Economic Modelling 51 (2015) 444–453

Contents lists available at ScienceDirect

Economic Modelling

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

Does genetic proximity to high growth countries affect a country's own growth?☆

Azam Chaudhry *, Rabia Ikram

Department of Economics, Lahore School of Economics, Intersection DHA Phase VI and Burki Road, Burki, Lahore, Pakistan, 53200

ARTICLE INFO

Article history:
Accepted 29 August 2015
Available online 19 September 2015

Keywords:
Growth
Spillovers
Geography
Culture

ABSTRACT

While technological advances have effectively reduced the distance that knowledge and innovations have to travel between countries, the literature has found that innovations, technology and growth are still slow to diffuse between countries. We present an econometric model that explains how a country that is genetically closer to other high growth countries can experience higher growth or 'growth spillovers'. Recent empirical work has found that genetic links matter because countries with common genetic characteristics tend to have common languages, common business practices, and common areas of economic interest which eases the process of interaction. We empirically prove that the effect of genetic proximity to high growth economies can be separated from the impact of geographic proximity or trade links to these countries. Using measures of cross-country genetic links, our empirical results also prove that even after taking both the geographic distance and the amount of trade between countries into account, genetic proximity to high growth economies increases growth in a country.

1. Introduction

Traditional empirical analyses of economic growth have not only examined the factors that affect a particular country's growth rate, but also how growth in one country may be affected by growth in neighboring or economically linked countries, a phenomenon known as 'growth spillovers'. So growth in Japan boosts growth in Korea and growth in the US spurs growth in Canada. While earlier research on economic growth emphasized basic tests of convergence in cross-country growth rates (and tests of regional convergence), the recent literature has investigated the specific mechanisms through which growth can be transferred. One strand of the research has investigated the various economic linkages across countries, ranging from production externalities across regions to the impact of ethnic and social networks on trade. Our model describes the way in which economic growth can spill over between countries that are not only close to each other geographically, but also close to each other genetically.

The reason for investigating why spillovers can occur between countries that are linked genetically is because even though advances in technology have reduced the need for physical movements in the spread of innovation, other factors still play a role in the spread of technology: Countries with common genetic characteristics have been proven to have more ethnic or cultural characteristics in common even if they are separated by significant distances (see Giuliano et al. (2006) and Guiso et al. (2009)). The countries that share common ethnic or cultural characteristics can potentially transfer innovations more easily, because of common languages, similar business practices, overlapping areas of economic interest, similar institutions, similar biases or just a greater degree of comfort when interacting. So there is a greater chance of interaction between countries which have genetic links. This greater interaction results in growth spillovers between these genetically linked countries (and development policies can focus on using these links between connected countries to promote economic growth).

In this paper we consider a model of economic growth and incorporate growth spillovers and cross-country genetic links. After describing a model that explains how genetic proximity can cause growth spillovers, we use measures of cross-country genetic distances to empirically test if growth spillovers have occurred between countries through genetic links. Our empirical results prove that even after controlling for geographic distances and the volume of trade between countries, countries that are genetically closer to high growth economies experience higher economic growth.

The setup of this paper is as follows: Section 2 reviews some of the literature on growth spillovers. In Section 3, we define genetic distance and investigate the link between genetic distance and geographic distance as well as the link between genetic distance and bilateral trade. Section 4 describes a basic model of growth spillovers and discusses the empirical results from that model. Section 5 estimates a variation of the spillovers model in which the size of

☆ We are grateful to the editor and the three anonymous referees for four rounds of extremely insightful comments on our paper. Any errors are our own.

* Corresponding author. Tel./fax: +92 42 36560969.
E-mail addresses: Azam@lahoreschool.edu.pk (A. Chaudhry), Rabiai@lahoreschool.edu.pk (R. Ikram).

http://dx.doi.org/10.1016/j.econmod.2015.08.031
0264-9993/

economies is incorporated into the model. Section 6 discusses the robustness of our empirical results and Section 7 presents our conclusions.

2. Literature on economic growth and spillovers

The modern literature on economic growth is rooted in the theoretical growth model of Solow (1956) which emphasized the process of accumulating domestic factors of production for long run economic growth. Mankiw et al. (1992) used this model to estimate a basic exogenous growth model that empirically tested the relationship between cross-country growth rates and capital accumulation. Their estimated model found that differences in domestic saving rates, education and population growth rates explain most of the cross-country variation in growth. In contrast to the models of Solow (1956) and Mankiw et al. (1992), endogenous growth models assumed increasing returns to various domestic factors of production and explained long term trends in economic growth in terms of externalities. Among these endogenous growth models, the work by Aghion and Howitt (1992), Grossman and Helpman (1994) and Romer (1994) related endogenous long term growth with investment in areas like domestic research and development. Most of the early theoretical and empirical work done on economic growth tested how country level heterogeneity explained differences in cross country growth, but largely ignored how linkages or interactions between countries could result in one country's growth having spillover effects on growth in other countries.

Other authors tested the nature of economic linkages between countries with an emphasis on factors such as research and development (R&D) investments among trading partners (see Coe and Helpman (1995), Park (1995) and Coe et al. (1997)). This literature empirically tested how R&D investments in foreign countries embodied in traded goods were a principle channel for technological diffusion and authors found that there were significant R&D spillovers from industrial countries to developing countries (see Coe and Helpman (1995), Coe et al. (1997) and Keller (2002)). A separate strand of this literature empirically proved that higher levels of foreign direct investment led to more R&D spillovers and technological spillovers between countries (see Leimbach and Edenhofer (2007)).

An extension of the research on cross-country linkages investigated how business and ethnic links have increased interaction between countries. Rauch (2001) and Rauch and Trindade (2002) analyzed how ethnic networks promote international trade by reducing contract enforcement problems and information costs across countries. The empirical results of Combes, et al. (2004), Bardhan and Guhathakurta (2004), Herander and Saavedra (2005), Dunlevy (2006) and Bandyopadhyay, et al. (2007) proved that stronger ethnic networks increase trade within countries. Guo (2004) measured cultural proximity between countries by using religious and linguistic links and applied a gravity model to US and Chinese trade data. His empirical results found that linguistic links have become more important in the growth of foreign trade than geographical proximity. The common theme in both the theoretical and empirical literature in this area is that cultural or ethnic links increase the probability of matching buyers and sellers (and thus completing transactions) and also increase the probability of contract enforcement (though both formal and informal channels).

While much of the work discussed above investigates the types of linkages between countries, some authors focused less on the nature of these linkages and more on how one country's growth rate could be affected by the growth rates of its neighbors (also known as growth spillovers). They empirically tested the hypothesis that countries that were closer to high growth economies tended to grow faster. Taking a regional perspective, authors like López-Bazo et al. (2004) empirically tested the impact of regional spillovers for a sample of European regions using a spatial lag growth model and the authors' results proved significant spatial dependence in growth rates across European regions. Similarly, Arbia et al. (2010) also tested European regional growth and used a spatial Durbin growth regression model to prove that growth rates in European regions that share similar institutions tended to converge more quickly after controlling for geographical distance. Maza, et al. (2012) used spatially conditioned distribution dynamics to examine how distance affected regional per capita income disparities in Europe between 1980 and 2005. The authors' empirical results proved that poor regions surrounded by rich regions have a greater chance of escaping poverty. Using U.S. data, Blazek and Sickles (2010) provided an empirical explanation for growth spillovers by creating a modified endogenous growth model which allowed spatial spillovers to impact the productivity of workers across regions.

Other authors hypothesized that growth spillovers went beyond geographical regions and used spatial estimation techniques to test whether growth rates in a larger sample of countries were linked. Empirical work by Moreno and Trehan (1997), Conley and Ligon (2002) and Vaya, et al. (2004) investigated the impact of distance on cross country growth spillovers for a large sample of countries across regions. In their empirical results, greater 'distance' between countries (which could be measured using geographic distance or 'economic' distance) had a significantly negative impact on growth spillovers between countries. Behar (2008) applied a spatial error model to a panel of 134 countries and his empirical results proved that negative growth spillovers tend to be concentrated in geographic neighborhoods but that countries can mitigate these negative spillovers by increasing economic openness.

The majority of authors that have investigated cross country linkages have either analyzed the type of links between countries (without testing the impact of these specific links) or have empirically tested the impact of links between countries on growth spillovers (without investigating the specific nature of these links). Some authors have also studied the impact of specific links between countries on cross country trade or cross country income. Giuliano et al. (2006) tested the relationship between genetic links between countries and bilateral trade. Their empirical results demonstrated that genetic distance played a more important role in explaining trade flows than cultural distance. Spolaore and Wacziarg (2009) also empirically tested the impact of genetic distances and their results proved that genetic distance has a significant impact on income differences across countries even after controlling for geography.

In the same vein, Gorodnichenko and Roland (2010) constructed an endogenous growth model and using genetic distance as an instrument for culture, empirically proved that individualism leads to more innovation. Instead of using genetic differences, Guiso, et al. (2009) empirically tested how cultural 'trust' between countries affected the level of economic interaction between European countries and proved that lower bilateral trust led to less trade, less portfolio investment, less direct investment and less convergence in income. Chou, Chen and Mai (2011) constructed a spatial lag model to test the impact of economic integration on China's outward FDI and proved that while geographic proximity did not have an impact, cultural proximity between China and other countries did significantly affect Chinese outward FDI. Basile et al. (2012) considered a semi-parametric spatial autoregressive model to estimate the role played by different kinds of proximities in determining regional spillovers across Europe and found that relational, social and technological proximities explained productivity growth across Europe. More recently, Benos et al. (2015) investigated the effects of geographical and technological proximity on interregional externalities and found that geographical as well as technological links explained interregional growth differences.

The model and results presented in the following sections extend the empirical work on cross-country linkages and economic growth. In the next section, we define genetic distance and then investigate whether the impact of genetic distance on economic growth can be separated from the impacts of geographical distance and bilateral trade on economic growth. After, this we empirically test the impact of genetic distance on economic growth.