



Extended abstract

EXTENDED ABSTRACT

Title: The determinants of industrial location in European regions

Authors and e-mails:

Javier Escribá Pérez francisco.j.escriba@uv.es

Alicia Gómez Tello: alicia.gomez-tello@uv.es

M^a José Murgui García maria.j.murgui@uv.es

M^a Teresa Sanchís Llopis m.teresa.sanchis@uv.es

Department: Análisis Económico

University: Universitat de València

Subject area: Area 8 Localización de la actividad económica

Abstract: (*minimum 1500 words*)

Keywords: location; industrial investment; regions.

JEL codes: E22, L60, R30



EXTENDED ABSTRACT

The objective of this paper is to analyse the process of industrial investment location in some European regions over the period 1995-2014. Our aim is to determine which are the regional and national factors responsible of the attraction of inward private investment.

We classify the determinants of industrial investment location into four groups. The first group is related to agglomeration economies (namely, concentration-diversification of industry in the region). The second group includes characteristics related to the labour market and local demand. For instance, lower wages could make a location more attractive; then it is important to control for the relative labour costs. Furthermore, regions with high increases in wages could stimulate capital intensification, fact that can be controlled taking into account the relative growth rate of wages. Finally, and according the "new economic geography", some characteristics of the local demand can attract new investors. The third group gathers the stimulating role played by the infrastructures, R&D, and human capital endowments. Finally, the last group of determinants, is related to national regulation indicators: indices based on objective information compiled by international organizations, such as the OECD, and indices based on subjective judgements in surveys of business opinion, such as that of the Fraser Institute.

In order to develop our empirical exercise we build a database using information from two main datasets: BD.EURS (NACE Rev1) and EU-KLEMS. Our final dataset contains information of gross value added, gross fixed capital formation, capital stock, and employment. Our sample is composed by 121 European regions (NUTS2) belonging to nine European countries (henceforth EU-9): Germany (de), Austria (at), Belgium (be), Spain (es), France (fr), Netherlands (nl), Italy (it), Portugal (pt) and Sweden (se).

Although the spatial level we are interested in exploiting in this study is mainly NUTS-2 level, we begin describing some descriptive statistics at country level (NUTS-0). Figure 1 shows the trend of the industrial investment by country over time. In order to ease the analysis, the values in year 1995 are equal to 100. In most countries there



was a positive trend of the industrial investment from 1995 to 1999–2000. After that year, there was slight fall, but from year 2004 the positive trend started again. This positive trend finished in years 2007–2008, with the Great Recession.

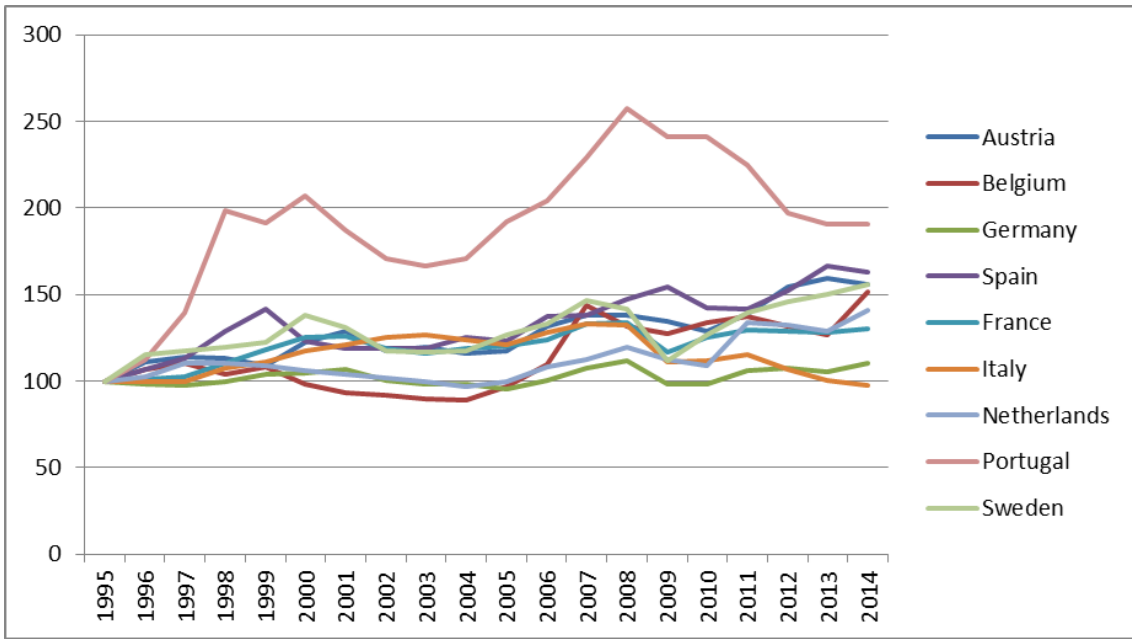


Figure 1. Industrial Investment (1995=100) for 9 European Countries.

Source : BD.EURS (2018)

Figure 2 shows the relative importance of the industrial sector respect to the business non-financial. As we can observe this percentage depends on the country. The country in which the industrial investment had the highest weight was Germany (60%) In Spain, this weight was around 40%, but along the period 1999–2008 it was 10 percentage points lower.

Now we focus on the spatial distribution of the industrial investment over time. The maps show the relative importance of the investment of each region respect to the total investment (EU-9). Then, darker colours represent regions with high levels of investment, while lighter colour represents regions with low levels of investments.

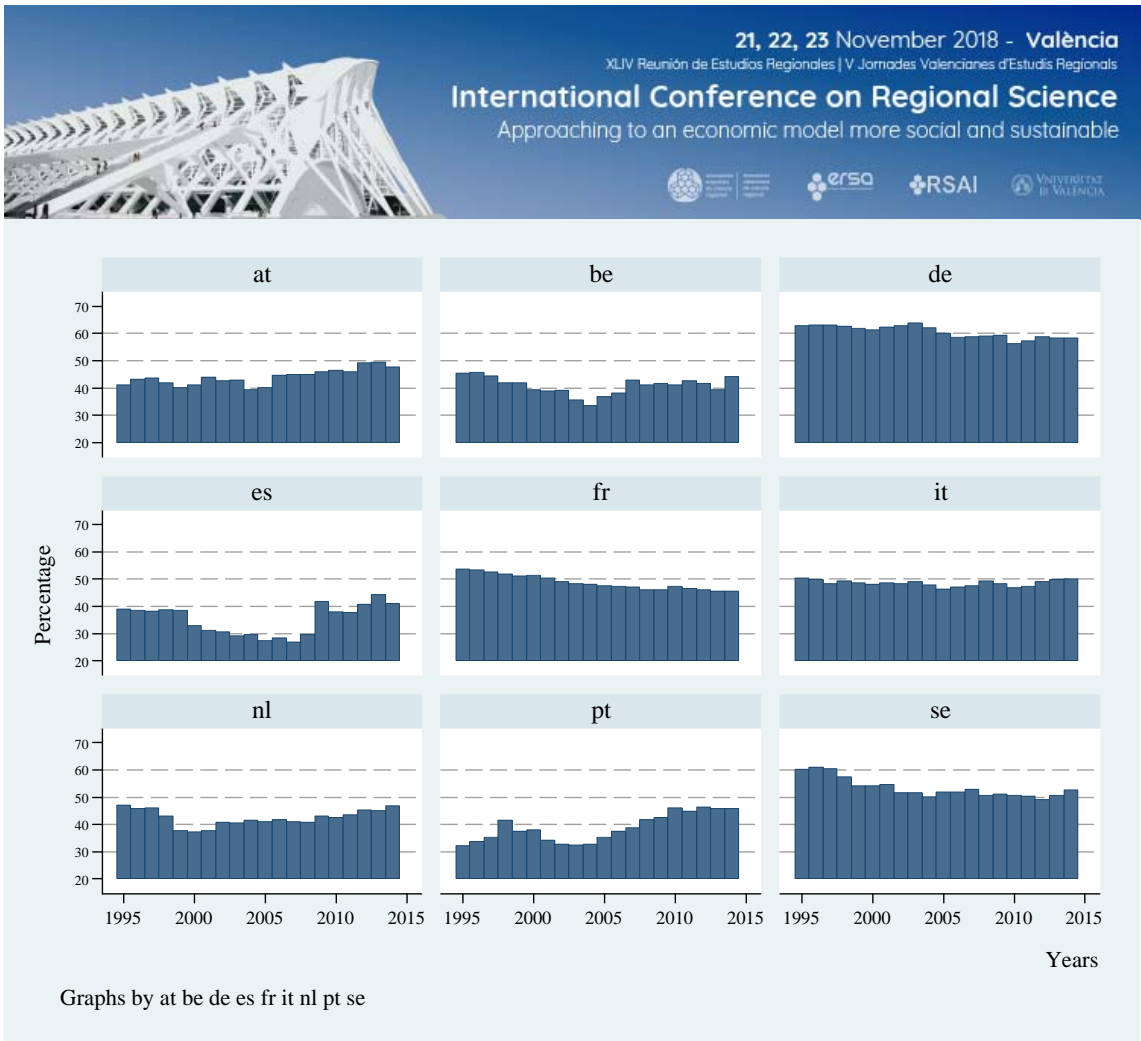


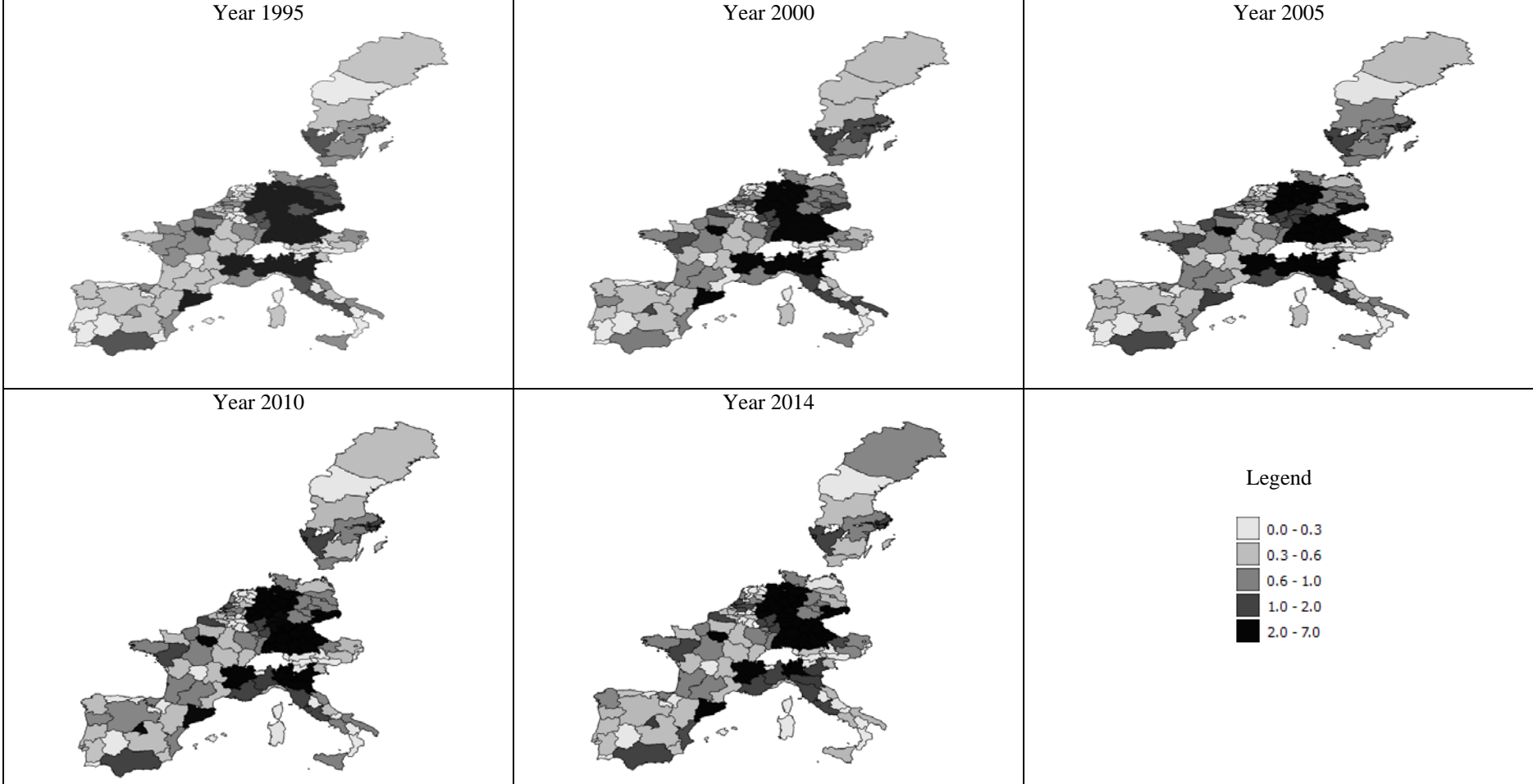
Figure 2. GFCF industry/ GFCF Business-non financial. Percentage.

Source: BD.EURS (2018)

In 1995 there were 14 regions with levels of investment that represented more than 2% of the EU-9 investment. Four of these regions were located in Germany, four in the North of Italy, two in France (Île de France and Rhône-Alpes), and one in Spain (Catalonia). If we also consider regions with an industrial investment with 1%-2% of EU-9 investment, this group increase to 25 countries. It means that the rest of regions (95 regions) had negligible levels of industrial investment. The top region in industrial investment was German lander Nordrhein-Westfalen, which concentrated between 6-7% of the total investment along the whole period of analysis.

As we can observe in the maps, the spatial distribution of the industrial investment did not suffer important changes over time (2000, 2005, 2010, and 2014), which means that the industrial investment was concentrated in the same regions. Therefore, it is important to analyse which factors are affecting the industrial investment location, and whether the effect of these factors is equal in all region.

Variable: Relative importance of the GFCF (%)





Our approach will be developed following the extensive literature related to the location of foreign direct investment (FDI). In Europe, the FDI flows has been mainly analysed at country level (see Barba and Venables (2004) for a review); nevertheless, the literature related to location pattern at regional level is much more limited (Casi and Resmini, 2010). The approach used in the latter branch of the literature relies on an equation that depend on both the risk and the expected profitability of the investment, and usually the econometric analysis is develop using disaggregated data, namely at company level. Then, in our study, we are adapting this approach to a dataset at regional level.¹

The econometric specification in our exercise is based in the following translogarithmic (trans-log) equation:

$$\ln I_i = \delta_0 + \sum_k \delta_k \ln X_{ik} + \sum_k \sum_l \delta_{kl} \ln X_{ik} \ln X_{il} + \sum_k \delta_{kk} (\ln X_{ik})^2, \quad (1)$$

where X_{ik} represents characteristics or determinants related to risk and expected profitability of the investment. As we have previously explained these determinants are classified in four groups. A first group of regional characteristics is related to agglomeration economies². A second group is related to labor market and local demand and the third group to infrastructure, R&D, and human capital.

Finally, the last group refers to national indicators related to regulation. Recent papers have directly addressed the influence of institutions on other macroeconomic variables (see Acemoglu et al. 2001, Aghion and Griffith, 2005 and Crafts, 2006). In reference to investment decisions, Alesina et al. (2005) and Escribá and Murgui (2017) show that substantial levels of regulations may have a negative impact on firms' investment decisions. From all possible indicators, we are especially interested in corruption, one of the subcomponents of business regulation in the EFW (Economic Freedom of the World, Fraser Institute) index. Campos et al. (2010) show that

¹ See Escribá and Murgui (2008) for Spanish regions.

² An extensive literature on regional economics investigates the role played by agglomeration economies in the growth and location of employment and output (see Rosenthal and Strange, 2004 for a survey) and even in foreign investment (see Head and Mayer, 2004).

corruption can represent an important barrier for new companies, improving the power of monopoly and the income obtained by established companies.

The estimation of a trans-log function has not only the advantage of being much more flexible than the common log-linear function, but also it allows us to obtain an elasticity for each characteristic-region combination. In addition, it is possible to analyse the stability and robustness of the estimated elasticity, not matter the complexity of the specification.

To develop our econometric analysis, we have a panel of 121 European regions over the period 1995–2014. Nevertheless, following Wheeler and Moody (1992), we are not introducing regional fixed effect in our econometric specifications since they will not allow us to capture the data variability we are interested in. We want to exploit the heterogeneity between regions, namely how the impact of a specific determinant depends on the region. The introduction of regional fixed effects does not allow us to capture this between-regional variation.³

We are interested in studying whether the investment choices are affecting the location of companies among regions. Nevertheless, the location decision in a specific region not only depends on the current characteristics of the region, but also on the difference between the characteristics of that region and the characteristics of other regions. In order to capture this fact, equation (1) is rewritten to include a reference or *numéraire*, in our case nine European countries (EU-9). Then, the estimated coefficients represent the deviation of the regional investment respect to EU-9. Then, the equation we are estimating presents the following trans-log form:

$$\ln\left(\frac{I_i}{I_E}\right) = (\delta_{0i} - \delta_{0E}) + \sum_k \delta_k (\ln X_{ik} - \ln X_{Ek}) + \sum_k \sum_l \delta_{kl} (\ln X_{ik} \ln X_{il} - \ln X_{Ek} \ln X_{El}) + \sum_k \delta_{kk} [(\ln X_{ik})^2 - (\ln X_{Ek})^2] \quad (2)$$

In order to develop the empirical exercise we use information from two main datasets: BD.EURS (NACE Rev1) and EU-KLEMS. The 121 regions (NUTS2) considered are from nine European countries: Germany, Austria, Belgium, Spain,

³ To a detailed explanation see Wheeler and Moody (1992), page 61.



France, Netherlands, Italy, Portugal and Sweden. The final dataset has been built after analysing the quality and coherence of basic macroeconomic variables: gross values added (GVA), gross fixed capital formation (GFCF), capital stock (K), and employment (EMP). The variables GVA, GFCF, and K are in real term (€2010), which means that the obtained results will not be influenced by changes in prices. All the variables are computed at NUTS-0 and NUTS-2 levels and disaggregated by six different sectors (as presented in Table 1) over the period 1995–2014. One of the novelties of our final dataset is the availability of the information about capital stock.

Table 1. Sector disaggregation according to NACE Rev. 2.

Sector	NACE Rev. 2
Agriculture, forestry and fishing	A
Industry less construction	B–E
Construction	F
Wholesale, retail, transport, accommodation & food services, information and communication	G–J
Financial and business services	K–N
Non-market services	O–U

Finally, to finish this extended summary, we briefly comment some possible political implications related to our study. We think that our results could be useful to evaluate the EU cohesion policy, which main objective is reducing disparities among European regions.



References

- Acemoglu, D., Johnson, S., and Robinson, A., (2001): “The Colonial Origins of Comparative Development: an Empirical Investigation”. *American Economic Review*, 91(5), 1369-1401.
- Alesina, A., S. Ardagna, G. Nicoletti and F. Schiantarelli (2005): “Regulation and Investment”. *Journal of the European Economic Association*, 3(4), 791-825.
- Aghion, P. and R. Griffith (2005): *Competition and Growth*, The MIT Press, Cambridge, Massachusetts.
- Barba G. and A. Venables (2004): *Multinational firms in the world economy*. Princeton: Princeton University Press.
- Brown, J.P, R. Florax y K.T. MacNamara (2009):”Determinants of investment flows in U.S. manufacturing”, *The Review of Regional Studies*. 39,(3), 269-286.
- Campos, F. N., Dimova R. and Saleh, A. (2010): “Whither corruption?, A quantitative survey of the literature on corruption and growth”, Discussion Paper no.8140, *Centre of Economic Policy Research*.
- Casi L. and L. Resmini (2010): “Evidence on the determinants of foreign direct investment: the case of EU regions”, *Eastern Journal of European Studies* 1(2), 93-118.
- Crafts, N. (2006): "Regulation and Productivity Performance". *Oxford Review of Economic Policy* 22 (2), 186-202.
- Escribá, F.J. and M.J. Murgui (2008):”Factores de localización regional de las inversiones industriales”, *Revista de Economía Aplicada* 47, 101-126.
- Escribá, F.J. and M.J. Murgui (2017): “Do market regulations reduce investment? Evidence from European regions”, *Regional Studies*, 51(9), 1336-1347.



EU-KLEMS: *Growth and Productivity Accounts: Statistical Module, ESA 2010 and ISIC Rev. 4 industry classification. September 2017 release, Revised July 2018.*

<http://www.euklems.net/>

FRASER Institute. <http://www.fraserinstitute.org/programs-initiatives/economic-freedom.aspx>

Head, K., y T. Mayer (2004): "Market potencial and the location of japanese investment in the European union", *Review of Economics and Statistics* 86, 959-972.

Le, Q. and P. Zak (2005): "Political risk and capital flight", *Journal of International Money and Finance*, 25(2), 308-329.

OECD: <http://www.oecd.org/eco/growth/indicatorsofproductmarketregulationhomepage.htm>

OECD: <http://www.oecd.org/employment/emp/oecdindicatorsofemploymentprotection.htm>

Rosenthal, S.S. y W. Strange (2004): "Evidence on the nature and sources of agglomeration economics", in Henderson, J.V. and J.F. Thisse (eds.) *Handbook of Regional and Urban Economics*, Volume 4, Elsevier North-Holland.

Wheeler, D. and Mody, A. (1992): "International Investment Location Decisions The Case of U.S. Firms." *Journal of International Economics*, 33, 57-76.