (Generalised Method of Moments) approach (Blundell and Bond, 1998) to account for the endogeneity of right-hand side variables (namely employment growth rates, participation rates and net migration rates).[10] We complement internal GMM instruments with a set of external instruments, namely *i*) the share of provincial population aged between 15 and 24 on the total provincial population, *ii*) the share of provincial population aged between 25 and 39 on the total provincial population, *iii*) the share of provincial population aged between 40 and 64 on the total provincial population, *iv*) the log of provincial average house price (source: Bank of Italy), and *v*) the log of provincial disposable income (source: Prometeia). As the age structure of the population may be affected by past migration flows, while disposable income and house prices may be conditioned by past unemployment conditions, we carefully test the validity of these external instruments through the difference in Hansen test after controlling that they do not enter significantly the model.

[9] We are aware that a finer classification would be advisable for this kind of analysis. Unfortunately, more detailed sectoral information (Census data) is only recorded over decades rather than on a yearly basis.

[10] A number of studies have suggested a possible reverse causality problem in the relationship between unemployment and migration rates (e.g. Pissarides and McMaster, 1990; Jackman and Savouri, 1992; Basile and Causi, 2007).

An important issue in the application of System-GMM estimators concerns the fact that the number of instruments increases with the sample size $T$ (it is quadratic in $T$). A large number of instruments can overfit instrumented variables and leads to inaccurate estimations of the optimal weight matrix, leading to downward biased two-step standard errors and, thus, wrong inference in the Hansen test (Roodman, 2009). To avoid these problems, we use a restricted set of instruments for GMM estimates. Specifically, the number of instruments for the estimation of first differences equations is set in the range between one and two in that we use one or two lagged levels in time periods $t-1$, $t-2$ as instruments, while we use one period lagged first-differences for GMM in levels equations.

## 4.2 Estimation results

Results from the two-step dynamic System-GMM robust estimations of equation (15) are shown in Table 1. The estimated short-run and long-run effects of the included regressors are reported in Table 2. The baseline specification (Model 1) is based on total net South-North migration rates and *viceversa*, computed taking into account the education level of the migrants, as defined in condition (14). Model 2 aims at testing possible asymmetric effects of in-migration and out-migration by including separately human-capital augmented in-migration (*In-migr*) and out-migration (*Out-migr*) rates, computed as the number of human-capital weighted registrations and cancellations from the municipality registry (divided by the human-capital weighted total residential working age population), respectively.

*Tab.1* and *Tab.2*

As for Model 1, regional unemployment rates turn out to be highly persistent: the lagged dependent variable enters positively and significantly with a parameter of 0.59, in a way consistent with the existent literature. Net of this autoregressive process, the net migration rate has a negative impact on regional unemployment dynamics: the short run effect is -10.6, while the long run effect is equal to -25.7 (-10.631/(1-0.587)). This evidence signals the lack of an equilibrating role of labour mobility. In keeping with our theoretical framework, the negative effect of the human-capital augmented net migration rate points to the existence of externalities and gives empirical support

to the idea that workforce outflows may worsen local labour market performances. As expected, higher employment growth lowers provincial unemployment (short run effect equal to -0.12, long run effect equal to -0.28), while increasing participation rates exert detrimental effects on local labour market performances (short run effect equal to 1.32, long run effect equal to 3.19). The positive effect of the participation rate along with the negative effect of the employment growth rate suggests, in particular, that labour market conditions in the less developed areas have worsened as a result of a faster growth of the labour force (i.e., young people) in contrast to a lower growth of new jobs (or vacancies). Finally, higher shares of employment in manufacture and services reduce unemployment. Hence, provinces specialised in these industries exhibit lower unemployment than provinces with a different industrial structure.

The evidence emerging from Model 2 documents that, in contrast to the neoclassical predictions, out-migration of human capital increases the unemployment rate, and in-migration flows of human capital exert the opposite effect. The effect of employment growth remains negative and highly significant in terms of both short-run and long-run effects (Table2). The same conclusion of Model 1 holds true for the participation rate, the magnitude of the estimate effects being in line with the counterpart of the baseline model. On the other hand, the coefficients of the regressors related to the structure of the economy turn out to be statistically not significant (share of employment in services) or weakly significant (share of employment in manufacture). Interestingly, the Wald test does not reject the equality of the parameters of (*In-migr*) and (*Out-migr*), suggesting that in-migration and out-migration rates produce symmetric effects on regional unemployment in Italy, as the lowemost entry of Table 3 shows. Moreover, in both specifications the test statistics of serial correlation (AR1 and AR2), the Hansen test and the C-statistics for the level equation (i.e. the difference-in-Hansen statistic between the set of instruments of the System-GMM and that of the Arellano-Bond first difference GMM model) and for the external instruments, indicate that the instruments used in System-GMM estimations satisfy the required orthogonality conditions, confirming the adequacy of our econometric setup (Table 3).

*Tab.3*

### 4.3 Robustness check: controlling for spatial autocorrelation

A further specification issue relates the possible role of spatial autocorrelation owing to a number of reasons: i) frictional effects of distance related to commuting (Patacchini and Zenou, 2007); ii) agglomeration effects arising from demand linkages across nearby areas (Overman and Puga, 2002); iii) omitted time-varying variables clustered in space (LeSage and Pace, 2009). Given that the un-modelled spatial autocorrelation may lead to misleading estimates and inference, we estimate the following spatial Durbin version of the dynamic Model 1 (Model 3):

$$\begin{aligned} u_{i,t} &= \tau u_{i,t-1} + \delta_1 \sum_{j \neq i} w_{ij} u_{j,t} + \delta_2 \sum_{j \neq i} w_{ij} u_{j,t-1} + \\ &+ \sum_k \gamma_k X_{k,i,t} + \sum_k \theta_k \sum_{j \neq i} w_{ij} X_{k,j,t} + \eta_i + \lambda_t + \varepsilon_{i,t} \end{aligned} \tag{16}$$

where $w_{ij}$ represents a general element of a distance-based spatial weighting matrix. Specifically, it represents a combination of a binary spatial weight based on the critical cut-off criterion and a decreasing function of pure geographical distance, namely the inverse distance function ($d_{ij}^{-1}$):

$$w_{ij} = \begin{cases} d_{ij}^{-1} / \sum_{j \neq i} d_{ij}^{-1} & if \quad 0 < d_{ij} < d^* \\ 0 & if \quad i = j \quad or \quad if \quad d_{ij} > d^* \end{cases}$$

where $d_{ij}$ is the great-circle distance between the centroids of provinces $i$ and $j$.[11] The selected cut-off distance ($d^*$) corresponds to the minimum distance that allows all provinces to have at least one neighbor.

The parameter of Model 3 are estimated using bias-corrected quasi-maximum likelihood (QML) estimators (Lee and Yu 2010). This method allows to control for the endogeneity of time and spatial lags of the dependent variable, but not for the endogeneity of the other regressors (e.g. the net migration rate). Thus, we interpret with caution the results of this robustness check against the spatial autocorrelation bias hypothesis.

The results are reported in Table 4. The parameter $\delta_1$ associated with the spatially lag term of unemployment turns out to be statistically significant, even though it is not very large in magnitude

[11] Geographic distance has frictional effects on labour market activity. Workers prefer to find a job in their closer environment because commuting and moving entail monetary and psychological costs. Therefore, we use great circle distances between centroids of provinces to define the entries of the spatial weights matrix.

(0.1). This implies that the characteristics of province $i$ (for example, its level of net-migration) or an idiosyncratic shock in that province do not only influence the unemployment dynamics in that location, but that they also affect the outcome of all other regions with an intensity that decreases with distance. In other words, the coefficients associated to each explanatory variable lose their typical interpretation since a change in a single observation (region) associated with any given explanatory variable will affect the region itself (a direct impact) and potentially affect all other regions indirectly (an indirect or spatial spillover effect) through the spatial multiplier mechanism. The direct impact includes the effect of feedback loops where observation $i$ affects observation $j$ and observation $j$ also affects $i$. Moreover, direct and indirect effects change according to the spatial position of the region.

*Tab.4*

In the presence of spatial spillovers, it is customary to measure the average (across regions) direct (ADE) and indirect effects (AIE). The sum of average direct and indirect effects is called average total effect (ATE). Moreover, given the dynamic specification of the model, we can also compute both short run and long run ADE, AIE and ATE (see Elhorst, 2014). Focusing on the effect of labour migration, the results reported in Table 5 clearly indicate that, even controlling for spatial dependence, both direct and indirect marginal effects of human-capital augmented net migration rate are negative both in the long run and in the short run. These findings corroborate the idea that human capital outflows worsen local labour market performances and exacerbate the divide between backward areas and the rest of the country.

*Tab.5*

# 5 Conclusions

This work has investigated whether or not interregional migration helps to equilibrate regional labour market performances. According to the textbook case of efficient local labour markets with homogenous labour and idiosyncratic random shocks over time and across regions, labour mobility eliminates disparities in regional unemployment rates. As a consequence, interregional mobility

should be encouraged. However, the effects of interregional labour migration change drastically when standard texbook assumptions are relaxed. For instance, in the presence of agglomeration forces or selective migration, interregional labour mobility is likely to magnify regional disparities in the unemployment rate.

Our analysis has focused on the Italian case over the 2002-2011 period, which was characterised by a sustained outflow of skilled workers from the South to the North. Using longitudinal data at the NUTS-3 level, we have documented that net outflows of human capital from the South to the North have increased the unemployment rate in the South and decreased the unemployment rate in the North, suggesting that human capital externalities are very important in Italy. In particular, we have shown that selective migration exacerbates spatial unemployment disparities in the South: Southern provinces which have experienced the strongest out-migration of skilled workers are also those with the poorest performance in terms of employment.

Our results turn upside down the policy implications based on simple textbook models, and suggest that curbing the brain drain from the South should be a priority in order to reduce the long-run North-South dualism. In this respect, policies could include incentives and/or subsidies to R&D activities and to the recruitment of skilled workers. Supporting the start-up of innovative businesses would also help to hold human capital. Finally, we should also emphasise the importance of policies aimed at increasing the stock of physical capital, which enhances human capital productivity and reduces emigration by itself.

# References


[1] Attanasio O. and Padoa-Schioppa F. (1991), "Regional inequalities, migration and mismatch in Italy, 1960-86", in F. Padoa-Schioppa (ed.), Mismatch and labor mobility. Cambridge, Cambridge University Press.

[2] Baddeley M., Martin R. and Tyler P. (2000), "Regional wage rigidity: the European Union and United States compared", Journal of Regional Science, 40: 115-142.

[3] Basile R. and Causi M. (2007), "Le determinanti dei flussi migratori nelle province italiane: 1991-2000", Economia e Lavoro, 2: 139-159.

[4] Bayer C. and Jüben F. (2007), "Convergence in West German Regional Unemployment Rates", German Economic Review, Verein fur Socialpolitik, 8: 510-535.

[5] Blanchard O.J. and Katz L.F. (1992), "Regional evolutions", Brooking Papers on Economic Activities, 1: 1-75.

[6] Blundell R. and Bond S. (1998), "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models", Journal of Econometrics 87: 115-143.

[7] Bonasia M. and Napolitano O. (2012), "Determinants Of Interregional Migration Flows: The Role Of Environmental Factors In The Italian Case", Manchester School 80: 525-544.

[8] Brunello G., Lupi C. and Ordine P. (2001), "Widening Differences in Italian Regional Employment", Labour Economics, 8: 103-129.

[9] Burda M. C. (1995), "Migration and the Option Value of Waiting", Sonderforschungsbereich, Humboldt Universitaet Berlin, 373 1995-58.

[10] Burda M. C. and Wyplosz C. (1992), "Human Capital, Investment and Migration in an Integrated Europe", European Economic Review, February, 677-684.

[11] Burridge P., Gordon I. (1981), "Unemployment in the British Metropolitan Labour Areas", Oxford Economic Papers, 33:274-297.

[12] Chiri S. (2006), "Le Politiche per il Mezzogiorno dopo il 1992", in Cannari L. and Panetta F., Il Sistema Finanziario e il Mezzogiorno, Bari: Cacucci, 339-383.

[13] Daniele V. and Malanima P. (2007), "Il prodotto delle regioni e il divario Nord-Sud in Italia (1861-2004)", Rivista di Politica Economica, 97: 1-49.

[14] Daniele V., Malanima P., (2011), "Il prodotto delle regioni e il divario Nord-Sud in italia, 1861-2011", Rubbettino.

[15] Decressin J. and Fatàs A. (1995), "Regional Labour Market Dynamics in Europe", European Economic Review, 39: 1627-1655.

[16] Elhorst J.P. (2014), Spatial econometrics: from cross-sectional data to spatial panels, Heidelberg, Springer.

[17] Epifani P. and Gancia G.A. (2005), "Trade, Migration and Regional Unemployment", Regional Science and Urban Economics, 35: 625-644.

[18] Faini R., Galli G., Gennari P. and Rossi F. (1997), "An Empirical Puzzle: Falling Migration and Growing Unemployment Differentials among Italian Regions", European Economic Review, 4: 571-579.

[19] Feser E. and Sweeney S. (2003), "Out-migration, depopulation and the geography of U.S. economic distress", International Regional Science Review, 26: 38-67.

[20] Francis J. (2009), "Agglomeration, job flows and unemployment", Annals of Regional Science, 43: 181-198.

[21] Fujita M. and Thisse J. F. (2002), Economics of Agglomeration, Cambridge: Cambridge University Press.

[22] Groenewold N. (1997), "Does migration equalize regional unemployment rates? Evidence from Australia", Papers in Regional Science, 76: 1-20.

[23] Jackman R. and Savouri S. (1992), "Regional Migration in Britain: An analysis of gross flows using NHS Central Register Data", Economic Journal, 102:1433-1450.

[24] Jiménez-Rodríguez R. and Russo G. (2012), "Aggregate employment dynamics and (partial) labour market reforms", Bulletin of Economic Research 64: 430-448.

[25] Jiménez-Rodríguez R. and Russo G. (2008), "Institutional rigidities and employment rigidity on the Italian labour market ", Applied Economics Quarterly 54-3: 1-11.

[26] Kanbur R. and Rapoport H. (2005), "Migration selectivity and the evolution of spatial inequality", Journal of Economic Geography, 5: 43-57.

[27] Kostoris-Padoa-Schioppa F. and Basile R. (2002), "Unemployment Dynamics in the 'Mezzogiornos of Europe': Lessons for the Mezzogiorno of Italy", CEPR Discussion Paper, 3594.

[28] LeSage J.P. and Pace R.K. (2009), Introduction to Spatial Econometrics, CRC Press Taylor & Francis Group, Boca Raton, London, New York.

[29] Lee L. and Yu J. (2010), "A spatial dynamic panel data model with both time and individual fixed effects", Econometric Theory, 26: 564-597.

[30] Marston, S. T. (1985), "Two views of the geographic distribution of unemployment", The Quarterly Journal of Economics, 57-79.

[31] Mocetti S. and Porello C. (2010), "La mobilità del lavoro in Italia: nuove evidenze sulle dinamiche migratorie", Questioni di Economia e Finanza (Occasional papers), Banca d'Italia, n. 61.

[32] Möller J. (1995), "Empirische Analyse der Regionalentwicklung", in Gahlen B., Hesse H. and Ramser H. J. (Eds) Standort und Region – neue Ansätze zur Regionalökonomik. Wirtschaftswissenschaftliches Seminar Ottobeuren 24: 197–234. Mohr, Tübingen.

[33] Overman H.G. and Puga D. (2002), "Unemployment Clusters across Europe's Regions and Countries", Economic Policy, 34: 116-147.

[34] Patacchini E. and Zenou Y. (2007), "Spatial dependence in local unemployment rates", Journal of Economic Geography, 7: 169-191.

[35] Partridge M. and Rickman D. (2006), "An SVAR model of fluctuations in U.S. migration flows and state labor market dynamics", Southern Economic Journal, 72: 958-980.

[36] Pissarides C.A. and McMaster I. (1990), "Regional Migration, Wages and Unemployment: Empirical Evidence and Implications for Policy", Oxford Economic Papers, 42: 812-831.

[37] Prasad E.S. and Utili F. (1998), "The Italian Labor Market: Stylized Facts, Institutions and Directions for Reform", IMF Working Paper.

[38] Roodman D. (2009), "A Note on the Theme of Too Many Instruments", Oxford Bulletin of Economics and Statistics, 71: 135-158.

[39] Shukla V. and Stark O. (1990), "Policy comparisons with an agglomeration effects-augmented dual economy model", Journal of Urban Economics, 27: 1-15.

[40] Stark O. and Fan C. S. (2008), "Rural-to-Urban Migration, Agglomeration and Capital Accumulation", Journal of Economic Behavior & Organization, 68: 234-247.

[41] Südekum J. (2004), "Selective migration, union wage setting and unemployment disparities in West Germany", International Economic Journal, 18: 33-48.

[42] Südekum J. (2005) "Increasing returns and spatial unemployment disparities", Papers in Regional Science 83: 159-181.

[43] Windmeijer F. (2005), "A finite sample correction for the variance of linear efficient two-step GMM estimators", Journal of Econometrics, 126: 25-51.

[44] Wrage P. (1981), "The regional effects of internal migration on regional wage and unemployment disparities in Canada", Journal of Regional Science, 21: 51-63.

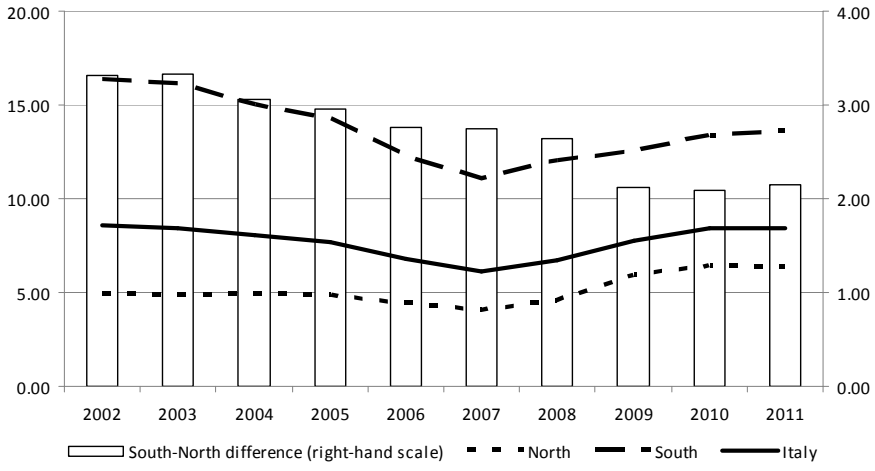


Figure 1: National unemployment rate and North-South divide: 2002-2011

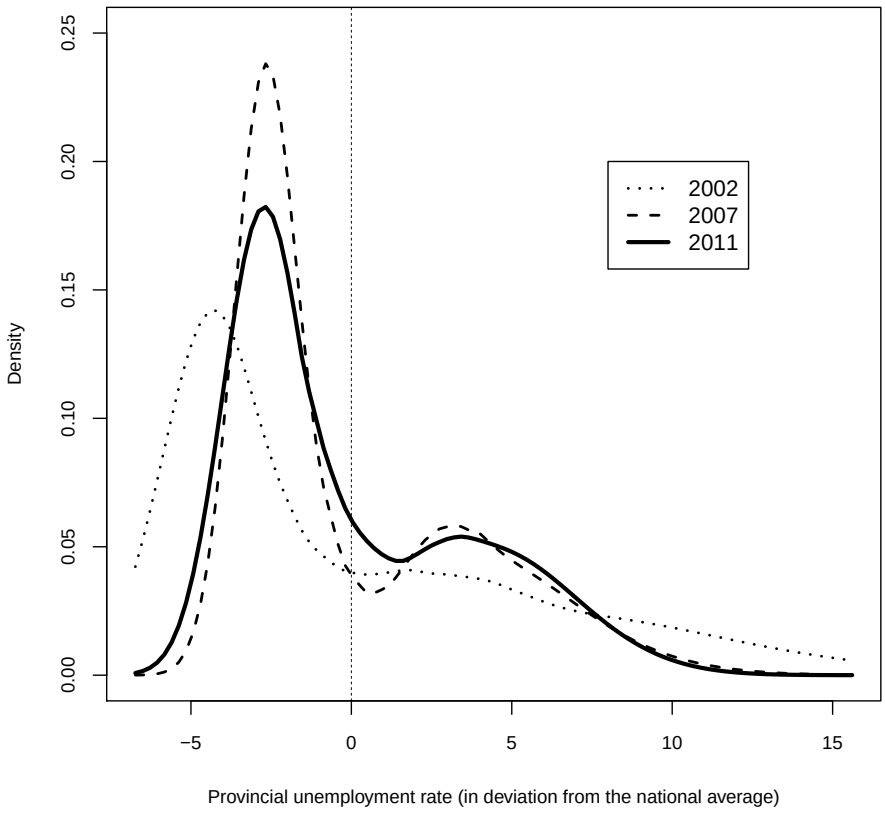


Figure 2: Density estimation of provincial unemployment rates: 2002, 2007 and 2011

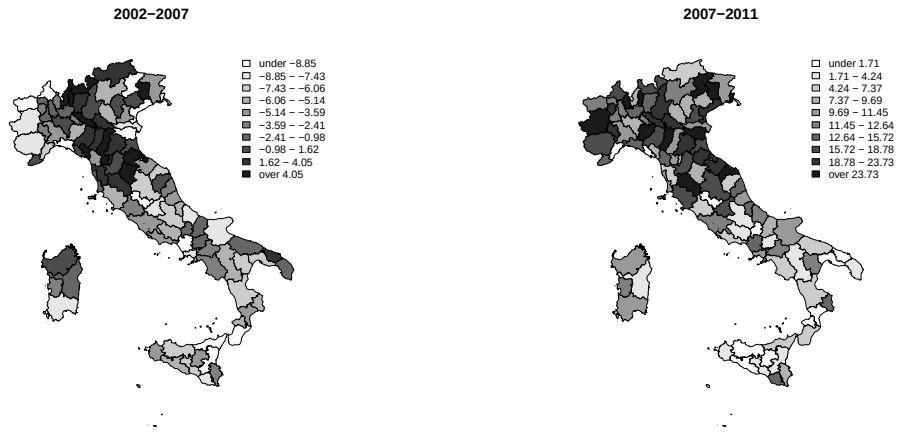


Figure 3: Provincial unemployment growth rates (annual averages): 2002–2007 and 2007-2011

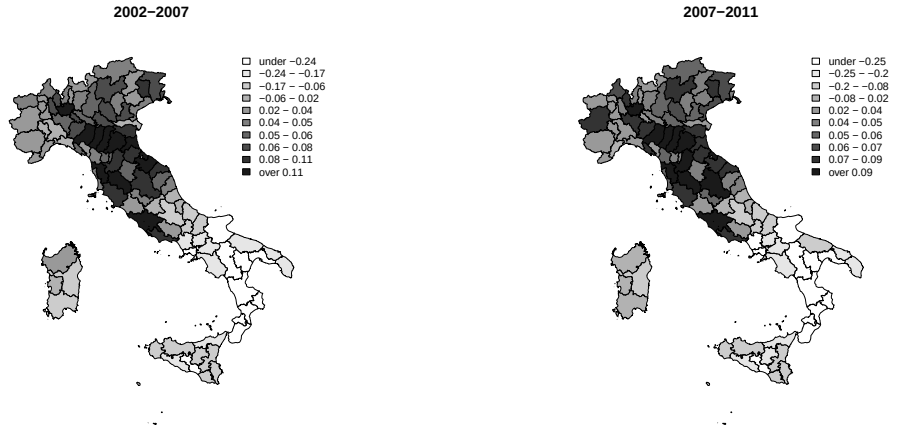


Figure 4: Provincial net migration rates (annual averages): 2002-2007 and 2007-2011

Table 1: Dynamic panel data models. Estimation results

| | Model 1 | Model 2 |
|---|---|---|
| *Variables* | *Coefficients (s.e. in parentheses)* | |
| $u_{t-1}$ | 0.587*** (0.049) | 0.581*** (0.050)) |
| $migr$ | -10.631*** (2.928) | |
| $in - migr$ | | -7.668* (4.728) |
| $out - migr$ | | 10.338*** (3.425) |
| $\Delta emp$ | -0.115*** (0.025) | -0.116*** (0.027) |
| $ser$ | -0.088* (0.046) | -0.054 (0.056) |
| $man$ | -0.130** (0.055) | -0.107* (0.063) |
| $part$ | 1.317** (0.625) | 1.025*** (0.634) |

Notes: the dependent variable is $u_t$). Models are estimated by two-step system robust GMM method in a way to incorporate Windmeijer's (2005) finite-sample correction. Standard errors in parenthesis and P-values in brackets. $*$, $**$ and $***$ denote significance at the 1, 5 and 10 per cent levels respectively. Time dummies are included in all models, albeit not reported.

Table 2: Dynamic panel data models. Short and Long run effects

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| *Variables* | Short run | Long run | Short run | Long run |
| $migr$ | -10.631*** | -25.717*** | | |
| $in - migr$ | | | -7.668* | -18.340* |
| $out - migr$ | | | 10.338*** | 24.726*** |
| $\Delta emp$ | -0.115*** | -0.278*** | -0.116*** | -0.278*** |
| $ser$ | -0.088* | -0.213* | -0.054 | -0.131 |
| $man$ | -0.130** | -0.316** | -0.107* | -0.257* |
| $part$ | 1.317** | 3.187** | 1.025* | 2.453* |

Notes: $*$, $**$ and $***$ denote significance at the 1, 5 and 10 per cent levels respectively.

Table 3: Dynamic panel data models. Diagnostic tests

| | Model 1 | Model 2 |
|---|---|---|
| *Variables* | *Coefficients (s.e. in parentheses)* | |
| $AR(1)$ | [0.000] | [0.000] |
| $AR(2)$ | [0.887] | [0.863] |
| Hansen $J$ | [0.159] | [0.089] |
| $C$-Stat. instr. for levels | [0.974] | [0.520] |
| $C$-Stat. external instr. | [0.964] | [0.537] |
| Test $H_0 : In - migr = Out - migr$ | | [0.331] |

Notes: the dependent variable is $u_t$). $AR(1)$ and $AR(2)$ are the Arellano and Bond tests for first and second-order serial correlation; Hansen $J$ is the over-identification test; $C$-statistics are difference-in-Hansen statistics ($H_0$: exogenous).

Table 4: Dynamic spatial panel data specification. Estimation results

| | Model 3 |
|---|---|
| *Variables* | *Coefficients (s.e. in parentheses)* |
| $u_{t-1}$ | 0.467*** (0.034) |
| $Wu$ | 0.101** (0.043) |
| $Wu_{t-1}$ | 0.018 (0.014) |
| $migr$ | -3.448** (-1.192) |
| $\Delta emp$ | -0.148*** (1.013) |
| $ser$ | 0.111* (0.047) |
| $man$ | 0.133 (0.062) |
| $part$ | 0.274** (0.027) |
| $Wmigr$ | 3.912** (1.672) |
| $W\Delta emp$ | -0.004 (-0.011) |
| $Wser$ | -0.060 (0.055) |
| $Wman$ | -0.211*** (-0.075) |
| $Wpart$ | -0.062 (-0.093) |

Notes: the dependent variable is $u_t$). The dynamic spatial panel data specification is estimated by by QMLE. Standard errors in parenthesis and P-values in brackets. $*$, $**$ and $***$ denote significance at the 1, 5 and 10 per cent levels respectively. Time dummies are included in all models, albeit not reported.

Table 5: Dynamic spatial panel data specification. Short and Long run effects

| | | Model 3 | |
|---|---|---|---|
| *Variables* | | Short run | Long run |
| *migr* | ADE | -3.590*** | -7.113*** |
| | AIE | -4.186*** | -10.038*** |
| | ATE | -7.777*** | -17.152*** |
| $\Delta emp$ | ADE | -0.154*** | -0.305*** |
| | AIE | -0.179*** | -0.429*** |
| | ATE | -0.333*** | -0.733*** |
| *ser* | ADE | 0.116* | 0.229* |
| | AIE | 0.135* | 0.324* |
| | ATE | 0.251* | 0.554* |
| *man* | ADE | 0.135* | 0.267* |
| | AIE | 0.157* | 0.377* |
| | ATE | 0.291* | 0.643* |
| *part* | ADE | 0.283*** | 0.559*** |
| | AIE | 0.329*** | 0.786*** |
| | ATE | 0.612*** | 1.345*** |

Notes: $*$, $**$ and $***$ denote significance at the 1, 5 and 10 per cent levels respectively. $ADE$ direct marginal effect, $AIE$ indirect marginal effect, $ATE$ average total effect (ADE+AIE).