Rivista Italiana di Economia Demografia e Statistica Volume LXVIII n. 3/4 Luglio-Dicembre 2014

SPATIAL ANALYSIS OF EMPLOYMENT MULTILPLIERS IN SPANISH LABOR MARKETS

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1. Introduction

Governments all over the world, in particular of those countries where the Global Financial Crisis has hitted most intensively, allocate increasing amounts of public financial resources to promote economic development and foster employment. These economic development policies are very often implemented at a local level, in response to bottom up and decentralizing strategies.

In general, the main target of local development initiatives, which mainly consist of promoting new businesses' start-up or favouring the development of existing businesses, is the so-called tradable sector, i.e., the sector producing goods that tend to be sold and consumed elsewhere. This attention to the tradable sector is essentially motivated by the alleged presence of a "multiplier" effect that benefits the entire (local) economy: an initial "injection" might generate a larger final impact on the local economy due to the emergence of a positive, cumulative effect arising from the links between the tradable sector and the rest of the economy.

There are several different approaches to estimate the magnitude of the multipliers. Quite often, the quantification of multiplier effects is carried out through Input-Output tables making a distinction between three types of effects: direct, indirect and induced. The direct effect is the effect that takes place in the targeted industry; the indirect effects concern inter-industry transactions: as a new firm opens, it will demand locally produced materials, possibly resulting in a further creation of jobs; induced effects measure the effects of the changes in overall household income brought in by the employment increase. Within this context, the employment multiplier is then represented by the ratio of direct plus indirect plus induced employment changes to the direct employment change.

In a rather recent paper, however, Moretti (2010) argues that this way of quantifying the multiplier effect might be inaccurate as it tends to overlook offsetting general equilibrium effects on local prices: as employment increases also wages (unless local labour supply is infinitely elastic) and land rents (unless land supply is infinitely elastic) do, thus imposing cost increases to all local firms. As a consequence, the author suggests an alternative method for estimating the size of the multiplier effect based on a simple regression framework. Apart from allowing for general equilibrium effects, this method has the additional important advantage of being particularly easy to implement, thus providing analysts and policy makers with an easy-to-use tool to evaluate the consequences of policy actions.

The aim of this work is to analyse, using the empirical methodology proposed by Moretti as a basis, the presence and magnitude of local multipliers within Spanish local labour market areas. The paper is structures as follows: in the second Section the local nontradable multiplier is presented, the third Section describes the data set, the fourth Section is devoted to the empirical analysis and the conclusive comments.

2. Local non tradable multiplier

Moretti's (2010) aim is to estimate the long term employment multiplier at the local level and presents a simple, informal, spatial equilibrium framework, according to which a positive shock to a tradable industry has: *i*) a positive effect on employment both in the nontradable sector and in other tradable industries and *ii*) offsetting general equilibrium effects (due to the increase in wages and land rents).

To do this, Moretti extends the simple spatial equilibrium model by Rosen and Roback (Rosen, 1979, Roback, 1982) featuring: production of both tradable and nontradable goods; non-homogeneous labour in tastes and skills; imperfect labour mobility due to idiosynchratic location preferences.

In Moretti's (2010) conceptual framework, policy intervention might attract new firms or increases product demand for existing firms. The local nontradable multiplier in a city is

$$M = \frac{\Delta N^T + \Delta N^{NT}}{\Delta N^T} = 1 + \frac{\Delta N^{NT}}{\Delta N^T}$$

where ΔN^T is the tradable sector labor change and ΔN^{NT} is the nontradable sector

labor change. Moretti estimates the elasticity $\varepsilon = \frac{\Delta N^{NT}}{\Delta N^{T}} \times \frac{N^{T}}{N^{NT}}$ and then focusses on $\frac{N^{T}}{N^{NT}}$ calculated as $\hat{\varepsilon} \times \frac{N^{NT}}{N^{T}}$. Operatively, the elastiticy is estimated via a simple linear regression

$$g^{NT} = \mathrm{a} + \mathrm{b}g^{T} + u \quad (1)$$

where g is the growth rate (change in the log number) of jobs and u is the usual iid error term.

As anticipated, the main advantage in using this approach is that it overcomes the tendency of the traditional methodology, i.e. local Input-Output, to overlook the offsetting general equilibrium effects (Moretti, 2010). In addition, as emphasised by de Blasio and Menon (2011), with the present methodology the exogenous variation is directly attributed to the tradable sector which in fact attracts most of the politcy interventions.

There are however two potentially critical issues. The first is the existence of spatial dependence, implied, for example, by trade and migration flows that lead to feedback across cities. This issue is totally neglected by Moretti despite a large literature suggesting that untreated spatial dependence might affect the estimates (among others, LeSage and Pace, 2009). To deal with this, the literature offers a list of modelling strategies, among which the most common are the spatial lag and the spatial error models.

The second critical issue is represented by a possible inverse causation of the variables in the regression that, in turn, implies endogeneity. Moretti (2010) treats this by adopting the instrumental variables estimator (IV) where the istrument is represented by the potential growth rate that each labor market area would have experienced had its economic subsectors grown at the corresponding national average growth rate. This is a rather commonly used instrument (Bartik, 1991). In his empirical analysis, Moretti (2010) obtaines that an additional job in the tradable sector leads to 2.77 (OLS) or 1.59 (IV) in the nontradable one.

Here, we deal with both issues simulateously proposing a tentative apprach in two steps. Firstly, we remove spatial dependence through a spatial filter; then, we proceed by estimating via IV. More formally, we estimate via IV

$$g_F^{NT} = \mathrm{a}' + \mathrm{b}' g_F^{T} + u' \quad (2)$$

where

$$g_F^{NT} = \left(I - \rho_{NT} W\right)^{-1} g^{NT}$$

$$g_F^{T} = \left(I - \rho_{T} W\right)^{-1} g^{T}$$

where W is a row-standardized spatial weight matrix.

3. Data

The empirical analysis considers a sample of 103 Spanish Local Labour Market areas (LLMAs). The data, collected by the Spanish Ministry of Empoyment and Social Security, gather the quarterly occupational statistics in the 60 CNAE (Clasificación Nacional de Actividades Económicas, the Spanish adaptation to the NACE classification) economic subsectors, which have been recorded for each local labour market area from 1999 to 2012. The Social Security database includes, for each municipality, observations for each of the 60 economic subsectors of the CNAE classification. To build the dataset, data at the municipality level have been gathered together according to the definition of the LLMAs.

In extreme synthesis, the reasons why LLMAs are preferred to administrative regions are two. Firstly, the choice of the territorial unit must ensure that the effects of local policies are confined, as far as possible, within the targeted area (Cheshire and Hay, 1989; Cheshire and Magrini, 2006). Secondly, results depend on size and shape of spatial units in an apparently unpredictable way thus leading to what is called Modifiable Areal Unit Problem (MAUP). In this framework, Openshaw (1996) claims that the MAUP will disappear once researchers know what the areal objects they wish to study are and according to Arbia (1989, 1991) it becomes essential to use units characterised by 'significant boundaries' from an economic standpoint.

The variables of interest to estimate model (1) are obtained by grouping employment data for 60 subsectors. The traditional approach to separate tradable from nontradable jobs, adopted in the studies by Moretti (2010) and de Blasio and Menon (2011) identifies tradable industries with manufacturing and nontradable ones with services. However, as emphasised by Jensen and Kletzer (2005) many service activities can in fact be considered as producing tradable goods and some manufacturing goods can be included among the nontradables. Consequently, rather that adopting the traditional classication, we use the two-digit code classification provided by Hufbauer and Vieiro (2013) (based on the approach developed by Jensen and Kletzer, 2005). According to this approach, when production is concentrated at a distance from consumption within the US, as inferable from a locational Gini coefficient exceeding 0.1, the activity is classified as tradable.

4. Empirical analysis

The aim of the current regression analysis is to estimate the elasticity of nontradable employment with respect to tradable. In particular, we first conduct a traditional OLS analysis; then, we proceed with an IV estimate to address endogeneity concerns; finally, we repeat the IV estimate on previously spatially filtered data in order to deal, simultaneously, with both spatial dependence and potential endogenity issues. All results are reported in Table 1.

Table 1 – *Estimates.*

	OLS		**IV**		**Spatial Filter + IV**	
	Coeff (s.d.)	p-value	Coeff (s.d.)	p-value	Coeff (s.d.)	p-value
Intercept	0.3151 (0.0316)	0.000	0.5033 (0.082)	0.000	0.480 (0.067)	0.000
Tradable	0.5036 (0.080)	0.000	-0.0104 (0.226)	0.963	0.039 (0.180)	0.829
	Statistic	p-value	Statistic	p-value	Statistic	p-value
Moran's *I*	4.766	0.000	3.9554	0.000	-1.169	0.242

As shown in the second and third column of Table 1, the OLS estimates of the b coefficient in model (1) are significant. However, they are not reliable, as we know that endogenity is likely to affect them. Consequently, to tackle this issue, the IV estimates are computed and this clearly changes the results, since now the coefficient of the tradable is not significant anymore (fourth and fifth column). The last row of Table 1 displays the results of the Moran's I test of spatial dependence; spatial patterns are significantly found both in the OLS and IV residuals and this leads to the last step of our analyis which is represented by an IV regression of the spatially filtered varibales, whose outcomes are reported in the last two columns of Table 1. The spatial filter is carried out using a maximum likelihood estimator of ρ_{NT} and ρ_T, W is a 15 neighbors row-stardardized spatial weight matrix. The results confirm that also once both issues are taken into account, the coefficient multiplying the growth rate of the employment in the tradable sector is not significant.

Along the lines of Moretti (2010) we computed (when possible) the job effect, i.e. the jobs in the nontradable sector created by an additional job in the tradable one and present in Table 2 we present a comparison of the results obtained in this work with those obtained by Moretti (2010) and De Blasio and Menon (2011).

Table 2 – *Estimated elasticities and additional non tradable jobs for each additional tradable job.*

	Spain		**Italy**		**US**	
	Coeff	Job Effect	Coeff	Job Effect	Coeff	Job Effect
OLS	0.504	0.671	0.061	n.a.	0.554	2.77
IV	0	0	0	0	0.335	1.59
Sp. Filter + IV	0	0				

All in all, once spatial dependence and endogeneity are simultaneously accounted for, the estimated coefficient is no longer statistically significant thus leading to the conclusion that the analysis of the Spanish Local Labour Market Areas does not provide evidence in support of local multipliers. In other words, once spatial spillover effects and endogeneity are controlled for, the relationship between the growth rate of the employment in the Tradable Sector and the one recorded in the NonTradable sector does not reveal any multiplicative effect. What emerges from the Spanish case, as well as from the Italian study by De Blasio and Menon, is therefore a rather different picture with respect to the US case. A possible motivation for this might be that Spanish and Italian labour markets are not as flexible as the US labour markets; in addition, it is likely that labour and land supplies are less elastic than in the US (due to lower job and geographical mobility) thus leading to stronger offsetting general equilibrium effects.

Further work could possibly proceed along the following direction. First, the model should include other variables, next to the growth rate of the tradable sector – that are more context-specific, and affect the magnitude of local multiplicative effects. These factors could be grouped into two main categories depending on how they affect the final effect. A first group directly affects the local labour market, by modifying the elasticity of the local labour demand or supply. For example, the high degree of centralization of the wage determination, the lower propensity to

move from the hometown to main job-attracting cities, and a more structured welfare system make wages less responsive to the local economic conditions and the local economy will experience a lower degree of job turnover.

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SUMMARY

Spatial analysis of employment multilpliers in spanish labor markets

The purpose of this work is to investigate the effect of employment promotion policies in Spain. In general, this depends on the ability of the intervention at creating new jobs in the targeted area, but also, to a large extent, on the impact they have on other parts of the local economy. Estimating the latter effect of the local multiplier, is therefore, important for regional economic development policies. Along the lines of Moretti (2010), we present an empirical analysis of the local multipliers using data of Spanish labor market areas over the period 1999-2007. From the methodological point of view, in this work not only endogenity (via instrumental variables estimates), but also spatial effects are taken into account. According to the results, the inclusion of spatial effects reveals the magnitude of the multiplier could be limited.

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