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The Effects of Technology Spillover on Life Environment Pollution with the Demolition Model

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EXTENDED ABSTRACT

The flow of technology spillover to countries, causing knowledge increase and technology transfer and creating competitive advantages, has been considered during the last decades. Evidently, the economic growth mostly increases the environmental pollution. In this paper, we investigate the effects of spillover technology from the channels of foreign direct investment (FDI) and import of intermediary and capital goods on environmental pollution in economic developing countries in the four continents Asia, Europe, Africa and America during the period 2000-2017. Because of the importance of Geography and the distance between the countries, and also the exactness of the spatial econometrics model, the spatial econometrics method is chosen and it is the innovation of this research. The result shows that the impact of technology spillover from the channel of foreign direct investment on the environmental pollution is negative. Furthermore, the impact of technology spillover from the channel of intermediary and capital goods imports on the environmental pollution is also negative.

INTRODUCTION

With international economic growth in the global economy, attracting foreign direct investment was considered as one of the components of economic growth and development of countries. Among the benefits of attracting foreign direct investment are increased economic growth, technology transfer, job creation and increased competitiveness. Technology spillover is one of the most important factors affecting economic growth and development. According to studies, most firms that enter the host economy

by attracting foreign direct investment have relatively modern and more advanced technology than domestic firms, which leads to overflows (technology, new management methods, local labor training). It leads to the host economy so that the spillover of these components leads to an increase in the competitive environment and competitiveness between industries in the host economy and the international level. Vaseghi and Jalaee (2016) in a study entitled: The study of the effect of technology spillover on CO2 emissions in Iran, show that the technology spillover variable not only has a positive and significant effect on CO2 emissions, but also the turning point of the environmental curve. It also enables Kuznets at a higher per capita income. Alfaro and Chavin (2017) in their study examined the impact of foreign direct investment on the economic development of host countries. The results show the positive impact of foreign direct investment on economic development, because due to financial constraints in the developing countries and the desire of countries to attract foreign direct investment and create competition between domestic and foreign companies, this issue increases production and quality improvement of production.

METHODOLOGY

In the present study, in order to estimate the effect of technology spillover on environmental pollution, using gravity model, knowledge product function, Kuznets curve and technology framework spillover indicators, the model framework is expressed as the following model and then the degradation coefficient is entered as a proxy. Modeled and its impact on environmental pollution is measured. In this study, selected and emerging economies are in 4 continents (China, India, Russia, Malaysia, Turkey, South Korea, Italy, Brazil, South Africa), so these countries are considered as owners of technology and source of spillover during the period 2000-2017, it has been extracted from the website of the World Bank and the Statistics Center of Iran and the energy balance sheet, and also due to the use of spatial econometric method, the theoretical foundations of this method have been given.

FINDINGS

Today, spatial and regional data and observations can be used in many scientific studies, such as commercial, commercial, etc. Studies. By considering a factor such as space, errors in estimating and forecasting can be prevented. This indicates the better capability and application of spatial econometrics than conventional econometrics. On the other hand, the use of spatial and regional data will cause two problems: 1) spatial dependence

between observations and 2) spatial heterogeneity. In this study, to detect spatial autocorrelation in perturbation components, Lagrange coefficient test is used to identify a suitable model for eliminating spatial autocorrelation. Which is performed based on the remainder of the least squares and calculations related to the spatial weight matrix W. According to the results of estimating the Lagrange coefficient, the Chail statistic in the Lm Lag - Panel and Lmerror tests is more than 635.6 and indicates the significance of the Lmerror test, so the estimation model is the SEM model. According to the results of estimates in this study, it can be said that the effect of technology spillover from two channels of foreign direct investment and the import of intermediate goods and capital on environmental pollution is a negative and significant effect.

CONCLUSION

To determine the role of technology spillover, two key indicators of foreign direct investment and the import of intermediate and capital goods have been used. The results show that the foreign direct investment ratio is negative. Therefore, technology spillover through foreign direct investment channels reduces environmental pollution. Also, technology spillover through the channel of import of intermediate goods and capital have a negative and significant effect on environmental pollution. The results show that the import coefficient of capital and intermediate goods is negative, which decreases with increasing imports of intermediate goods and capital. Therefore, in particular, technology spillover channels (foreign direct investment and import of capital goods and intermediate goods) for the studied countries can not only serve economic growth, but also moderate environmental pollution.

Reference

Aghnoum, M., Feghhi, J., Makhdoum, M., & Jabbarian Amiri, B. (2014). Assessing the Environmental Impacts of Forest Management Plan Based on Matrix and Landscape Degradation Model. *Journal of Agricultural Science and Technology, 16*(4), 841-850. Retrieved from http://jast.modares.ac.ir/article-23-5194-en.html [in persian]

Ajideh, B., &Adeny, O. (2010): FDI and the Environment in Developing Economics: Evidence from Nigeria. *Environmental Research Journal*, No. 4, 291-297.

Alfaro, L., & Chvin, J. (2017): Foreign Direct Investment Finance and Economic Development. *Encyclopedia of International Economics*

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(former Economic Studies)

and Global trade, 2, 231-259.

Bahmani, M. , Hasankhani, M. and Shakibaee, A. (2017). Evaluation the FDI Spillover Effects on Labor Productivity in Iran's Manufacturing Sector. *Journal of Industrial Economics researches*, *1*(2), 87-100. doi: 10.30473/indeco.2019.18618.1025 [in persian]

Bernard, A., & LeSage, J. (2011): Quantifying Knowledge spillovers using Spatial Econometric Models. *Journal of Regional Science*, 3, 471-496.

Crespo, J., Martin, C. & Velázquez, F. (2004): The Role of International Technology Spillovers in the Economic Growth of the OECD Countries. *Journal of Global Economy*, 4 (2), 1-18.

Eskandari, S. (2015). *Convergence analysis of gas exporting countries in the process of gas OPEC formation with spatial econometric approach and technology overflow analysis.* (Unpublished doctoral dissertation). Shahid Bahonar University of Kerman, Kerman, Iran. [in persian]

Hosseini Nasab, A., & Payekari. S. (2013). Investigating the Impact of Economic Growth and Trade Liberalization on Environmental Pollution, *Economics Journal*, 8(9). [in persian]

Kim, H., & Beak, J. (2011): The Environmental Consequence of Economic Growth Revisited. *Economics Bulletin*, 31, 1121-1198.

Leylian, N. , Ebrahimi, M. , Zare, H. & Haghighat, A. (2023). Assessing the short run and long run effects of foreign direct investment, human capital and financial development on the economic growth of different income groups in developing countries (application of the panel cointegration approach). *Quarterly Journal of Quantitative Economics (JQE)*, *20*(3), 35-77. doi: 10.22055/jqe.2021.36604.2339 [in Persian]

Leylian, N., Ebrahimi, M., Zare, H., & Haghighat, A. (2022). Presenting the foreign direct investment model and economic growth of developing countries with the mediating role of human capital and information and communication technology. *Quarterly Journal of Quantitative Economics (JQE)*, *19*(3), 125-153. doi: 10.22055/jqe.2021.32814.2225 [in persian]

LeSage, James P. (1999): *The Theory and Practice of Spatial Econometrics*, University of Toledo, 28.

Makhdoum, M. F. (2002): Degradation model: A quantitative EIA instrument, Acting as a decision support system (DSS) for environmental management. *Environ. Manage.* 30, 151- 156.

Marin, A., & Bell, M. (2006): Technology Spillovers from Foreign Direct Investment (FDI): The Active Role of MNC Subsidiaries in Argentina in the 1990s. *Journal of Development Studies* 42 (4), 678-697.

Mingyong, L., Shuijun, P., & Qun, B. (2006): Technology Spillovers, Absorptive Capacity and Economic Growth. *Journal of chin Economic Review,* 17, 300-320.

Pao, T., & Tsai, C-M. (2011): Modeling and Forecasting the Co2 Emissions, Energy Consumption and economic Growth in Brazil. *Energy*, 36, 2450-2458.

Sadeghi, H., & Seaadat, R. (2005). Population growth, economic growth and environmental impacts in Iran. *Iranian Journal of Economic Research,* 64, 163-180. [in persian]

Sepehr, H., Makhdoum, M., Faryadi, S., & Ramezani, M. (2016). Assessment of land quality in protected areas using the degradation model (Case study: Turan Protected Complex). *Environmental research*, 6, 13-119. [in persian]

Shafei, S., Bakhshoodeh, M., & Farajzdeh, Z. (2019). The Effect spillovers of technology on Space emissions CO2 of Selected in Developing Countries in Asia, *Journal of Environmental Science and Technology,* https://jest.srbiau.ac.ir/article_12224.html?lang=en. [in persian]

Shahabadi, A., Valinia, A., & Ansari, Z. (2013). Impact of technology overflows due to foreign direct investment on the performance of the industrial sector. *journal of science and technology parks & incubators*, 9 (33), 13-25. http://www.roshdefanavari.ir/en/Article/20066 [in persian]

Vaseghi, A., & Jalaee, A. (2017). Investigation of technology overflows on CO2 emissions in Iran. *Journal of Environmental Sciences*, 4 (1), 117-124. https://envs.sbu.ac.ir/article_97659.html?lang=en [in persian]