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Lampón, Jesús F. and Lago-Peñas, Santiago and Cabanelas, Pablo

University of Vigo

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[*]Jesús F. Lampón, [**]Santiago Lago-Peñas, [***]Pablo Cabanelas

[*] GEN and Departamento de Organización de Empresas y Marketing. Universidade de Vigo
Facultad de Ciencias Empresariales y Turismo
Campus Universitario As Lagoas, 32004 Ourense (Spain)
E-mail: jesus.lampon@uvigo.es
Phone: (+34) 988 368 700 Fax: (+34) 988 368 700

[**] GEN, IEB and Universidade de Vigo

[***] Departamento de Organización de Empresas y Marketing. Universidade de Vigo

ABSTRACT
The paper analyses changes experienced by Spain, as a European Peripheral region, in the spatial concentration of value-added and high-skill activities, and generation of technology in the automobile components industry. The analysis of plants set up (investments) and relocated (divestments) by multinationals (MNEs) between 2001 and 2010 show that Spain is no longer a place for labour-intensive activities and standardized processes using simple technologies in comparison to other peripheral regions. However, the continuing majority presence of foreign-owned companies is limiting decision power for generating and transferring technology, concentrating it mainly in those which Spanish MNEs have specialised

Key words: production geography, relocation, automobile components industry, periphery, multinationals.

JEL classification: F2, F23, L2, L23, O3, O33

Introduction

Changes in the international spatial distribution of production activities are a topical theme in the socio-political and academic areas. Many recent studies thus have covered this phenomenon from different approaches, focusing especially on analysis of the determinants of location (MacCarthy and Atthirawong, 2003), relocation (Brower et al., 2004; Sleuwaegen and Pennings, 2006; Kinkel, 2012; Lampón et al., 2013), and direct investment (Resmini, 2001; Pradhan, 2004). These studies all stress the special role played by multinationals (MNEs) in the distribution of production decisions, regarding both investment and relocation processes (Barba et *al.*, 2001; Belderbos and Zou, 2006; Konings and Murphy, 2006). They also emphasize technological aspects as key factors in such spatial changes (Dicken, 2007; Leamer, 2007).

Those processes of change have been especially intense in the geography of production in the European automobile sector (Chanaron, 2004; Frigant and Layan, 2009; Lampón and Lago-Peñas, 2013). Among the theoretical approaches that have dealt with the changing production geography in this sector in Europe, the core-periphery analysis has had a prominent role in the academic debate (Domanski and Lung, 2009; Layan and Lung, 2007; Lung, 2004). It focuses on the changing role of the periphery in production and R&D activities caused by changes in manufacturer-supplier relations in the sector and by the development and learning that goes on in these geographical areas (Frigant and Layan, 2009; Domanski and Gwosdz, 2009). Depending on the moment of the openness of the economy to the automobile industry expansion, different types of periphery can be identified (Layan and Lung, 2007; Lung, 2004): first periphery (Spain and Portugal), second periphery (Eastern Europe), and probably now a third periphery (North Africa). Interest in this has already been aroused, as shown by the appearance of several studies on the determinants of investment in the sector and their effect on national industry in Eastern Europe (Pavlínek et al., 2009; Domanski and Gwosdz, 2009; Ozatagan, 2011); and in countries in North Africa (Layan and Lung, 2007).

In this context of peripheral regions[1], analysis of changing trends in the sector in Spain leads to conclusions that could be applied to a large number of countries in Europe and in other areas of the world which joined the sector's periphery later. In particular, analysis of the Spanish case shows how is dealing with the development of other peripheries in terms of concentration of value-added and knowledge-intensive activities as well as generation of technology. Particularly, analysis of the components manufacturing industry offers keys to this spatial reorganisation. First, because of its specific weight in the industry in production and employment terms and, second, because of the strategic relevance it has acquired as a result of the outsourcing of production and of R&D by automobile manufacturers. In fact, the cost of components purchased has been estimated as 75% of the total cost of producing a vehicle (Frigant and Layan, 2009).

The purpose of this article is therefore to analyse if the components industry in Spain, as first periphery in Europe, is experiencing changes in its approach to core as defined by the concentration of skill-intensive and value-added activities, and by decision power for generating and transferring technology. It is divided into three sections. The first summarises the keys to belonging to the core or the periphery in this sector. The second provides an empirical analysis of trends in production and R&D in

[1] Since globalization is outstanding in the automobile industry, the expression 'region' throughout the paper refers to country level (Sturgeon et al., 2008).

Spain between 2001 and 2010. The article closes with the main conclusions and implications.

Review of the literature

Geographical distribution between the core and the periphery and MNEs

Core-periphery duality provides a point of reference for describing a type of spatial organisation validated in new economic geography (Krugman, 1991, Fujita et al., 1999; Okubo and Tomiura, 2012). In those studies, core is characterised by the spatial concentration of complex activities associated with high-technology skills and a broad knowledge base. In peripheral areas, activities are transferred from core areas and the skills transferred are comparatively simpler. So, the core-periphery concept is a kind of strongly interdependent system where the core has the dominant position, and the periphery is core-dependent. Therefore, core is able to deploy leadership in development process due to its central position and connection capacity in the productive structure, while this involves a certain weakness or dependence on peripheral regions (Muñiz et al., 2011). This implicitly assumes there is a division of power in which the core areas decide on how activities and technologies are to be distributed (Muñiz et al., 2011).

As a result, the location of technology involves a regional phenomenon, and technological competencies partly help to explain the uneven international distribution of production amongst countries (Baldwin et al., 2001). If we add to this the vertical disintegration and international breakdown of production processes and of business functions that result from globalisation (Fujita and Thisse, 2006; Mouhoud, 2006), we end up with the current situation in which specialisation and the location of activities exploit comparative advantages (Fenestra, 1998; Markusen, 2002). The international technological gap that stems from this process has widened over recent years (Kemeny, 2011) and has led to a clear geographical division between economies based on knowledge-rich activities and those based on standardised production which compete in costs (Autor et al., 2003; Leamer, 2007).

However, when peripheral regions offer a favourable institutional environment, business opportunities and development, they can change their position in the initial set-up (Morosini, 2004). So, going beyond the strict division between two extremes –core and periphery– there are intermediate areas that have learning and technological development dynamics that allow them to move towards core. Internal development of skills and competencies in firms that operate in such regions and the generation of tacit knowledge backed by formal and informal institutions associated with the region are key aspects in this trend (Lundvall, 1992; Nelson, 2007).

A leading role is played in this trend by MNEs because of the availability of resources and the operational flexibility that allows them to transfer such resources internationally (Kogut and Kulatilaka, 1994; Dasu and Li, 1997). It is these enterprises that are in a position to take advantage of the concentration of the specific human and physical capital offered by any one region and obtain competitive advantages from setting up operations there, especially the production of certain innovations (Gertler, 2003; Storper and Venables, 2004). In parallel, the economies benefit from interactions between these MNEs and the local institutional and business environment in which they are working, leading to development of a technological context that allows different agents linked to the region to participate in this dynamic of innovation and development (Bilbao and Camino, 2008).

Production geography of the automobile sector in the European periphery

Although the automobile sector covers all firms involved in producing the final product –manufacturers and components– increased outsourcing and modularisation have given the auxiliary industry a key role in the geographical distribution of production and R&D in the sector (Sako, 2003; Takeishi and Fujimoto, 2003; Sturgeon et al., 2008). As a result, the components manufacturing sector is characterised by very heterogeneous products, production processes and technologies and by many MNEs that are highly international in both their consumer markets and their production centres.

Over the last decade, the geography of the components manufacturing sector in Europe has been through a fast process of change caused by expansion of the production space –with the search for new peripheries– and reorganisation of the spatial division of work based on intensification of intra-corporate flows (Lung, 2004). This process has been helped on its way by the presence of large MNEs that dominate the sector and that have taken advantage of certain regional conditions (Dicken, 2005; Sturgeon et al., 2008).

But this change has not been straightforward. The peripheries in the automobile sector were characterised by firms that assembled imported components and by standardised production based on simple, low value-added technologies. In many cases, firms were MNE subsidiaries that aimed to reduce labour costs and obtain incentives for investment. However, this type of activity is not sustainable in the long term because the costs of production factors rise fast, and the initial appeal of such economies disappears when other locations with lower costs appear (see Tiggeloove and Vossen, 2005). There is, therefore, a high risk of relocation of such activities and consequent dis-industrialisation of such geographical areas unless the right conditions are created to attract or generate another type of activity (Ženka, 2009).

Changing the situation of the periphery requires a gradual change in the regional competitive advantage based on low labour costs towards an economy based on the generation of technology and high value-added activities. This change is only possible if there is a strategy for re-structuring based on technological development and investment in R&D (Lipietz, 1992; Szalavetz, 2007). Such a new economy requires specific conditions in the region; availability of highly-skilled human resources, quality infrastructure to support technological innovation, intense cooperation in innovation among firms, suppliers, research centres and institutions, amongst others (Brower, 2004; Asheim and Gertler, 2005; Moodysson et al., 2008).

Therefore, in order for a region to be able to develop and attract technology and knowledge-based activities, it needs to have infrastructure for technological innovation and there must be cooperation among agents for innovation and effective transfer to the production sector of any technology generated. The move from the periphery to the core is not, therefore, a natural process but one that depends on the development of the human and physical resources linked to the region.

Empirical evidence on the evolution towards the core of the components industry in Spain

The automobile components industry in Spain

In Spain the automobile industry (including both manufacturers and components producers) accounts for 6% of GDP and 18% of total exports. Several vehicle manufacturers have presence in Spain through seventeen production plants. Those produced 2.36 million units in 2011, placing Spain as the ninth country in terms of cars production (2.9% of worldwide production).

The components industry (SIC 3714) is an essential part of the Spanish automobile sector. It employs over 190,000 people (4% of total industrial employment) and has a turnover of 29.5 billion euros in 2011, experiencing an increase of the 37.2% since 1999 when the turnover was 21.5 billion euros. It places the third position in Europe, only surpassed by Germany and France, and sixth in the world. Development of the sector in Spain has been spurred on by a favourable environment, with a strong industrial fabric linked to automobile manufacturing plants located in the country, highly-skilled and experienced labour in the sector and firm institutional support.

An example of such institutional support was the great development of technological support infrastructure set up specifically for the sector (Table 1), which was especially marked over the last decade (2001-2010). State aid was also provided through various plans to support the sector. In the last two-yearly plan for 2009-2010 (Integral Automobile Plan), the Spanish government paid out 4.07 billion euros (0.37% of GDP). Of this amount, 800 million went to support investment in the modernisation and adoption of advanced production systems, in the industrialisation of new products and processes and in training for technical staff.

(Table 1)

Another of the keys to this change was the development of industrial fabric linked to technical services providing support and assisting in the industrialisation of production processes. Unsurprisingly, the lack of technological capacity among local suppliers is the main difficulty found by MNEs when transferring complex processes (Brown, 2000). The availability of engineering consultancies, firms offering technical design and calculation services, suppliers of capital goods and facilities and systems for automation and control, among others, helped provide the sector with the necessary technical capacity for industrialising new production processes that were more technology intensive.

In parallel, over the last decade firms have seen a far-reaching change in their size and their situation within the sector's value chain (Frigant, 2009; Klier and Rubenstein, 2008; Sturgeon et al., 2008). The world's main producers of components are present in Spain, alongside a large number of Spanish firms, some of which are highly internationalized. Today, plants belonging to MNEs are operating at the first and second levels of supply, and dominate production and technological activity in the sector. This has generated intense investment and divestment processes among these large multinational groups. The divestment processes have been mainly linked to relocation of production activity towards countries offering competitive advantages in terms of labour costs.

Especially interesting was the investment in new R&D centres belonging to MNEs in the period 2001-2010 in Spain. In this sector, although some of the R&D activity is performed in production plants, it is mostly done in R&D centres. The table 5 summarises the information on R&D centres: MNE owning the centre, year of creation and technological innovation activities performed. During the period of analysis, there were no relocations of R&D centres.

(Table 2)

Research approach and data

With the aim of identifying if a change in the patterns of industrial production of automobile components in Spain is occurring we analyzed two differentiated groups of MNEs' production plants. On the one side, new plants (*investments*); on the other, plants partially or totally relocated (*divestments*)[2]. The period of analysis was 2001-2010, and for the selection of the sample we have used AMADEUS database to identify *investments* and *divestments* during this period in the automobile components industry (SIC 3714). For collecting data we combine different sources of information, field research and in-depth interviews[3] with managers who participated in these processes of investment and production mobility, also data from AMADEUS, and content analysis[4]. In view of research goals and the availability of two differentiated groups (investment/divestment), the econometric specification selected was logistic regression. It allows estimating the probability of investment or divestment depending on the value of variables. Then we delve into the characteristics of each of the groups.

a) Investments during the period 2001-2010.

Comprises 73 new plants were set up in Spain during this period. 30 of them (41% of the sample) were Spanish owned and 43 belonged to foreign MNEs. The main investors during this period were France with 13 plants, Germany 12, US 5, and Italy and Japan 4 plants each. The products and activities of these new plants were the following (Table 3): processing of metal components for both bodywork and chassis (19 plants), mechanical motorisation, transmission, suspension and braking systems (16 plants), production of plastic, rubber and similar components (13 plants), module integration (10 plants). These four activities represented 80% of plants created during this period.

b) Divestments during the period 2001-2010

The number of relocated production plants (divestments) belonging to MNEs on which information is available during this period was 35. These divestments led to the loss of over 9,600 jobs in Spain, most of them in foreign-owned plants (91% of the total sample).

Wiring, textiles (internal upholstery, seat covers and airbags) and assembly activities accounted for 70% of the relocated activity resulting from these divestments (Table 3).

(Table 3)

The geographical destination of production was mainly nearby countries where the economies focus on the production of standard products, with competitive labour costs. The main destinations of migrated production were Eastern Europe (Poland, Czech Republic, Romania, Slovenia, Slovakia, Belarus and Turkey) with 48% of total

[2] The table 3 highlights the relevance of these processes lies in their consequences in terms of employment, revenues and value-added.

[3] This field work was performed as part of the project "Identification of international relocation factors in the Spanish automobile parts industry". This project included, among its main objectives, the creation of a database containing complete information about relocations and start-ups in the sector from 2001 to 2008, and offered the authors the chance of publishing different research studies on international relocation (Lampón et al., 2013; Lampón and Lago-Peñas, 2013). In the latter research, the field work was extended to include 2009 and 2010.

[4] The content analysis was especially intensive in the case of divestments, including scientific literature, sector reports and studies, public and private surveys on relocation and data bases on European restructurings.

relocated jobs, North Africa (Tunisia and Morocco) with 29% and Portugal with 8%. Others were Asia (China and India) and Latin America (Mexico) with 6% and 3% respectively.

Variables and econometric specification

Core, as defined by the spatial concentration of value-added and skill-intensive activities, and decision power for the generation and transfer of technology can be approximated by using five variables. These are defined in Table 4 and descriptive statistics for the two samples of investments and divestments are given in Table 5.
In order to determine whether these five variables that define core were key in the decision to invest or divest in Spain during the period analysed, the endogenous variable *Investment* was defined, showing a binary response (0/1; divestment/investment).

(Table 4)

(Table 5)

The *Capital intensity* is a measure of the production assets[5] (machinery and equipment) per employee in the production plant. A high value in this variable means that the plant's production activity is based on the use of capital-intensive production technologies. Low values indicate that the activity is based on labour-intensive technologies.

The *Production complexity* variable measures the number of high-productivity operations and the degree of vertical integration of the production unit (Pennings and Sleuwaegen, 2000). Low values indicate production units based on assemblage characterized by high import and re-exports of assembled components, and therefore absence of higher productive and non-productive functions generating high added value (Zenka, 2009). A high value in this variable indicates that the plant includes a large number of processes and has a high degree of vertical integration.

The *Skill requirements* variable measures the level of the technologies used in the plant's production process (Lampón et al., 2013). High values in this variable indicate the need for skills with a high technological level in the plant's production process. Low values are related to production activities based on simple technologies with lower requirements in terms of skills (Pelegrín and García-Quevedo, 2012).

Decision power is a dichotomous variable that takes value 1 if the decision centre of the MNE is located in Spain, that is, if the plant belongs to a Spanish-owned MNE. It takes 0 if the plant belongs to a subsidiary of a foreign-owned MNE. Decision power for generating and transferring technology among geographical spaces is a feature of the core (Muñiz et al., 2011). In the automobile industry, regions in which the MNEs have their headquarters are in a relatively more powerful situation than other for generating and transferring technology generated by such enterprises. Companies in the automobile sector from countries with a highly developed lead market and a strong R&D base at home find a suitable climate for innovation and concentrate most of their research activities in the country of origin close to the headquarter (Gerybadze and Reger, 1999).

[5] Only these assets are included in the variable, unlike other related empirical studies (Pennings and Sleuwaegen, 2000; Sleuwaegen and Pennings, 2006) which used fixed capital (intangible assets, tangible assets, and financial assets), and in which tangible assets included the value of the plant in addition to machinery and equipment.

The *R&D intensity* variable determines the intensity of in-house generation of technology. A high value in this variable means that there is a greater investment in technological innovation in comparison with the revenue generated by the activity. A low value is related to a low level of efforts to generate technology.

The source of data used to obtain the *Capital intensity, Production complexity* and *Decision power* variables was the AMADEUS data base. The *Skill requirements* and *R&D intensity* variables were obtained from in-depth interviews with business managers who participated in these processes of investment and production mobility. Finally, the estimated econometric specification is as follows:

$$Investment_i = \beta_0 + \beta_1 \cdot Capital\ intensity_i + \beta_2 \cdot Production\ complexity_i + \\ + \beta_3 \cdot Skill\ requirements_i + \beta_4 \cdot Decision\ power_i + \beta_5 \cdot R\,\&\,D\ intensity_i + \varepsilon_i$$

Analysis and discussion of results

Tables 6 and 7 show the correlations of the independent variables and the results of the logistic regression, respectively. The model is estimated by maximum likelihood and iteratively using STATA 12 software. The estimated coefficients, standard errors and corresponding elasticities at average values of regressors are given. Also, to measure the explanatory capacity of the model we include the pseudo-R^2. Finally, Figure 1 shows on the horizontal axis the probability estimated by the model for *Investment* and, on the vertical axis, the observed value (0/1) of the variable.

(Table 6)

(Table 7)

(Figure 1)

Taking into account the pseudo-R^2 and Figure 1, the model explains reasonably well the behaviour of the independent variable, especially when the *Investment* variable takes value 1. Regarding aspects linked to production activity, the results show that the *Capital intensity, Production complexity* and *Skill requirements* variables are significant. The signs of the regression coefficients indicate that MNEs whose production activities are more capital intensive, more complex and more knowledge-based were more likely, during the period analysed, to invest in Spain. Conversely, the MNEs with labour-intensive, low value-added and less knowledge-based activities did not only find Spain attractive as a location but also those already working in Spain were more likely to divest. In a descriptive but telling way, Table 3 shows that the activities in relocated plants were mainly labour-intensive (wiring and textiles) and of low added value (assembly activities), whereas many of the new activities were capital-intensive, more complex, and with a higher technological content (mechanical systems for motorisation, transmission, suspension, braking and heating, amongst others).

These results for the *Capital intensity* variable point to the great pressure on MNEs having labour-intensive activities in Spain to relocate their production. In parallel, new plants have greater requirements for investment in production assets for processes based on capital-intensive technology. This change can indicate that while Spain is still competitive in labour-costs with respect to core (Germany and France), its position is under pressure in comparison with the second and third periphery (and the suppliers located there).

The values obtained in the analysis for the *Production complexity* and *Skill requirements* variables show the difference between migrated plants, characterised by low value-added activities, and new plants which have more complex activities associated with high-technology skills. During this period, MNEs have relocated the standard processes based on simple technology that were carried out in Spain to other locations with lower costs and lower requirements in terms of skills and knowledge.

Concerning the results for the variables related to decision power for the generation and transfer of technology, the significance of the *Decision power* variable ($p<0.05$) shows how the domestic-owned MNEs whose decision-making centre is in Spain have gained a relative important weight in the sector. Moreover, the significance of the *R&D intensity* variable indicates that MNEs with new investments make a greater effort to generate technology in Spain than the MNEs that have divested over the last decade. However, in this case the level of significance is only 10% ($p<0.1$).

If we take into account that decision power on the generation and transfer of technology is located in the region of MNE's parent companies, then the main implication of these results is that, even though foreign MNEs are still very relevant for new investment in the sector in Spain (59% of new plants), the net balance between entries and exits indicates a clear increase in the relative weight in production activity of Spanish-owned MNEs. This means that Spain is approaching towards a core context regarding decision power for the generation and transfer of technology. In fact, this transitional situation towards core explains the low significance of the *R&D intensity* variable, because foreign-owned MNEs with activities in Spain leave much of their R&D activity in their parent companies, which means that their investment in technological innovation in Spain is relatively low. As shown in table 2, the investments of Spanish-owned MNEs emphasize their commitment with the generation of technology during this period in Spain. The main areas of technology innovation in these news centres were the development of new materials –especially metal alloys, plastics and composites–, and the innovation of production-related processes – technologies for injection, foam, stamping, coating, as well as new joining and welding processes.

Finally, the elasticity values allow comparison of the relative effect of the variables for explaining the endogenous variable. As explained above, the variables related to production activity –*Capital intensity*, *Production complexity* and *Skill requirements*– for which elasticity is 0.18, 0.17 and 0.25 respectively, have greater explanatory power than the variables related to decision power for the generation and transfer of technology –*Decision power* and *R&D intensity*– for which elasticity is 0.07 and 0.09 respectively.

Conclusions

The changing production geography in the automobile component industry in Europe, which is characterised by the expansion of production towards new peripheries and reorganisation of spatial division of labour, has led MNEs with labour-intensive, low value-added activities in Spain to divest. In this context, the Spanish sector, based on the availability of skilled human resources, a fabric of technically-skilled local suppliers and an industrial policy focused on technological development, has attracted investment linked to capital-intensive activities that are more complex and offer more added-value. As a result, Spain is less attractive for the labour-intensive activities and standard processes using simple technologies that are characteristic of countries belonging to the second or third periphery, and has become a location for activities associated with a higher technological level and a more diverse knowledge base.

In parallel, the breakdown of the value chain and increased outsourcing by automobile manufacturers from the auxiliary industry has led to a change in the location of technology in the sector. So, from concentration of technology in the automobile manufacturers, the industry has experienced a move towards dispersion and geographical specialisation of the technology linked to the auxiliary sector. This is an opportunity for technological development in many regions, especially in the peripheral regions. In the case of auxiliary sector in Spain, this was used to take up the challenge of performing much of the sector's R&D activity, particularly concentrated in the domestic MNEs. In part, this condition has given Spanish automobile auxiliary industry the decision power for generating and transferring technology, favouring the approach of regional industrial fabric towards core.

These results have a number of implications for public decision-makers in peripheral regions, which could follow the example of the sector in Spain. In order to change the regional competitive advantage based on low labour costs and move towards core, aid to production sectors in these regions should give priority to firms and investment projects based on criteria of greater technological content rather than criteria such as revenue or employment. Public policies should aim not so much to reduce operating costs (tax exemptions for the activity or subsidies for hiring) but rather to generate human and physical capital as this will attract investment in greater value-added activities. Finally, proactive participation by public administrations in the development of infrastructure to support quality innovation, and institutional backing for effective cooperation among companies and agents involved in innovation should allow firms to generate technology. This is necessary for regions to move from being peripheral to a situation of core.

The results offer new challenges to continue the research agenda. It could be valuable the application of the core-periphery analysis in the comparison of the Spanish automobile industry with other European countries, and defining the relative position of European automobile industry. It could also be worthy the assessment of public administration decisions in periphery (infrastructure, and innovation and cooperation incentives to auxiliary industry) and MNEs investments or divestments.

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Table 1: Technological support infrastructure for the automobile sector in Spain

Infrastructure	Nº	Objectives related to technological innovation
Technology parks	9	To promote knowledge-based, high value-added firms and organisations To promote technology transfer and innovation among firms and organisations using parks
Clusters or Associations of Innovative Enterprises	11	To encourage collaboration between firms in the sector and institutions and universities in order to carry out joint R&D+I projects and co-create capabilities To create synergies, foster innovation and improve competitiveness
Technology platforms	4[(a)]	To define the sector's Strategic Research Agenda To mobilise critical mass in research and innovation
Technology hubs	15[(b)]	To generate and transfer technological knowledge to firms in the sector
Universities[(c)]	13[(c)]	To train human capital in the acquisition of knowledge and technological skills linked to production and R&D processes in the sector

[(a)] *Two national and two regional.*

[(b)] *Number of technology hubs in which firms in the sector represent all or the majority of firms on the hub's board.*

[(c)] *In this study, the universities were analysed only from the point of view of support for training human capital. The number indicates the universities that offer specific post-graduate courses on aspects of the sector.*

Source: Drawn up by the authors based on information from the Asociación de Parques Científicos y Tecnológicos de España (APTE); Fundación Española para la Ciencia y la Tecnología (FECYT); Ministerio de Industria, Energía y Turismo; Ministerio de Educación.

Table 2: R&D centres created during the period 2001 – 2010

R&D centre	MNE owner (Country of origin)	Year of creation	Technological innovation activities
CETEC	Grupo Copo (Spain)	2001	Development of polyurethane and other polymer foams
Autotech Engineering AIE	Gestamp (Spain)	2002	Profiling, hydroforming and cold stamping of metals Hot stamping and new metal coatings Laser and hybrid welding to join metals
IK4-Lortek	Grupo Mondragon (Spain)	2002	Welding and joining of materials
Cromoduro Innovación y Tecnología	Cromoduro Corp. (Spain)	2003	Injection of plastics, rotational moulding, and polyurethane foam
Centro Tecnológico Pujol & Tarragó	Ficosa (Spain)	2004	Development of advanced electronic control systems
Fundación CIE I+D+I	CIE Automotive (Spain)	2008	Development of light metal alloys
Teknia R&D	Teknia (Spain)	2010	Injection of plastics and processing of composites

Source: Qualitative analysis from Amadeus and information provided by firms.

Table 3: Products and production activities and key figures of new and relocated plants period 2001-2010

New Plants (Investments)		
Products or production activities	**Nº of plants**	**%**
Processing of metal components for chassis and bodywork	19	26.0%
Motorisation, transmission, suspension and braking systems	16	21.9%
Plastic, rubber, thermoformed and composite components	13	17.8%
Module integration (seat, acoustic package, cockpit, door and front end)	10	13.7%
Heating and air conditioning systems	4	5.5%
Others (exhaust systems, electronics, glass, textiles…)	11	15.1%

Number of plants	Number of employees	Revenue (M€ / year)	Added value (M€ / year)
73	14,150	3,830	1,590

Plants Relocated (Divestments)		
Product or production activity	**Nº of plants**	**%**
Wiring	11	31.4
Textiles (airbags, seat covers and internal upholstery)	7	20.0
Assembly activities (assembly of electric motors, sub-assembled components and others)	6	17.1
Small metal elements for mechanics (bearings, plates, ties)	4	11.4
Others (rubber and plastic products, locks, steering columns, seat frames)	7	20.1

Number of plants	Number of employees	Revenue (M€ / year)	Added value (M€ / year)
35	9,630	1,410	310

Table 4: Definition of the variables

Variables	**Definition**
Capital intensity	Value of production fixed assets (machinery and equipment) per employee of the plant
Production complexity	Value added to sales revenues of the plant
Skill requirements	Senior engineers and graduates among the total plant staff
Decision power	Dummy: value 1 if capital of MNE is Spanish; 0 if is mostly foreign-owned
R&D intensity	Investment in R&D to sales revenues of the MNE in Spain

Table 5: Descriptive statistics on the variables

		N	Mean	S.D.	Max.	Min.
Capital intensity	Investments	73	72.14	47.328	212.78	5.90
	Divestments	35	38.45	32.534	123.78	2.46
Production complexity	Investments	73	0.38	0.223	0.94	0.07
	Divestments	35	0.22	0.122	0.49	0.01
Skill requirements	Investments	73	0.182	0.1444	0.790	0.016
	Divestments	35	0.090	0.0645	0.276	0.012
Decision power	Investments	73	0.41	0.495	1	0
	Divestments	35	0.09	0.284	1	0
R&D intensity	Investments	73	0.032	0.0552	0.291	0.000
	Divestments	35	0.005	0.0156	0.081	0.000

Table 6: Matrix of correlations between the independent variables

Variables	(1)	(2)	(3)	(4)	(5)
(1) *Capital intensity*	1				
(2) *Production complexity*	0.153	1			
(3) *Skill requirements*	0.128	0.184	1		
(4) *Decision power*	0.035	0.108	0.071	1	
(5) *R&D intensity*	0.339	0.063	0.003	0.329	1

Note: Pearson's coefficient between pairs of quantitative variables and Spearman's coefficient for correlation between pears of variables in which one of them is qualitative.

Table 7: Results of the logistics regression model

Variables	**β**	**Standard error**[0]	**Computed elasticities**
Capital intensity	0.020	0.009**	0.18
Production complexity	3.610	1.801**	0.17
Skill requirements	11.146	4.315***	0.25
Decision power	1.623	0.761**	0.07
R&D intensity	27.380	14.940*	0.09
N		108	
Pseudo-R^2		0.397	

[0]: *** *p<0.01;* ** *p<0.05;* * *p<0.1*

Figure 1: Predicted vs. observed values from *Investment*