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Youth labour market performances in the Russian and Italian regions

Olga Demidova [a], Enrico Marelli [b], Marcello Signorelli [c,*]

[a] Department of Applied Economics, National Research University Higher School of Economics, Moscow, Russia
[b] Department of Economics and Management, University of Brescia, Italy
[c] Department of Economics, University of Perugia, Italy

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ABSTRACT

The focus of this paper is on youth unemployment in Italy and Russia: in both countries, youth unemployment rates (YURs) are higher than adult (or total) ones. Despite these general trends, there are significant regional differences in YURs and above-average YUR regions tend to cluster close to each other. Moreover, a distinction between "North" and "South" regions seems appropriate for both countries. The purpose of this study is to identify key determinants of YURs in the Russian and Italian regions, for the period 2000–2009. We also search for the existence of distance spatial effects. In particular, we estimate a modified Arellano–Bond model for the regional YUR, including some explanatory and control variables (e.g. regional GDP in PPP, regional population density, regional total unemployment rate), together with year dummies and North/South dummies. The use of distance matrixes enables important analysis to be conducted on the role played by spatial effects, which turn out to be significant. Also the negative impact of the 2008–2009 crisis is statistically confirmed (at least in the case of Italy). The relevant policy implications are highlighted in the conclusions.

* Corresponding author. Tel.: +39 0755855279.
E-mail addresses: demidova@hse.ru (O. Demidova), enrico.marelli@unibs.it (E. Marelli), marcello.signorelli@unipg.it (M. Signorelli).

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1. Introduction

In most European countries, the youth unemployment rate (YUR) is twice or three times higher than the total unemployment rate (UR). In Italy, as in many other countries in the South of Europe, YURs are much higher than adult rates. Also in Russia, YURs are particularly high. In general, the recent economic crisis abruptly ended the gradual decline in global YUR recorded during the period 2002–2007 (ILO, 2012).

Unemployment and youth unemployment have been extensively investigated, also in international comparisons at the country level. However, studies on unemployment in general, and youth unemployment in particular, at a regional (sub-national) level are rare. In order to help fill this gap, the main purposes of this paper are to analyse the regional differentiation of the YUR in two major countries, Russia and Italy; to investigate the key determinants in both countries for the 2000–2009 period; and to detect the spatial effects of possible mutual influence across the regions within each of the two countries.

Russia and Italy are very different economies in several respects; however, they have some similarities in the regional differentiation of their labour markets. Despite their different sizes, the regional differences in unemployment and other labour market indicators are significant in both countries. In other European countries, also the big ones (like France, the United Kingdom, and even Germany itself), regional differentiation is less pronounced. To anticipate the outcome of the research reported in this paper, we found not only that there are significant regional differences among youth unemployment rates (YUR) in both countries, but also that above-average YUR regions tend to cluster close to each other.

The regional breakdown focuses on the North/South dichotomy for both countries. In the case of Italy this distinction is natural, since there is a huge body of literature concerning the gap between southern (Mezzogiorno) and northern regions both in general economic terms and with reference to the labour market situation. As far as Russia is concerned, other types of sub-national disaggregation have been considered: for example Demidova et al. (2013) focused on East–West differentiation, which turned out to be statistically significant. However, there have also been some studies on the possible existence of a North/South distinction in the case of Russia as well: for example, Demidova and Signorelli (2011) highlighted the worse performance of Southern Russian regions, especially in the 1998–1999 crisis period. Nevertheless, the present paper is one of the first to focus explicitly on the North–South dichotomy in Russian labour markets.

While the focus of our empirical investigation is on spatial (regional) differences, the inclusion of time dummies in our estimations allows us to detect the possible impact of the 2008–2009 financial crisis and the consequent Great Recession. The negative impact has been found to be statistically significant for Italy (in the year 2009). For Russia, it is probably necessary to consider a longer period including many years after the crisis. To be noted is that the labour market impact of recessions is always delayed (in normal recessions unemployment reaches top values 18 months after the start of the recession); but it is even longer in the case of financial crises (see IMF, 2010).

Section 2 conducts a literature review focusing on the youth unemployment problem and on the regional differences. Section 3 presents the data used in the empirical analysis, details about the variables used, and our initial hypotheses. Section 4 sets out the econometric specification and the results of estimations. Section 5 concludes.

2. Literature review

The first strand of literature which is worth exploring concerns the causes of high and persistent YUR. As stated in the Introduction, the YUR is, in most countries, at least twice as high as the total UR; but in some countries the ratio is more than 3 (note that most empirical studies refer to individuals aged 15–24 years old, but other ages are sometimes considered). Besides macroeconomic, demographic and structural determinants of unemployment, policies and institutions also play a major role.[1] The

[1] OECD (2006) found that almost two-thirds of non-cyclical unemployment changes over two decades can be explained by changes in policies and institutions.

importance of active labour market policies (ALMP) and of unemployment benefits (amount, duration, and replacement ratio) has been shown by many empirical studies. With specific reference to young workers, the implications of the wide adoption of temporary contracts have been especially investigated (e.g. Booth et al., 2002). In fact, following a recession, young workers are among the first to lose their jobs, because of the reduction in labour demand, and because school-leavers compete with more jobseekers for fewer vacancies (Scarpetta et al., 2010).

This is one reason why youth unemployment seems especially sensitive to cyclical economic conditions. Also the long-run consequences of big recessions – loss of work experience and human capital, lower employability and reduced earnings, poorer job quality and precarious employment – are particularly worrying.[2] After the recent crisis, the increase in the YUR has been generally larger than the rise in the total rate: young workers, who have weaker work contracts, lower qualifications and less experience than older workers, have borne the brunt of the "Great Recession".[3]

Some studies focus on the more specific variables relevant for the determination of the YUR (as compared to general unemployment rates). They refer to human capital levels, skill mismatches, school-to-work transition processes. Young people with low human capital and fewer skills are frequently exposed to long-term unemployment, unstable and low quality jobs, and social exclusion (OECD, 2005); but, besides education, also the "youth experience gap" in many cases reduces the employability of young people.

The second strand of literature reviewed in this section concerns the regional analysis of labour market problems. The regional dimension of unemployment was first considered in the seminal work by Blanchard and Katz (1992). Elhorst (2003) provides a comprehensive review of theoretical and empirical studies on regional unemployment. Marelli et al. (2012) show that regional unemployment differentials are wide and persistent, and that low unemployment regions tend to cluster close to each other. Moreover, such differentials exhibit a clear core-periphery pattern, since high and persistent unemployment is concentrated in peripheral regions. Some other authors have attempted to identify, within and across countries, groups of regions with specific characteristics.[4]

Much more scarce are studies on "youth" unemployment (rather than general unemployment) at the regional level. We mention here Perugini and Signorelli (2010a) for the EU regions, Perugini and Signorelli (2010b) for the transition countries,[5] Demidova and Signorelli (2012) and Demidova et al. (2013) for the Russian regions.[6] Even in regard to the unemployment impact of the recent crisis there is a lack of studies at the regional level.[7]

Finally, we must briefly explain the North vs. South breakdown of the regions in our empirical analysis of the two countries. As to Italy, the North/South divide has been typical in studies on the economic and social development of the country. The so-called 'Mezzogiorno problem' – i.e. the problem of the lagged development of Italian regions located in the South of the country and in the Islands – has been widely studied. Note that, despite a certain catching-up accomplished by the Southern regions from the 1950s to the 1970s, and notwithstanding the literature devoted to the "endogenous" development of the "Third Italy" (i.e. the regions belonging to the North–East and

[2] Choudhry et al. (2012), considering approximately 70 countries, found that the impact of financial crises on the youth unemployment rate is significant and robust; youth unemployment increases until five years after a financial crisis, with the largest effects in the second and third years. The gender-specific effect of crises on young workers has also been investigated in this paper.

[3] Persistent unemployment is likely to become structural, especially in countries affected by a lengthy recession; and for young people it raises the risk of their becoming a "lost generation" (Scarpetta et al., 2010). According to Quintini and Manfredi (2009), the crisis has pushed young people, even those who performed well in good times, into the group of "poorly-integrated new entrants" and possibly into the group of "youth left behind". There is thus the problem that young people are more vulnerable to a crisis's effects than older adults; but a second and more important problem is that these effects are more long-lasting for the young (O'Higgins, 2012).

[4] See, for example, Basile and De Benedictis (2008), Marelli (2006), Overman and Puga (2002). Some of these studies employ advanced econometric techniques (e.g. spatial dynamic models) to investigate how spatial links between regions affect the performance of regional economic systems and labour markets.

[5] For a thorough survey of regional labour market developments in transition countries see Huber (2007).

[6] Also Kolomak (2011) should be mentioned: although this paper does not deal with labour market issues, it includes an interesting application of spatial econometrics and compares Eastern with Western regions.

[7] Marelli et al. (2012) is an exception: they investigated the impact of the crisis on unemployment with a detailed analysis at the regional (NUTS-2) level for the EU countries.

Centre, mainly located close to the Adriatic coast, in most cases benefiting from the presence of a diffused system of small and medium-sized enterprises), the North–Centre vs. South dichotomy has persisted and even increased in the new century.[8]

This dichotomy concerns labour markets as well, because of the much lower activity and employment rates in Southern regions (compared to the national averages, and even more so to the Northern regions) and the correspondingly higher unemployment rates; both occurrences refer – to a much greater extent – to female workers and to young people. We mention only some recent studies, e.g. Basile and Kostoris Padoa Schioppa (2002), who have compared the unemployment situation of Italy's Mezzogiorno with that of other "Mezzogiornos" of Europe. Cracolici et al. (2007) have carried out an econometric investigation at the provincial level (much finer than the usual regional breakdown and corresponding to the Nuts-3 level of Eurostat), and they have shown that areas characterised by high (or low) unemployment tend to be spatially clustered. Finally, De Santis (2008) has focused particularly on youth employment and unemployment, by comparing the situation of Mezzogiorno with that of other European regions.

Also in the case of Russia there have been studies on the uneven development across regions that has somewhat increased in the transition period. Polarisation trends consisting in concentration in Western regions and de-population of Eastern regions have been explained both in terms of natural regional endowments and on the basis of agglomeration economies (e.g. Benini and Czyzewski, 2007). Of course, the regional disparities also concern the labour markets, although the studies on this issue are rare (see the works by Demidova et al. mentioned above concerning East and West Russian regions).

Besides the East–West divide, other types of polarisation can be found in Russia: for instance, the contrast between urbanised centres (especially Moscow's region) and the rural regions affected by economic and demographic decline. For example Shilov and Möller (2009) note that "*one can observe substantial variation across regions; in 2005 the Moscow region evidently experienced an unemployment rate of only 1%, whereas the Dagestan region in the Northern Caucasus had unemployment as high as 22.6%*". Demidova and Signorelli (2011), in an investigation on the impact of crises on youth unemployment in Russian regions, found – among others – the following interesting results: (i) the huge differences in terms of total and youth unemployment rates across Russian regions; (ii) the problem of youth and general unemployment is more serious for South and Siberian federal districts; (iii) during the 1998–1999 crisis, the problem of youth unemployment in Southern districts became more aggravated.

Before ending this section, we mention some specific features of the Russian labour market. The first is the relatively high stability of employment and unemployment over time, even in the presence of significant economic shocks. The key explanation for this resides in the broad implementation of "flexible working time" and "flexible pay" that makes it possible to offset pressures on the labour market during a crisis without a drastic readjustment of employment (Kapelyushnikov et al., 2012). The overall flexibility derives from the willingness and ability of both employers and employees to curtail their exposure to formal rules and rely on informal arrangements (Gimpelson et al., 2010). This is also consistent with the evidence that law implementation has been extremely flawed in Russia.

The second feature to be mentioned is low interregional mobility. Thus, "about a third of Russian regions are actually locked in 'poverty traps', and even in other regions the effect creates significant obstacles. Russian regions may therefore be more plausibly considered isolated labour markets than U.S. regions" (see again Shilov and Möller, 2009).

3. Data, variables and hypotheses

In our research we used data on 20 Italian and 75 Russian regions during the period 2000–2009. A list of all regions is given in Table A1 in the Appendix. The data for the other 8 Russian regions were not included in the study for the following reasons: (1) there were changes in the administrative-territorial structure of Russia, (2) for some regions, such as Chechnya, official data are lacking for some years. These data were provided by Rosstat (www.gks.ru) and Istat (www.istat.it). We divided both

[8] Paniccia et al. (2011).

Italian and Russian regions between non-Southern and Southern[9] (correspondingly 14 and 6 regions for Italy; 65 and 10 regions for Russia).

Our focus, i.e. the variable to be explained, was "youth unemployment". Taking into account the official datasets available, for Italy we used the unemployment rate in the 15–24 age group, whereas for Russia we used the rate for the 20–29 age group. This variable was used as the dependent in our econometric analysis.

We started our analysis by studying descriptive statistics for all Italian and Russian regions and separately for non-Southern and Southern regions. According to the figures in Table A2 in the Appendix, youth unemployment in Southern regions is higher than in the non-Southern ones in both Italy and in Russia.

This is not a specific feature of youth unemployment. According the results in Table A3 in the Appendix, the same tendency was apparent in the total unemployment rate in both Italy and Russia. Hence we added the total unemployment rate as an independent variable in all our models.

It is also interesting to consider the ratios of youth to total unemployment rates (Table A4 in the Appendix). In the case of Italy the ratio is close to the level of 3 in almost all years. It is a little lower in Southern regions compared to Northern and Central ones; but this is due to the much higher total rate in Southern regions. In Russia the ratio, although greater than 1, is lower than in Italy: hence the relative situation of young people, compared to adults, is not as bad as it is in Italy. Also in Russia the ratio between the youth and total unemployment rates in Southern regions is not much worse than in the remaining regions of the country.

As to the other explanatory variables, we used density of population in the regions and per capita GRP (Gross Regional Product). A possible assumption is that the higher the population density in a region, the easier it is for young people to find a job: in fact many job opportunities in the service sector are found in densely populated areas. On the other hand, such areas may constitute attraction pools of migrants from rural areas who are not always able to find jobs. GRP was used as the indicator of the region's economic development. We assumed that the more economically developed a region is, the lower its youth unemployment rate (due to the greater labour demand).

Descriptions of all the variables are given in the Appendix, Table A5.

According to the descriptive statistics (see Table A6 in the Appendix), the density in Southern and non-Southern regions of Italy did not differ to a great extent, whereas for Russia there was a sufficient difference in population density for non-Southern and Southern regions, both for mean values and variance.

Comparing Southern and non-Southern per capita GRP (see Table A7 in Appendix), one notes that for both Italy and Russia the Southern regions exhibit lower per-capita product.

We also analysed scatter diagrams[10] for youth unemployment and other variables. We concluded that the dependence of youth unemployment on the total unemployment seems linear, whereas the dependence of youth unemployment on density and GRP per capita may be nonlinear (we used quadratic specification).

We also assumed that the youth unemployment rate in one region may depend on youth unemployment rates in other regions. To test this assumption, we calculated the Moran's indices for inverted distance weighted matrices. We used distance by motorway (in km) between capitals of regions for Russia, and Euclidean distances (in km) between centres of region centroids (not regional capitals) for Italy.[11]

Let us recall that Moran's index for variable X is defined as

$$I(X) = \frac{N}{\sum_{i,j} w_{ij}} \frac{\sum_{i,j} w_{ij}(X_i - \bar{X})(X_j - \bar{X})}{\sum_i (X_i - \bar{X})^2} \tag{1}$$

where N is the number of spatial units indexed by i and j, $\bar{X}$ is the mean of X, and w_{ij} are elements of the weighted spatial matrix. Moran's I index values range from −1 (indicating perfect dispersion) to 1

[9] Including the two islands, Sicily and Sardinia.
[10] Available from the authors on request.
[11] We thank Elena Samoilova and Roberto Patuelli for providing this information.

(indicating perfect correlation). A zero value indicates an absence of spatial correlation. For significance testing, Moran's I values can be transformed into Z-scores in which values greater than 1.96 or smaller than −1.96 indicate spatial autocorrelation that is significant at the 5% level. A positive index indicates that any change in the other regions leads to the same (opposite) changes in the region considered.

The results in Table A8 in the Appendix show that Moran's indexes are positive for non-Southern regions and non-significant for Southern regions, both in Italy and Russia. However, the latter finding may be the consequence of the small number of Southern regions (6 in Italy and 10 in Russia). Hence additional studies are necessary.

We also estimated the Moran scatter plot for Italy and Russia. If the dependence of weighted youth unemployment on youth unemployment is linear, we can speak of a spatial lag. However, according to the scatter diagrams[12] we can doubt that the dependence is linear. Additionally, we can assume that the dependence is not the same for Southern and non-Southern regions.

Previous discussion (see the literature review above) and preliminary data analysis enabled us to formulate the following main hypotheses to test empirically.

H1: There exists a sufficient difference in the determinants of youth unemployment in non-Southern and Southern regions both for Italy and Russia.

H2: The mutual influence of non-Southern and Southern regions of Italy and Russia is asymmetric.

4. Econometric approach and results of estimation

Considering that we used spatial lags of youth unemployment rate as explanatory variables (they were endogenous), we used the Arellano–Bond two-step general methods of moments (GMM: for details see Green, 2012, p. 400–409, and Cameron and Trivedy (2010)). According to this method for endogenous variables, lags of the dependent and explanatory variables are used as instruments. Estimates of the coefficients obtained by the Arellano–Bond methods are consistent under the following conditions: (i) errors ε_{it} in the initial model (1) must be serially uncorrelated and (ii) the population moment conditions (consisting in the orthogonality of the errors and instruments) must be correct. To test the first condition, the errors of equation in first differences are tested for the presence of autocorrelation. If the errors in the initial model are uncorrelated, the errors in the difference equation must be identified as first-order autocorrelations and do not reveal higher-order autocorrelations. The second condition is verified by the Sargan test, with the null hypothesis that overidentifying restrictions are valid. We verified these two conditions for all the estimated models.

In order to identify the difference between Southern and non-Southern regions, we split all variables into two parts, non-Southern and Southern; thus, for example for Russia:

$$gdp^n = \begin{cases} gdp, & \text{if } i = 1,\ldots,65 \text{ (no South regions)} \\ 0, & \text{if } i = 66,\ldots,75 \text{ (South regions)} \end{cases},$$
$$gdp^s = \begin{cases} 0, & \text{if } i = 1,\ldots,65 \text{ (no South regions)} \\ gdp, & \text{if } i = 66,\ldots,75 \text{ (South regions)} \end{cases}$$

Weighted matrices both for Italy and Russia were split into four parts: for example, for Russia:

$$\underbrace{W}_{(75\times75)} = \begin{pmatrix} \underbrace{W_{nn}}_{(65\times65)} & 0 \\ 0 & 0 \end{pmatrix} + \begin{pmatrix} 0 & W_{ns} \\ 0 & 0 \end{pmatrix} + \begin{pmatrix} 0 & 0 \\ W_{sn} & 0 \end{pmatrix} + \begin{pmatrix} 0 & 0 \\ 0 & \underbrace{W_{ss}}_{(10\times10)} \end{pmatrix} \tag{2}$$

And the spatial lag of the dependent variable was also decomposed into four parts:

$$\begin{aligned} WYUR &= \begin{pmatrix} W_{nn} & 0 \\ 0 & 0 \end{pmatrix} YUR + \begin{pmatrix} 0 & W_{ns} \\ 0 & 0 \end{pmatrix} YUR + \begin{pmatrix} 0 & 0 \\ W_{sn} & 0 \end{pmatrix} YUR + \begin{pmatrix} 0 & 0 \\ 0 & W_{ss} \end{pmatrix} YUR \\ &= YUR^{nn} + YUR^{ns} + YUR^{sn} + YUR^{ss} \end{aligned} \tag{3}$$

[12] These diagrams are available from the authors on request.

With the help of this decomposition we tried to identify possible spatial differences between the non-South and South of Italy and Russia. We also tried to take account of a possible nonlinear dependence of youth unemployment factors on the explanatory variables.

Thus, our modified Arellano–Bond model took the following functional form:

$$YUR_{it} = \sigma YUR_{it-1} + \beta_n TUR^n_{it} + \beta_s TUR^s_{it} + f_{nn}(YUR^{nn}_{it}) + f_{ns}(YUR^{ns}_{it}) + f_{sn}(YUR^{sn}_{it}) + f_{ss}(YUR^{ss}_{it}) + \\ + g_n(gd\,p^n_{it}) + g_s(gd\,p^s_{it}) + h_n(density_n) + h_s(density_s) + \sum_{k=1}^{9}\gamma_k d_{200k} + \alpha_i + \varepsilon_{it}, \quad (4)$$

where $i=1, ..., n$, ($n=20$ for Italy and 75 for Russia), $t=2000, ..., 2009$, $d_{2001} - d_{2009}$ are dummy variables for the corresponding year,[13] α_i, $i=1, ..., n$ are individual regional effects,[14] and $\varepsilon_{it} \sim iid(0, \sigma^2_\varepsilon)$ are disturbances. Functions f, g, h in general have quadratic (ax^2+bx) functional form.

We started our analysis from the most general functional form with a full set of year dummies, linear functional form for total unemployment, and quadratic functional form for spatial lags, variables $density^n$, $density^s$, gdp^n, gdp^s. We then tested the hypotheses on the non-significance of the coefficients of the quadratic terms and of the year dummies (some sort of "stepwise methods"). Tables A9I and A9R in the Appendix set out the results of these estimations in columns "Model1 Italy" and "Model1 Russia" respectively.

We subsequently tested the hypotheses on the equality of the coefficients for the same non-South and South variables (for example $\beta_{density^n} = \beta_{density^s}$). All tested restrictions can be found at the bottom of Tables A9I and A9R. All accepted restrictions were incorporated in our models. We then interpreted the results of our final Model3 Italy and Model3 Russia estimates (Tables A9I and A9R in Appendix).

To be noted is that we verified the two conditions necessary for the consistency of Arellano–Bond estimates, as mentioned above. The results of Arellano–Bond tests (AB test AR(i), $i=1, 2, 3$) showed that, for the errors of the difference equation, first-order autocorrelation was found, but not higher-order autocorrelation, meaning that the first condition of consistency was valid. The validity of the second consistency condition was confirmed by the Sargan test (the p-value for the test statistic in each Sargan test was more than 0.1, so that the null hypothesis that moments conditions were valid was not rejected for each model). Hence the conditions for estimates consistency were fulfilled and we could interpret the results obtained.

The main results can be summarised as follows:

The situation of youth unemployment is more serious than adult unemployment in both Italy and Russia. However, the situation in Italy is even worse. For Russia we did not find significant differences between Southern and non-Southern regions; for Italy the difference between youth and adult unemployment was more strongly apparent in the North (although the level of both youth and adult unemployment was much higher in the South).

The hypothesis that the higher the density of population in the region, the lower the level of youth unemployment was rejected for both Italy and Russia; the coefficients of density variables were non-significant (probably, the two effects mentioned in Section 3 cancel each other out).

The hypothesis that the higher the GDP per capita, the lower the youth unemployment rate was confirmed only for non-Southern regions of Italy. For Russia we did not find linear or quadratic dependence.

We also found different spatial effects for Southern and non-Southern regions, for both Italy and Russia. For the non-South of Russia we identified a positive spatial lag (positive dependence of the unemployment rate in the region on the unemployment rate in other non-Southern regions) and a positive influence of non-Southern youth unemployment on that in the South.

For Italy we found a negative spatial influence of non-Southern regions on the other non-Southern regions and a positive influence on Southern regions. For Southern regions we also identified a positive

[13] Note that in the initial estimates we included all year dummy variables in our models. However, to avoid the problem of data multicollinearity and to increase the efficiency of our estimates, in the final estimations we excluded year dummies with non-significant coefficients.

[14] Furthermore, a dummy for Sardegna GDP (gdpsardegna) was introduced to avoid the problem of outliers.

spatial lag (i.e. a positive influence on other Southern regions) and a positive influence on non-Southern regions. There is a difference in the functional form of this dependence: for Southern regions the dependence is linear, for non-Southern regions it is quadratic.

Considering the impact of macroeconomic shocks on the youth unemployment rate (YUR) in individual years, the analysis of year dummies showed that the YUR diminished significantly in Russia in 2004, the year of the presidential election; by contrast, the impact of the financial crisis is clearly evident in Italy for 2009.[15]

In the case of Russia, the period is probably too short to detect significant effects of the crisis. The impact would be more easily detected if a longer period were considered.[16]

5. Conclusions

Russia and Italy are very different economies in several respects; however, they have some similarities in the regional differentiation of labour market performances. The focus of this paper has been on youth unemployment: in both countries, youth unemployment rates (YUR) are higher than adult (or total) unemployment rates. Despite these general trends, there are significant regional differences in the YUR: in both countries above-average YUR regions tend to cluster close to each other. Moreover, a distinction between Southern and non-Southern regions seems appropriate for both Russia and Italy.

The empirical part of this paper has focused on the period 2000–2009. Youth unemployment referred to slightly different age classes (20–29 for Russia and 15–24 for Italy) because of data availability. The same control variables were used for the two countries: total unemployment rate, GDP per capita, density of population.

The main finding of our paper is that the unemployment situation of young people in Italy is worse than it is in Russia. Moreover, for Italy the ratios between youth and total unemployment rates are higher in the North, although the level of both youth and adult unemployment is higher in the South. In the case of Russia, we did not find significant differences between Southern and non-Southern regions in terms of such ratios. As to time effects, for Italy we found a significant negative impact (i.e. an increase in youth unemployment) of the crisis in 2009, while for Russia there were positive effects in 2004, the year of the presidential election.

The relation between GDP per capita and unemployment was statistically confirmed only for non-Southern Italian regions. Even less significant was the role played by the density of population. As to spatial effects, strong interdependences were found both within the regions of the same territorial area (North or South) and across the areas of a given country (i.e. spillovers from North to South or vice versa). An example of within-area interdependence was provided by the non-Southern Russian regions, while in Italy the links were positive in Southern regions and negative in non-Southern ones. Examples of cross-area spillovers were found in Russia from non-Southern to Southern regions; in Italy cross-area interdependences were in both directions.

The main policy implication is the need to adopt appropriate labour policies to tackle the unemployment problem of young people, which has become even more worrying after the recent crisis, affecting the European countries especially. Although active labour market policies are often micro-based and implemented at the local level, such policies, although differentiated across regions, may produce significant spillover effects on nearby regions. The main finding of this paper is that spatial effects cannot be overlooked.

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[15] Since year effects are not shown in the tables, we specify here that for the final Italian model we had the following time effects: −0.870** for 2002, 1.228*** for 2005, 4.029*** for 2009. For the final Russian model we found the following time effects: −0.962*** for 2004 and −0.385 for 2009.

[16] For example 2000–2010, as confirmed by results in Demidova et al. (2013).

Development" (Moscow, National Research University – HSE, 1–4 April 2014), at the 13th International Workshop on "*Spatial Econometrics and Statistics*" (University of Toulon, France, 15–16 April 2014) and at the International Workshop on "*New Challenges for the Labour Market: Spatial and Institutional Perspectives*" (University of Naples Parthenope, 8–9 May 2014). The article benefited from the comments and suggestions received by several participants to the above conferences and workshops and, especially, by Misbah Choudhry Tanveer and an anonymous reviewer. The usual disclaimer applies. In addition, the paper has been presented at the 10th World Congress of the Regional Science Association (Ayutthaya, Thailand, 26–30 May 2014), at the 3rd Scientific Conference on "*Spatial Econometrics and Regional Economic Analysis*" (University of Lodz, Poland, 9–10 June 2014) and at the EACES Conference (Budapest, 4–6 September 2014). The article is a result of a research project supported by a Marie Curie International Research Staff Exchange Scheme Fellowship within the 7th European Community Framework Programme (under the project IRSES GA-2010–269134).

Appendix

Tables A1–A8, A9I and A9R.

Table A1
List of regions.

Regions	Italy		Russia			
Non-Southern	Abruzzo		Belgorod region	Yaroslavl region	Republic of Udmurtia	Republic of Tyva
	Emilia-Romagna		Bryansk region	Moscow	Republic of Chuvashia	Republic of Khakassia
	Friuli-V. Giulia		Vladimir region	Republic of Karelia	Perm territory	Altay Territory
	Lazio		Voronezh region	Republic of Komi	Kirov region	Krasnoyarsk Territory
	Liguria		Ivanovo region	Arkhangelsk region	Nizhny Novgorod region	Irkutsk region
	Lombardia		Kaluga region	Vologda region	Orenburg region	Kemerovo region
	Marche		Kostroma region	Kaliningrad region	Penza region	Novosibirsk region
	Molise		Kursk region	Leningrad region	Samara region	Omsk region
	Piemonte		Lipetsk region	Murmansk region	Saratov region	Tomsk region
	Toscana		Moscow region	Novgorod region	Ulyanovsk region	Republic of Sakha (Yakutia)
	Trentino-A. Adige		Orel region	Pskov region	Kurgan region	Kamchatka territory
	Umbria		Ryazan region	Saint-Petersburg	Sverdlovsk region	Primorsky Territory
	Valle d' Aosta		Smolensk region	Republic of Bashkortostan	Tumen region	Khabarovsk Territory
	Veneto		Tambov region	Republic of Marii El	Chelyabinsk region	Amur region
			Tver region	Republic of Mordovia	Republic of Altay	Magadan region; Sakhalin region
			Tula region	Republic of Tatarstan	Republic of Buryatia	Jewish autonomous area
Southern	Basilicata	Puglia	Republic of Adygea	Republic of Karachaevo-Cherkessia	Stavropol Territory	Volgograd region
	Calabria	Sardegna	Republic of Kabardino-Balkaria	Republic of Northen Osetia–Alania	Astrakhan region	Rostov region

Table A2
Descriptive statistics for the youth unemployment rate.

Year	All regions				Non-Southern regions				Southern regions			
	Mean	Median	Min	Max	Mean	Median	Min	Max	Mean	Median	Min	Max
Italy												
2000	15.84	22.4	4.9	33.71	19.62	16.8	6.35	44.9	54.23	55.5	42.1	63.4
2001	13.53	18.7	3.42	31.85	17.22	14.35	7.35	38.7	51	50.9	39.5	59.8
2002	11.68	18.3	2.59	26.48	15.82	13.45	5.4	34.3	49.73	49.75	37.8	59.5
2003	12.49	16.55	1.68	31.91	16.23	14.45	4.85	40.7	48.53	48.55	38.6	58.4
2004	10.5	18.5	2.5	26.46	16.4	15.55	7.85	31.9	37.93	36.65	35.4	42.9
2005	11.1	19.25	1.4	30.29	16.71	15.9	8.8	31.8	39.05	37.7	32.6	46.1
2006	10.99	16.1	2.44	29.74	15.13	13.45	8.3	28	34.18	33.8	31	39
2007	9.48	15.85	2.06	27.56	14.31	13.3	7.74	24.9	32.83	32.15	31.4	37.2
2008	10.06	17.3	1.26	24.91	15.56	14.15	7.09	28.8	34.86	34.55	31.6	39.3
2009	13.18	23.3	4.2	27.86	19.92	18.85	10.2	30.6	37.33	38.2	31.8	44.7
Russia												
2000	15.84	14.93	4.9	33.71	14.85	14.72	4.9	33.71	22.3	20.45	13.1	32.24
2001	13.53	12.67	3.42	31.85	12.66	12.38	3.42	27.17	19.17	18.12	11.73	31.85
2002	11.68	10.58	2.59	26.48	10.91	10.15	2.59	24.29	16.66	14.33	10.14	26.48
2003	12.49	12.46	1.68	31.91	11.58	11.06	1.68	27.92	18.42	16.47	9.1	31.91
2004	10.5	9.61	2.5	26.46	9.8	9.35	2.5	26.14	15.06	11.43	8.79	26.47
2005	11.1	9.88	1.4	30.29	10.41	9.61	1.4	30.29	15.61	13.14	8.73	30.23
2006	10.99	10.37	2.44	29.74	10.02	9.55	2.44	27.05	17.32	14.1	10.43	29.74
2007	9.48	8.66	2.06	27.56	8.61	8.14	2.06	27.56	15.18	14.28	8.66	27.5
2008	10.06	9.35	1.26	24.91	9.27	9.12	1.26	24.91	15.18	14.19	6.43	24.76
2009	13.18	12.74	4.2	27.86	12.83	12.56	4.2	27.86	15.44	13.85	11.52	23.53

Source: Our elaboration on Rosstat and Istat data.

Table A3
Descriptive statistics for the total unemployment rate.

Year	All regions				Non-Southern regions				Southern regions			
	Mean	Median	Min	Max	Mean	Median	Min	Max	Mean	Median	Min	Max
Italy												
2000	10.71	7.01	2.63	25.95	6.24	5.47	2.63	13.83	21.15	22.02	16.12	25.95
2001	9.77	5.44	2.54	25.56	5.47	4.69	2.54	13.57	19.8	19.99	14.57	25.56
2002	9.3	5.83	2.55	24.4	5.23	4.59	2.55	12.5	18.79	19.12	13.9	24.4
2003	8.99	5.15	2.41	23.26	5.01	4.345	2.41	12.08	18.26	18.36	13.67	23.26
2004	8.04	5.66	2.91	16.32	5.36	5.16	2.91	11.02	14.3	14.31	12.37	16.32
2005	7.76	5.89	3.15	15.24	5.26	4.605	3.15	9.77	13.59	13.82	11.7	15.24
2006	6.9	4.88	2.8	12.93	4.77	4.22	2.8	9.73	11.86	12.46	10.2	12.93
2007	6.32	4.69	2.73	12.4	4.39	4.175	2.73	8.05	10.83	11.05	9.48	12.4
2008	7.04	5.2	2.81	13.21	4.89	4.72	2.81	9.01	12.05	12.12	11.03	13.21
2009	7.97	6.77	3.18	13.53	6.06	5.73	3.18	9.03	12.42	12.62	11.21	13.53
Russia												
2000	11.77	11.4	3.9	28.5	11.04	10.8	3.9	23.6	16.46	14.65	9.5	28.5
2001	10.02	9.7	2.1	23.8	9.42	9.4	2.1	23.8	13.91	13.6	9.5	18.9
2002	8.85	8.3	1.4	20.3	8.32	8.1	1.4	20.3	12.33	11.75	7.6	19.1
2003	9.29	8.7	1.3	22.6	8.57	8.3	1.3	20.7	13.98	11.8	10.1	22.6
2004	8.85	8.7	1.6	25.7	8.04	7.9	1.6	19.7	14.1	11.35	8.6	25.7
2005	8.19	7.6	0.8	23.4	7.63	7.4	0.8	21.8	11.86	10.4	6.8	23.4
2006	7.75	7.3	1.6	20.7	7.1	6.8	1.6	20.5	11.98	8.75	7.4	20.7
2007	6.7	6.4	0.8	18.3	6.11	5.9	0.8	17.1	10.53	9.3	6.4	18.3
2008	7.31	7.1	0.9	19.2	6.85	7	0.9	19.2	10.29	7.95	4.8	18.3
2009	9.16	8.8	2.7	21.5	8.94	8.7	2.7	21.5	10.64	10.2	7.2	16.6

Source: Our elaboration on Rosstat and Istat data.

Table A4
Descriptive statistics for the ratio between the youth and total unemployment rates.

Year	All regions				Non-Southern regions				Southern regions			
	Mean	Median	Min	Max	Mean	Median	Min	Max	Mean	Median	Min	Max
Italy												
2000	2.9	2.8	2.36	3.85	3.05	3.05	2.36	3.86	2.57	2.58	2.44	2.69
2001	2.95	2.79	2.32	3.82	3.09	3.04	2.62	3.82	2.6	2.61	2.32	2.79
2002	2.86	2.81	2.12	3.74	2.94	2.97	2.12	3.74	2.67	2.68	2.39	2.86
2003	2.97	2.93	1.99	3.99	3.09	3.08	1.99	3.99	2.67	2.64	2.44	2.92
2004	2.93	2.94	2.39	3.59	3.04	3.06	2.51	3.59	2.66	2.62	2.39	2.93
2005	3.06	3.07	2.56	3.72	3.14	3.15	2.57	3.72	2.88	2.83	2.56	3.33
2006	3.09	2.99	2.58	3.88	3.17	3.19	2.61	3.88	2.89	2.89	2.58	3.14
2007	3.2	2.98	2.24	4.32	3.27	3.08	2.24	4.32	3.04	2.96	2.84	3.31
2008	3.07	3.01	2.52	4.1	3.14	3.05	2.52	4.1	2.9	2.92	2.62	3.14
2009	3.21	3.18	2.62	3.84	3.3	3.26	2.93	3.84	3.01	2.91	2.62	3.42
Russia												
2000	1.35	1.33	0.91	2.25	1.35	1.31	0.91	2.25	1.38	1.38	0.95	1.65
2001	1.37	1.36	0.94	1.92	1.37	1.36	0.94	1.92	1.37	1.36	1.13	1.69
2002	1.34	1.32	0.91	2.26	1.33	1.32	0.91	2.26	1.35	1.29	0.93	1.87
2003	1.35	1.33	0.85	1.94	1.36	1.34	0.85	1.94	1.3	1.33	0.9	1.57
2004	1.19	1.17	0.43	1.87	1.21	1.19	0.43	1.87	1.06	1.07	0.96	1.19
2005	1.38	1.36	0.83	2.35	1.39	1.38	0.83	2.35	1.31	1.29	1.11	1.62
2006	1.44	1.42	0.97	2.17	1.44	1.41	0.97	2.17	1.48	1.46	1.18	1.84
2007	1.45	1.41	0.5	3.07	1.45	1.38	0.5	3.07	1.44	1.49	1.19	1.58
2008	1.41	1.37	0.86	2.49	1.39	1.37	0.86	2.49	1.53	1.37	1.19	2.13
2009	1.47	1.41	1.13	2.14	1.47	1.41	1.13	2.14	1.47	1.47	1.19	1.72

Source: Our elaboration on Rosstat and Istat data.

Table A5
List of variables.

Variable	Description for Italy	Description for Russia
Yunemployment	Unemployment rate in the 15–24 age group	Unemployment in the 20–29 age group
Tunemployment	Total unemployment rate in the 15–70 age group	Total unemployment rate in the 15–72 age group
Spatial_lag_nn	Weighted youth unemployment in other non-Southern Italian regions (according the Euclidean distances between centres of non-Southern regions), YUR^{nn} in formula (3)	Weighted youth unemployment in other non-Southern Russian regions (according to the distance by motorway between capitals of non-Southern regions), YUR^{nn} in formula (3)
Spatial_lag_ss	Weighted youth unemployment in other Southern Italian regions (according the Euclidean distances between centres of Southern regions), YUR^{ss} in formula (3)	Weighted youth unemployment in other Southern Russian regions (according to the distance by motorway between capitals of Southern regions), YUR^{ss} in formula (3)
Spatial_lag_ns	Weighted youth unemployment in Southern Italian regions (according to the Euclidean distances between centres of non-Southern and Southern regions), YUR^{ns} in formula (3)	Weighted youth unemployment in Southern Russian regions (according to the distance by motorway between capitals of non-Southern and Southern regions), YUR^{nn} in formula (3)
Spatial_lag_sn	Weighted youth unemployment in non-Southern Italian regions (according to the Euclidean distances between centres of Southern and non-Southern regions), YUR^{sn} in formula (3)	Weighted youth unemployment in non-Southern Russian regions (according to the distance by motorway between capitals of Southern and non-Southern regions), YUR^{sn} in formula (3)
Density	People per square km	People per square kilometre
gdp	GDP per capita at chained prices [constant prices are obtained by directly factoring changes over time in the values of flows or stocks of goods and services into two components reflecting changes in the prices of the goods and services concerned and changes in their volumes (i.e. changes in "constant price terms"); the term "at constant prices" commonly refers to series which use a fixed-base Laspeyres formula]	Gross regional product per capita in the base price of 2000 year corrected for different purchasing power

Table A5 (*Continued*)

Variable	Description for Italy	Description for Russia
d200i, $i=0, \ldots, 9$	Dummy variable for corresponding year	
North	Indicator for northern and central regions in Italy (=1 for 14 regions and 0 for 6 regions)	Indicator for non-Southern regions of Russia (=1 for 65 regions and 0 for 10 regions)

Table A6
Descriptive statistics for density of population.

Year	All regions				Non-Southern regions				Southern regions			
	Mean	Median	Min	Max	Mean	Median	Min	Max	Mean	Median	Min	Max
Italy												
2000	178.3	155.2	36.8	426.5	176.13	155.2	36.8	394.2	183.37	166.75	61.8	426.5
2001	178.35	155.4	36.9	426	176.37	155.4	36.9	395.6	182.97	166.15	61.6	426
2002	178.84	156	37.1	426.6	177.08	156	37.1	397.9	182.95	165.85	61.4	426.6
2003	180.16	157.25	37.5	428.8	178.69	157.25	37.5	402.5	183.58	166.25	61.4	428.8
2004	181.83	158.6	37.8	431.2	180.74	158.6	37.8	408.8	184.37	166.7	61.4	431.2
2005	183.13	159.6	38.1	432.3	182.45	159.6	38.1	413.8	184.72	166.7	61.3	432.3
2006	184.12	160.3	38.4	432.4	183.89	160.3	38.4	417.1	184.67	166.55	61	432.4
2007	185.36	161.55	38.7	433.2	185.56	161.55	38.7	420.8	184.88	166.75	60.8	433.2
2008	186.7	163.2	39.1	434	187.34	163.2	39.1	425.1	185.22	167.1	60.8	434
2009	187.74	164.4	39.4	434.5	188.74	164.4	39.4	429.1	185.42	167.3	60.7	434.5
Russia												
2000	194.91	24.2	0.31	9100	217.99	20.07	0.31	9100	44.86	42.72	4.12	87.37
2001	197.42	24.07	0.31	9300	220.87	19.98	0.31	9300	44.96	42.61	4.05	88.37
2002	197.24	23.93	0.31	9400	220.66	19.9	0.31	9400	44.97	42.47	3.95	88.71
2003	197.06	23.77	0.31	9400	220.47	19.83	0.31	9400	44.88	42.3	3.9	88.54
2004	198.21	23.6	0.31	9500	221.82	19.74	0.31	9500	44.72	42.09	3.89	88.21
2005	198.03	23.43	0.31	9500	221.64	19.65	0.31	9500	44.56	41.88	3.87	87.92
2006	197.87	23.28	0.31	9500	221.48	19.56	0.31	9500	44.42	41.67	3.85	87.74
2007	197.77	23.16	0.31	9500	221.36	19.49	0.31	9500	44.37	41.53	3.83	87.74
2008	197.7	23.06	0.31	9500	221.29	19.46	0.31	9500	44.39	41.47	3.81	87.77
2009	198.99	22.98	0.31	9600	222.76	19.44	0.31	9600	44.42	41.43	3.8	87.67

Source: Our elaboration on Rosstat and Istat data.

Table A7
Descriptive Statistics for GRP per capita.

Year	All regions				Non-Southern regions				Southern regions			
	Mean	Median	Min	Max	Mean	Median	Min	Max	Mean	Median	Min	Max
Italy												
2000	20,291.71	21,098.7	12,921.81	27,488.02	22,990.77	23,241.49	15,235.64	27,488.02	13,993.91	13,628.71	12,921.81	15,883.18
2001	20,651.77	21,610.95	13,438.35	27,929.02	23,365.21	23,644.27	15,587.15	27,929.02	14,320.39	13,982.76	13,438.35	16,203.07
2002	20,627	21,575.28	13,442.4	28,066.98	23,313.5	23,481.87	15,676.66	28,066.98	14,358.5	13,967.16	13,442.4	16,128.75
2003	20,462.03	21,360.4	13,598.57	28,065.64	23,088.94	23,251.86	15,390.86	28,065.64	14,332.6	13,837.41	13,598.57	16,409.6
2004	20,545.53	21,384.79	13,696.22	28,163.27	23,163.74	23,314.26	15,616.39	28,163.27	14,436.37	13,902.71	13,696.22	16,488.03
2005	20,489.45	21,314.58	13,624.97	27,555.18	23,101.54	23,330.04	15,696.26	27,555.18	14,394.57	13,968.96	13,624.97	16,434.28
2006	20,830.46	21,701.71	13,788.65	27,836.03	23,476.09	23,799.79	16,244.32	27,836.03	14,657.32	14,215.46	13,788.65	16,477.08
2007	21,010.35	22,078.85	13,907.95	28,208.26	23,684.49	24,021.7	16,616.28	28,208.26	14,770.69	14,249.51	13,907.95	16,807.19
2008	20,641.25	21,775.24	13,510.11	28,236.23	23,281.78	23,433.27	16,546.33	28,236.23	14,480.03	14,002.7	13,510.11	16,548.12
2009	19,553.53	20,793.85	12,791.29	26,784.08	21,973.83	22,142.7	15,967.49	26,784.08	13,906.15	13,447.59	12,791.29	15,913.56
Russia												
2000	32,411.4	27,291	11,633	143,836	34,189.04	30,502.3	11,633	143,836	20,856.78	21,623.7	13,752.3	28,974.3
2001	34,418.13	30,049	13,896.9	157,473	36,323.27	32,244.8	14,646.7	157,473	22,034.72	21,340.75	13,896.9	30,049
2002	36,444.84	33,487.5	14,463.9	161,816	38,478.41	35,223.6	17,612.7	161,816	23,226.69	21,496.3	14,463.9	31,543.8
2003	39,662.63	36,281.9	15,941.2	180,923	41,980.61	38,690.5	18,728.8	180,923	24,595.76	23,304.9	15,941.2	33,966.2
2004	45,694.42	39,438.7	17,902.1	225,942	48,639.4	40,733	20,305.4	225,942	26,552.04	25,528.75	17,902.1	36,945.5
2005	50,878.75	42,566.7	18,552.1	290,836	54,191.73	44,089.5	21,976	290,836	29,344.4	28,507.25	18,552.1	42,670.8
2006	57,967.69	48,857.7	22,412.2	299,536	61,617.4	51,712	26,470.8	299,536	34,244.6	34,053.25	22,412.2	48,857.7
2007	64,178.23	53,034.7	26,312.2	295,780	68,127.06	58,300.9	30,793.2	295,780	38,510.86	36,966.35	26,312.2	57,741.8
2008	68,243.66	58,255.2	27,054.3	298,642	72,238.34	63,283.1	32,302.8	298,642	42,278.24	37,399.85	27,054.3	64,263.8
2009	61,941.51	54,549.6	27,735.6	250,598	65,356.67	58,221.1	29,903.3	250,598	39,743.02	36,312.75	27,735.6	58,239

Source: Our elaboration on Rosstat and Istat data.

Table A8
Dynamics of Moran's Spatial Correlation Index.

	Italy			Russia		
Year	All regions	Non-Southern regions	Southern regions	All regions	Non-Southern regions	Southern regions
2000	0.279***	0.128***	−0.152	0.306***	0.112***	−0.088
2001	0.287***	0.114 ***	−0.164	0.306***	0.108***	−0.098
2002	0.277***	0.127***	−0.173	0.249***	0.096***	−0.141
2003	0.268**	0.040*	−0.163	0.307***	0.129***	−0.204
2004	0.319***	0.181***	−0.066	0.41***	0.255***	−0.217
2005	0.318***	0.185***	−0.107	0.201**	0.126***	−0.176
2006	0.315***	0.159***	−0.13	0.332 ***	0.171***	−0.213
2007	0.275***	0.056**	−0.117	0.431***	0.156***	−0.095
2008	0.284***	0.11***	−0.054	0.372***	0.168***	−0.043
2009	0.235***	0.122***	−0.139	0.318***	0.139***	−0.07

***$p<0.01$, **$p<0.05$, *$p<0.1$.

Table A9I
The estimation results for Italy.

Variables	Model 1 Italy	Variables	Model 2 Italy	Variables	Model 3 Italy
		With incorporated restrictions βdensityn= =β densitys		With account taken of outlier	
Time lag	−0.037	Time lag	−0.034	Time lag	−0.026
Spatial_lag_nn	−1.959***	Spatial_lag_nn	−1.958***	Spatial_lag_nn	−2.0064***
Spatial_lag_nn_squared	0.037**	Spatial_lag_nn_squared	0.037**	Spatial_lag_nn_squared	0.0377**
Spatial_lag_ss	0.05	Spatial_lag_ss	0.033	Spatial_lag_ss	0.098*
Spatial_lag_ns	0.278***	Spatial_lag_ns	0.277***	Spatial_lag_ns	0.276***
Spatial_lag_sn	−0.371	Spatial_lag_sn	−0.41	Spatial_lag_sn	−0.495
Spatial_lag_sn_squared	0.042***	Spatial_lag_sn_squared	0.048***	Spatial_lag_sn_squared	0.049***
Tunemploymentnorth	3.156***	Tunemploymentnorth	3.144***	Tunemploymentnorth	3.128***
Tunemploymentsouth	2.056***	Tunemploymentsouth	2.098***	Tunemploymentsouth	2.039***
densitynorth	0.001	Density	−0.001	Density	−0.003
densitysouth	−0.211	Gdpnorth	0.004	gdpnorth	0.004
gdpnorth	0.004	gdpnorthsquared	−0.000*	gdpnorthsquared	−8.16E−08*
gdpnorthsquared	−8.131E−08*	gdpsouth	0.042***	gdpsouth	0.024
gdpsouth	0.040***	gdpsouthsquared	−0.000***	gdpsouthsquared	−7.30E−07
gdpsouthsquared	−1.328E−06***			gdpsardegna	−0.005
Year effects	Yes	Year effects	Yes	Year effects	Yes
_cons	−96.467			_cons	−69.456
				Turning point for Spatial_lag_nn	26.6
				Min for Spatial_lag_nn	13
				Max for Spatial_lag_nn	26.7

Tested hypothesis	*p*-value	Tested hypothesis	*p*-value	Tested hypothesis	*p*-value	
βtunemploymentnorth= =βtunemploymentsouth	0.0008	βgdpnorth= βgdpsouth βgdpnorthsquared= =βgdpsouthsquared	0.000	Arellano–Bond test for zero autocorrelation	1 2 3	0.002 0.067 0.49
βdensitynorth= =βdensitysouth	0.47			Sargan test for validity of instruments		0.38
βgdpnorth = βgdpsouth, βgdpnorthsquared= =βgdpsouthsquared	0.0014					

***$p<0.01$, **$p<0.05$, *$p<0.1$.

Table A9R
The estimation results for Russia.

Variables	Model 1 Russia	Variables	Model 2 Russia	Variables	Model 3 Russia
		With incorporated restrictions βtotunn = βtotuns, βdensityn = =βdensitys		With incorporated restrictions βgdpnsq = βgdpssq	
Time lag	−0.047	Time lag	−0.048	Time lag	−0.048
Spatial_lag_nn	0.991***	Spatial_lag_nn	0.971***	Spatial_lag_nn	0.961***
Spatial_lag_ss	−0.482	Spatial_lag_ss	−0.179	Spatial_lag_ss	−0.112
Spatial_lag_ns	−4.649*	Spatial_lag_ns	−3.842	Spatial_lag_ns	−3.813
Spatial_lag_sn	1.380***	Spatial_lag_sn	1.238***	Spatial_lag_sn	1.211***
Tunemploymentnorth	1.051***	Tunemployment	1.015***	Tunemployment	1.025***
Tunemploymentsouth	0.942***	density	0.007	density	0.007
densitynorth	7.94E−06	gdpnorth	−1.8E−05	gdpnorth	1.87E−06
densitysouth	−0.00165	gdpnorthsquared	5.32E−11	gdpsouth	5.28E−05
gdpnorth	−1.8E−05	gdpsouth	−0.00011	Year effects	Yes
gdpnorthsquared	5.58E−11	gdpsouthsquared	1.91E−09	_cons	−2.44086
gdpsouth	−0.00029	Year effects	Yes		
gdpsouthsquared	3.48E−09	_cons	−1.452		
Year effects	Yes				
_cons	9.781				

Tested hypothesis	*p*-value	Tested hypothesis	*p*-value	Tested hypothesis	*p*-value	
					Order	*p*-v
βtunemploymentnorth= =βtunemploymentsouth	0.58	βgdpnorth = βgdpsouth, βgdpnorthsquared= =βgdpsouthsquared	0.02	Arellano–Bond test for zero autocorrelation	1 2 3	0.0017 0.75 0.38
βdensitynorth= =βdensitysouth	0.24	βgdpnorthsquared= =βgdpsouthsquared	0.32	Sargan test for validity of instruments		0.43
βgdpnorth = βgdpsouth, βgdpnorthsquared= =βgdpsouthsquared	0.06					

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

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