Journal of Macroeconomics 43 (2015) 124–139

Contents lists available at ScienceDirect

Journal of Macroeconomics

journal homepage: www.elsevier.com/locate/jmacro

Proximity and growth spillovers in European regions: The role of geographical, economic and technological linkages

Nikos Benos [a,*], Stelios Karagiannis [b], Sotiris Karkalakos [c]

[a] Department of Economics, University of Ioannina, University Campus, 45110 Ioannina, Greece
[b] European Commission, Financial and Economic Analysis Unit, Joint Research Centre, Institute for the Protection and Security of the Citizen, Italy
[c] Department of Economics, University of Piraeus, Greece

ARTICLE INFO

Article history:
Received 12 December 2013
Accepted 17 October 2014
Available online 1 November 2014

JEL classification:
C21
I23
O33
R12

Keywords:
Regional growth
Regional proximity
Spatial econometrics

ABSTRACT

This study examines the role of proximity in regional growth using a multi-dimensional framework, for seven EU countries during 1990–2005. We incorporate geographical as well as economic and technological effects in two seminal growth models in order to test for the existence and magnitude of interregional externalities. Our findings show that spillovers are important for European regional growth, regardless of the measure of proximity; thus regions surrounded by dynamic entities are likely to growth faster than otherwise. Moreover, our results underline the need for coordinated EU policies aiming at higher physical and human capital accumulation, taking into account regional synergies.

1. Introduction

Investigating the relation between proximity and economic performance in European regions in terms of competitiveness, technology, investment and growth is a challenging and complex task. Given the dynamic interactions within and across economies, proximity effects are expected to have long-lasting and broad impacts on the capital and labor markets. Stylized facts demonstrate that the spatial allocation of regions within countries in terms of economic activity is not random (Nijkamp and Poot, 1998). In the context of the EU, there is a core of regions characterized by high GDP per capita which are located close to each other and a peripheral set of regions with low per capita income located away from the core (Combes and Overman, 2004). In light of this, we could argue that the growth processes lying behind such income differences between EU regions are affected by externalities, i.e. regional growth rates depend on the growth rates of neighbor regions.[1] This paper applies a strategy, which validates this claim and strengthens the case for coordinated EU policies towards economic and social cohesion, accounting for regional spillovers.

Spillovers exist in part because individuals learn from each other when they live and work in close proximity. Increasing amounts of evidence confirm this and document that the diffusion of ideas depends on physical proximity, technological

* Corresponding author. Tel.: +30 26510 05955; fax: +30 26510 05092.
E-mail address: nbenos@cc.uoi.gr (N. Benos).

[1] In line with these, many theoretical growth models emphasize the role of external effects for the accumulation of production factors (Solow, 1956; Romer, 1986; Tamura, 1991; Eicher, 1996; Rodriguez-Clare, 2007).

http://dx.doi.org/10.1016/j.jmacro.2014.10.003
0164-0704/

specialization, the stage of economic development, labor mobility, and other factors.[2] Spillovers are important for growth, but they exist not only within but also across economies[3] according to a number of studies (Lucas, 1993; Fujita et al., 1999; Fingleton, 1999). If there are externalities across regions, studies that do not account for them produce biased results, leading to erroneous conclusions (Vaya et al., 2004). At the same time, we think that that there are limits to the spread of externalities, that is, externalities exist among regional economies with common characteristics, e.g. those which share borders (Durlauf and Quah, 1999; Fingleton and Lopez-Bazo, 2006). However, in most empirical work external effects are modeled in an ad hoc manner, depending on regions and time period examined (Le Gallo et al., 2003; Fingleton, 2001, 2004; Abreu et al., 2005).

In this study, we investigate externalities within and across seven EU member-states at regional level during 1990–2005. Our contribution lies in the implementation of two types of regional proximity based on geographical as well as economic and technological criteria at the lowest possible level of spatial aggregation (NUTS III).[4] Specifically, spatial proximity is based on geographic distance, while economic and technological proximity are defined in terms of GDP per capita and R&D output, respectively. Furthermore, we make a methodological contribution by employing a non-linear spatial econometric framework, in which the spatial lag matrix is a function of a parameter that measures the rate at which proximity effects dissipate. We assume an exponential rate of decay, and estimate the decay parameter jointly with all the other model parameters. This eliminates the need for specification searches by employing a set of possible spatial lag matrices and choosing among them on the basis of some measure of fit, as is often done in the literature. Using the exponential decay function also avoids the need to overparameterize the model by specifying a large number of spatial lag matrices for different distances, and estimate parameters for each one of them. This exponential function allows us to parsimoniously estimate the geographic half-life of spillovers, i.e., the distance at which spillovers are reduced by 50%. Our analysis is solidly grounded on two seminal growth models – namely Mankiw, Romer, and Weil (1992) (MRW hereafter) and Benhabib and Spiegel (1994) (BS hereafter) allowing for across-region externalities in a spatial econometric framework. We model externalities in the form of growth effects. These effects incorporate the influence of factor accumulation, TFP growth, technology diffusion, initial conditions and production function parameters on the neighbor regional economies.

Our findings robustly demonstrate that interregional externalities do matter for growth in European regions, regardless of the definition of proximity. Geographical, economic and technological effects imply strong spillovers across regions, in both growth models. Physical capital exerts a strong positive impact on growth. Additionally, human capital[5] and R&D output enhance regional growth in the MRW-type model, while human capital boosts growth of the lagging regions via a catch-up mechanism in the BS-type model. Overall, we can infer that regional growth patterns can be understood as a function of several interrelated factors, among which geographical, economic and technological proximity hold a primary role.

The structure of the paper is as follows. In Section 2 we summarize the theoretical and empirical literature on growth and externalities. Section 3 specifies our empirical model, presents the econometric methodology and data we use. The empirical findings are analyzed in Section 4, while in the last Section we outline the concluding remarks and policy implications. In Appendix A, we develop the theoretical framework of our empirical investigation.

2. Growth models with geographical, economic and technological conglomerate effects

Externalities play a central role in the theory of economic growth. In the neoclassical growth model, Solow (1956) assumed that all firms in the economy enjoy the same TFP level, which reflects technology accessible to all. So, there are disembodied knowledge externalities across firms. Mankiw et al. (1992) augmented the original Solow-Swan model to include human capital assuming there are knowledge externalities across firms within countries and across countries. They found that each country reaches a steady-state income which depends on its propensity to invest in human and physical capital.

Some new growth models account for the agglomeration of economic activity due to externalities. For instance, Grossman and Helpman (1991) examined localized spillovers if positive externalities associated with R&D or, generally, with knowledge exist only within a certain group of countries. Localized externalities, hence the limited geographical impact of knowledge spillovers, may be due to cultural, political and institutional differences. Externalities can explain why some countries exhibit higher growth and output per capita than others, and these differences might not diminish over time, implying core–periphery equilibria. However, location is still not part of the analysis and the endogenization of growth does not extend to the role of geography, so new growth theory does not offer a theory of location.

The theoretical literature most closely related to our work lies within geographical economics, which investigates the spatial distribution of economic activity (Brakman et al., 2009). The starting point of this literature is the observation that economic activity is not located randomly across space; instead there is clustering at the global, continental and national levels. For example, high-income and low-income countries and regions are geographically concentrated. Geography matters, because increasing returns to scale and natural cost advantages due to location exist in conjunction with transport costs

[2] There is an extensive empirical literature which examines the predictions of theoretical models and a significant part of it relates to regional growth (Reed, 2009; Sala-i-Martin, 1996; Carlino and Mills, 1996). However, these studies do not consider interactions among regions.

[3] Increasing evidence suggests that regional rather than national economies are the decisive units at which growth takes place (Ohmae, 1995; Storper, 1997; Cheshire and Malecki, 2004).

[4] We would have been keen to include additional member-states in our sample, but unfortunately data limitations exist at NUTS III level.

[5] Human capital is considered exogenous, i.e. we do not examine the process of human capital accumulation.