



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Selected Poster prepared for presentation at the Agricultural and Applied  
Economics Association & Western Agricultural Economics Association (AAEA & WAEA)  
Joint Annual Meeting, San Francisco, LA, July 26-28, 2015

**THE ANALYSIS OF INTER-REGIONAL TRADE AND INVESTMENT FLOWS:  
THE AGGREGATED NET TRADE LEVEL IN THE SPANISH PROVINCES**

**PENA-LEVANO, LUIS.** PURDUE UNIVERSITY

**OSINUBI, ADENOLA.** UNIVERSITY OF GEORGIA

**SCOTT, FRANCISCO.** PURDUE UNIVERSITY

**RACHAL, MATTHEW.** PURDUE UNIVERSITY

**PENA-LEVANO, WILLIAM.** UNIVERSIDAD INCA GARCILAZO DE LA VEGA

**PENA-LEVANO, MIRELLA.** UNIVERSIDAD NACIONAL MAYOR DE SAN MARCOS

**DIAZ-LANCHAS, JORGE.** UNIVERSIDAD AUTONOMA DE MADRID

*Copyright 2015 by Pena-Levano et al. All rights reserved. Readers may make verbatim  
copies of this document for non-commercial purposes by any means, provided this copyright  
notice appears on all such copies.*



**ABSTRACT**

This study examines the relationship between trade and potential determinants: GDP, FDI, unemployment rate in Spanish provinces while incorporating spatial dependence. This methodological paper contributes to the literature because it evaluates trade at a more disaggregated level and includes FDI to explain the trade pattern. The research concludes that: (1) Only considering GDP and unemployment rate; increase in economic growth or a decrease in unemployment rate could motivate trade in the province; likewise trade of the neighbors will increase the competition, which could decrease the province sales. (2) If FDI is included, FDI received by the neighbor provinces could decrease the exports of the province because it makes its rivals more productive and competitive.

**RELEVANCE OF THE TOPIC**

International flows of commodities and products between countries represent a significant portion of the world GDP. The two channels are **trade and foreign direct investment (FDI)** (Laurin, 2012). The **Spanish** economy became one of the receptors of foreign investments and also a potential trade partner because its closeness to several regions of Europe and North Africa. However, despite the economic growth of the country, **not all** the provinces **receive this internalization of productivity growth with the same intensity**. At a national level, heterogeneity in trade has been intensively explored in the recent years in terms of cross-country heterogeneity and its relationship with trade (Rodrik, 2007). However, **there is not any empirical study that focuses on the evaluation of the trade pattern** inside a national perspective (i.e. interprovincial trade), which expresses the internal variation of trade within a nation, whereby the **trade of a province could depend on the trade flow of the partners and its geographical location and characteristics**.

**INTERNATIONAL VS. PROVINCIAL TRADE**

The study of the intraregional effects is different because:

Generally transportation cost is **larger** between nations than regions **especially** if the commodities are subject to **tariffs**

Source: The Resume Template

Provinces are under the **national government** control, therefore **political/federal laws apply for all the provinces** which does not happen in the relation between countries

Source: Carroll Connection

There are **natural barriers** between countries such as language and cultural aspects

Source: Knektion

There is **free trade between all the provinces** inside the country which eliminate potential trade barrier effects (Falvey and Foster, 2012)

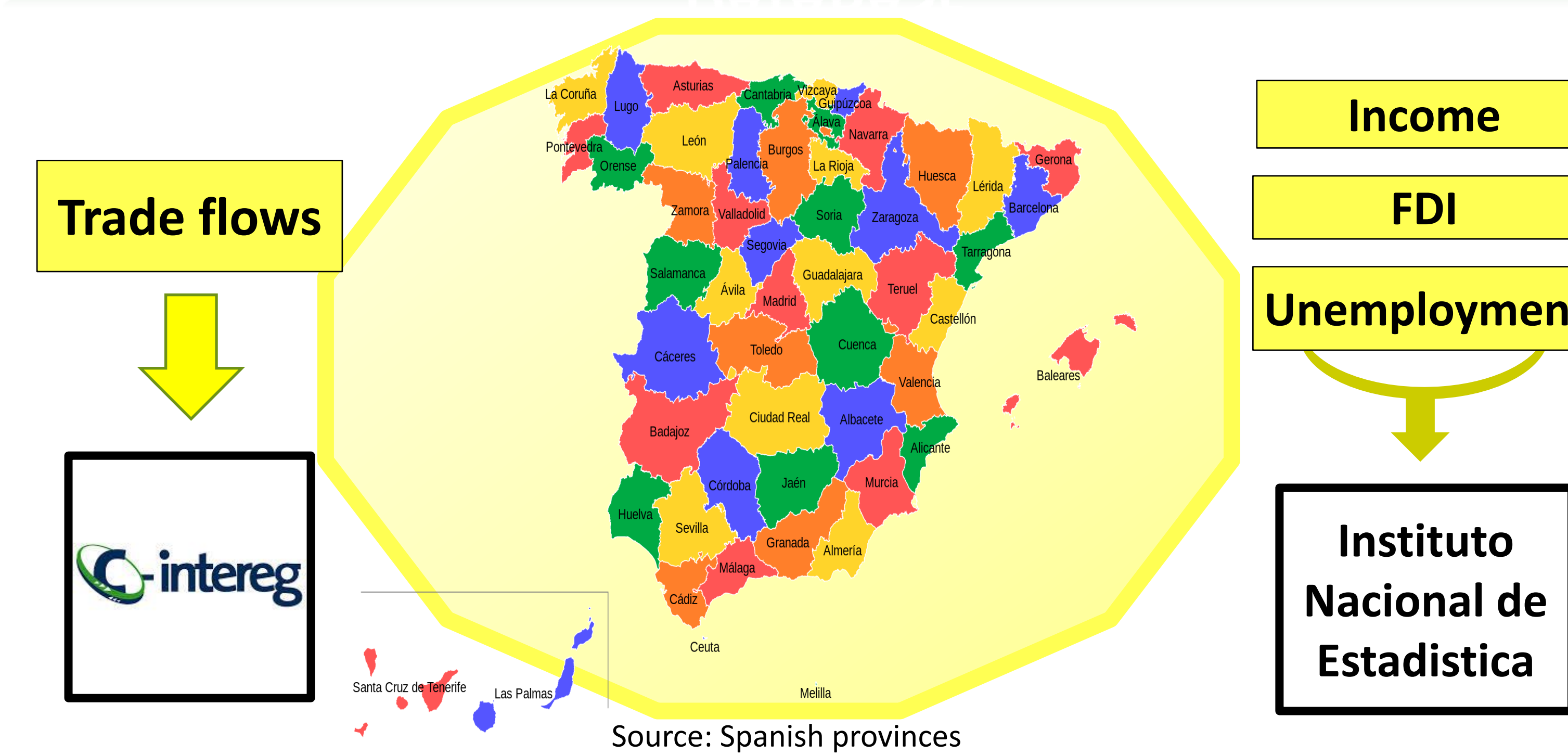
Source: Carroll Connection

**OBJECTIVE AND CONTRIBUTION**

The objective of this study is to test whether there is a relationship between a specific provincial trade and three factors: the GDP per capita, the international foreign direct investment (FDI), and the unemployment rate of the province and its neighbors while including the spatial dependence with the trade flow of the provincial neighbors.

This paper contributes to the literature in several aspects:  
(1) We will include the impact at a more disaggregated level: the **provincial level**, which has been unexplored and contains a higher level of heterogeneity.  
(2) The analysis also includes the impact of the provincial neighbors using an **extension of the gravity model**.

**DATABASE**



**ECONOMIC MODEL**

The model is based on Helpman *et al.* (2004) for heterogeneous firms. We first obtain the ratio of the revenues from exports and FDI (**SXI**):

$$SXI = \tau^{1-\varepsilon} \left[ \left( \frac{f_I - f_X}{f_X} \frac{1}{\tau^{\varepsilon-1} - 1} \right)^{\frac{k}{(\varepsilon-1)}} - 1 \right]$$

*k* : Parameter of the Pareto distribution of labor  
*f<sub>X</sub>, f<sub>I</sub>*: Entry (fixed) cost of export, FDI  
*τ*: Transportation cost  
*ε*: Elasticity of substitution

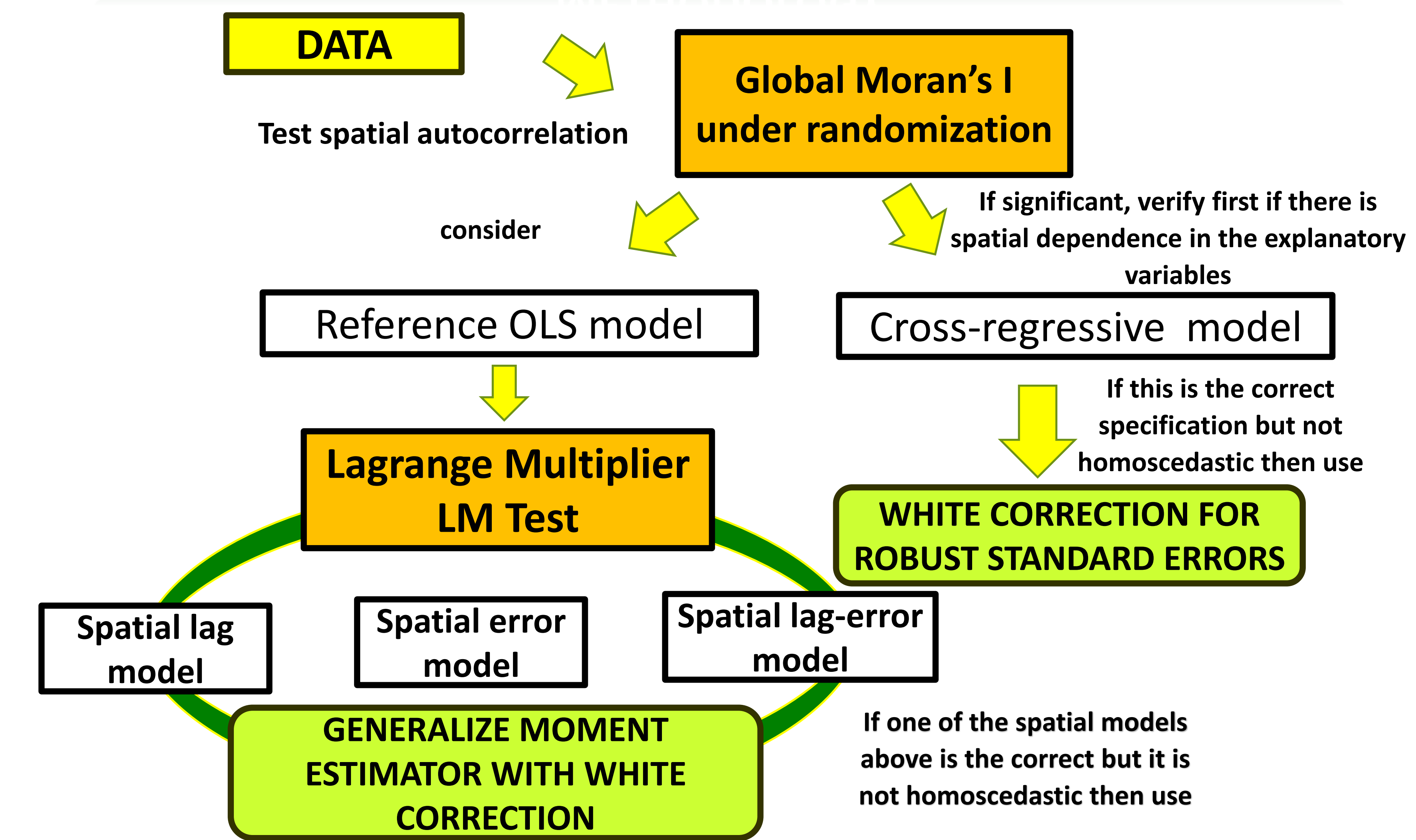
Multiplying by revenues from FDI. We obtain the following relation:

$$Exports = f(\tau, \varepsilon, k, f_I, f_X, FDI || GDP, POP)$$

Transportation cost depends on distance which is represented by the spatial weight matrix. We use unemployment as a proxy for *k*. Consumers inside the country have the same elasticity of substitution. We assume no entry costs because we are at a national level. Allowing differences in GDP and population, our model is as follow:

$$Exports = f(Distance, Unemployment, FDI, GDP, POP)$$

**METHODOLOGY**



Dependent variable: ln(Export per capita).

Variable	Estimate	Standard deviation	t-value	P-value
Intercept	- 5.82 ***	0.97	-5.97	<0.001
ln(GDP per capita)	0.71 *	0.37	1.95	0.056
Unemployment rate	-16.16 ***	4.46	-3.62	<0.001
Φ: W_ln(FDI per capita)	- 0.03 **	0.01	-2.28	0.027

Φ represents the spatial parameter for FDI.  
Significance star codes: 0 \*\*\*\* 0.01 \*\*\* 0.05 \*\* 0.1 \* 1

**RESULTS AND CONCLUSIONS**

In our methodological study we found that the model is consistent with trade and financial theory between countries:

- The **exports per capita** of each province could increase if there is an **economic expansion** (higher GDP per capita) of the province. However, it could **decrease** if there is **higher own unemployment rate**.
- Additionally, the results of this model shows that the **FDI received by the neighbor provinces could decrease the exports of the province**. One of the explanations of this behavior is **that receiving direct investment from other countries could increase the productivity** in that province. Thus, the province becomes more competitive in comparison to their neighbors. This motivates the province to export (Diaz, 2001; Nocke and Yeaple, 2007), therefore this **could decrease the quantity traded by the rival neighbors** and vice versa.