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Regional Specialization in the Colombian Manufacturing Industry: A New Economic Geography Approach

Introduction

The modern process of manufacturing consolidation in Colombia has started just lately in comparison with the advanced countries, but was relatively contemporary compared to the Latin-American neighbors. The overcoming of typical artisan production inherited from the previous periods occurred during the first decades of the 20th century mainly in specific points of the territory, and later experienced an unusual expansion during the import substitution stage. The footprint of such production evolution is an uneven process of regional development that opened a gap among traditionally manufacturing territories and the most lagging ones, which are more specialized and predominantly primary and agricultural. Such manufacturing inequalities influenced the urban development, technological level of regional societies, social progress, and the level of income.

With such a landscape, it is highly compelling to identify the determinants of regional specialization in an analysis preceded by the choice of a suitable theoretical background that can give an account of the formation of regional productive profiles and the definition of production patterns. The theoretical paradigm proposed by the New Economic Geography fits very well in our approach to the Colombian industrialization, bearing in mind the traditional presence of prohibitive transport cost, the profuse migration from the countryside to urban centers, and the consolidation of urban markets that spurred the exploitation of economies of scale.

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With such purpose, we tackled a theoretical and empirical analysis of possible determinants of manufacturing specialization. The first section of the study is devoted to discussing the contrast between the comparative advantages and New Trade Theory approaches as well as recent efforts for bridging the gap between both. The second part demonstrates the sectorial share of each Colombian department in the manufacturing network, applying standard industrial classification. In the third section, we run a panel data analysis for estimating the determinants of the location decisions taken by Colombian firms, recognizing the existence of time-invariant features in each department that exert a powerful influence for attracting firms. Finally, we arrive at general conclusions.

1. Theoretical discussion

Since the 18th century, the economic science has been explaining the visible phenomenon of specialization and since then the dominant stream has followed the Ricardian model of comparative advantages, the principles of which are based on the differences in cost and productivity. In this approach, the pattern of production in various countries is marked by specific commodities that were already relatively cheaper even in the absence of trade. In fact, the advantages of each country stem from diverse sources, but the productive vocation of regions or countries relies on their respective attributes and natural features (Krugman 1994).

For more than 200 years in economic science, the Ricardian pattern has been more predominant than the Smithian approach. The Smithian metaphor about the *pin factory* is a clear demonstration of the benefits derived from specialization based on economies of scale (Krugman 2008). Nevertheless, the predominance of the Ricardian stream means a convincing triumph of the Ricardian comparative advantage over Smithian increasing returns. This theoretical preference stems from the convenience of theoretical models, because constant returns and perfect competition gave more tractable mathematical models (Krugman 1994).

In the Ricardian pattern, the origin of trade relies on the uneven distribution of technology, resources or tastes, and the participant traders are eager to take advantage of their dissimilarities. In this context, an inter-industry trade is prompted and partners exchange commodities accordingly with their diverse characteristics (Ricci 1997). In such sort of models, the source of trade is the unequal position of each partner, in such a way that in the absence of such differences, the exchange becomes impossible.

Some variants of such intellectual structure appear in the Heckscher–Ohlin’s model concluding that specialization is induced by the exclusive production of commodities that are intensive in the most abundant factor. Therefore, the uneven initial allocation of resource endowments explains the differences in the productive specialization across countries. In such terms, the implicit achievement

of trade is the transfer of factorial services from regions intensively endowed with them to locations where they are scarce since we define the export of commodities as bundles of factors (land, labor, and capital) (Leamer 1995). Hence, in empirical terms, it is assumed that footloose labor is implicitly included in econometric models as a variable embodied in the price of commodities (Lederman and Colin Xu 2001). According to this point of view, the size of countries could affect comparative advantage but the impact on specialization depends on the extent in which factor endowments are changed. The factor abundance model relies on a few assumptions that from the outset cannot be reconciled with spatial approach's principles: perfect competition, homogeneous goods, constant returns to scale, inexistence of transport cost and international immobility of factors (Brackman et al. 2009).

Conversely, the new paradigm of the New Trade Theory (NTT) focuses on the advantages that stem from specialization in a world of large economies of scale, a reality that induces concentration of economic activity in a unique spot looking for exploiting the efficient scales of production. According to the last approach, trade patterns can rely on increasing returns rather than on inherent dissimilarities between them (Krugman 1994). In such a view, the sources of trade are the increasing returns, product differentiation and monopolistic competition. Under such conditions, the representative firm has the incentive for operating in one plant in order to produce a specific variety of a good, a differentiated good in comparison with the competitors' supply (Ricci 1997).

In fact, the New Economic Geography (NEG) models predict a deep divergence between regions due to the reinforcement of core-periphery frame, therefore the differences between commercial partners appear at the end of the process as an aftermath of exchange, not at the beginning, as the Ricardian model predicts (Krugman 1991). In general, the NEG relies on few factors affecting the geographical concentration of production: transport cost, economies of scale and footloose labor, but some models introduce elasticity of substitution between differentiated goods and the love for variety parameter as well. Other models involve the difference in wages between regions, substitution among varieties of goods, and the share of manufacture in consumers' expenditure (Puga 1999). The dynamics of models and the final equilibrium depends on slight changes in parameters that can induce radical modification in the outcomes. Furthermore, the NEG models predict abysmal regional divergences as long as manufacturing concentration is perpetuated (Kim 1998).

However, recent developments in theory (Pflüger and Tabuchi 2016) lead to a less outright conclusion conducive to full agglomeration. Recent models, bundling comparative advantages and agglomerative forces, rule out the existence of full agglomeration equilibria because the presence of advantages in a small economy ensures the placement of firms there. For our purposes, when interpreting the industrialization of Colombian peripheries, we consider the existence of natural advantages dispersed across the territory as a forceful argument for the emergence of specialized regions.

The analysis of intra-industry trade and the inclusion of monopolistic competition tools allow to model the sectorial behavior of firms and specialization of countries and regions more accurately. The advantages for firms that stem from scale economies promote gains in specialization along with higher degrees of economic integration. According to the microeconomic insights, in such market conditions firms can enhance the differentiation of products to grasp a larger market share (Grubel 1967). One of the main traits that originated the change of paradigm in the international trade theory was the rise of this sort of exchange in goods classed in the same industrial classification but differentiated by quality, brand, design or any other particular feature. Such exchange promises advantages for firms derived from the deepening of economic integration with minimal loss of jobs.

Such transformation of the theoretical thinking involves the introduction of micro-foundations in new models designed for including monopolist competition and increasing returns. Thus, the international trade theory has evolved from a pattern that tackles the analysis of international specialization as an outcome of fundamental differences between countries to an approach dominated by increasing returns, in which the definition of the pattern of trade relies on the advantages offered by specialization that produces a specific variety amid a set of differentiated goods. The full benefits offered by such market structure can be realized in a set of monopolistic firms strengthening their differentiation thanks to their spatial local market power (Krugman 1993a). The inclusion of monopolistic competition allows to recognize a degree of market power for the firms, but with a minimal modification in the simplicity of the former market model (Fujita and Krugman 2004).

Krugman's research evolved from an international trade approach encompassed by the NTT to a research navigating in the environment of location, space and geography. He realized that after years spent on analyzing international exchange, he was indeed entering fields of economic geography (Krugman 2008). The switch in the subject of the analysis was precipitated by some stubborn facts in the real world: mobility of factors and trade of goods submitted to transport cost. Therefore, the analysis demanded an approach close to the location of productive activity, because the distances and transport costs forced the introduction of the space in the analysis. This turnover brings back space and geography into the analysis of manufacturing location and specialization; therefore, the rules followed by location of firms within countries are as relevant as the principles of international trade. Since then, we have been familiar with a set of models dealing with tenfold equilibrium, the “path dependence” regarding the past trend and the preponderance of historical accidents for launching an accumulative and self-sustaining process of spatial concentration (Krugman 1991).

The NEG does not identify basic causes explaining the emergence of a concrete core of activity, assigning a high degree of randomness to the choice of specific places. In other cases, in addition to the appearance of manufacturing

seeds in specific spots by chance, some kind of self-fulfilling prophecy intervenes when all firms convene to settle in some space because there is a shared expectation of localization (Krugman 1991). In the words of Ottaviano and Puga (1997), agglomeration can take place even in the absence of historical accidents, by the action of common beliefs that confirm the cumulative causation expected by everyone. Be one or another force the origin of economic activity, the evident process will be unleashed: a pervasive reproduction of spatial concentration. Once one spot is favored attracting firms, the manufacturing growth there will feed on itself. Therefore, if manufacturing is established somewhere from the very outset, the increasing returns perpetuate industrial presence there (Krugman 1993), leading to an outcome characterized by deep regional divergences. In other words, core-periphery frames do not explain why the division between regions arises nor why originally akin countries can make up such unlike economic structures.

After the dazzling irruption of the NEG in explaining the localization of production, posterior theoretical contributions, i.a. Ricci (1999) and Pflüger and Tabuchi (2016), emphasized a less univocal explanation of specialization and agglomeration. Mixed arguments, combining idiosyncratic advantages in production costs and agglomeration based on increasing returns, offer a set of convincing models. The inclusion of additional parameters modifies the final results of equilibria.

Conversely to the NEG's description, the more recent combination of advantages and increasing returns rules out a full spatial agglomeration. Natural advantages and endowments enable the presence of manufacturing even in small regions, which are not benefited by large market size (Pflüger and Tabuchi 2016). Their model assumes the predominance of constant returns in the production of final goods and the production of an intermediate good exploiting increasing returns; so in the latter case agglomeration economies are prompted by input sharing. The final outcome of the model may diverge if the reduction in transport cost concerns the increasing return sector (agglomeration) or the comparative advantages sector (dispersion). Assuming that intermediate goods are non-tradable items, an increase in the transport costs conveys a predominance of increasing return forces in affecting the wage ratio; hence, the agglomeration will intensify in the location endowed with a larger labor force. Finally, applying a typical NEG assumption, the mobility of labor between locations leads to a partial agglomeration in any of the two regions. The determination of the equilibrium will depend on an intricate interaction of the transport cost affecting either the increasing return or comparative advantage sector.

The general implication of the model of Pflüger and Tabuchi (2016) is that transport costs act as a trigger for unleashing the definitive influence of any one of the two contesting forces: the agglomeration forces are prompted if the increasing returns are submitted to lesser transport costs, and the comparative advantages are reinforced when transport cost is reduced in the sectors where the

latter force predominates. In comparison with the NEG approach, this model has the additional novelty that it allows that the constant return sector is submitted to transport costs.

1.1. The NEG and comparative advantage

In spite of seemingly opposite positions of theoretical models, there have been endeavors to gather theoretical streams and bridge the gaps between the two paradigms. Recent empirical analyses use both theoretical approaches in order to understand manufacturing specialization.

Ricci (1999) models a mix of Ricardian advantages and the NEG approach, proposing two increasing return firms/sectors exploiting scale economies and each one producing a differentiated good. On the other hand, one firm-sector operates under constant returns offering a homogenous good. The purpose is to figure out the behavior of specialization under changes in regional agglomeration, provided that increasing return firms are located in one region and the remaining firms in another region. Some parameters appear in the model in addition to transport cost: the productivity increase, the comparative advantage of the industrial sector, and the diversity of manufacturing varieties that reduce the regional price index. In the end, regional specialization can respond to forces associated with either comparative advantages or the NEG.

The model conveys some interesting conclusions. In some cases agglomeration can come about not in the larger region (as the NEG would expect), but in the region where productivity is higher and the absolute advantage more marked. On the other hand, an increase in comparative advantage does not necessarily spur specialization, because if a particular region expands due to shifts in relative productivity, specialization can diminish if new firms belonging to diverse sectors are strongly attracted. Ricci's findings allow to identify a reduction in the degree of specialization in increasing returns sectors if agglomeration is speeded up, provided that the enlargement of the region has the effect of attracting more firms operating in other sectors, different from the original one. In addition, if transport costs are diminishing the conclusion could be counterintuitive regarding the NEG's logic, because the agglomeration can come about in a small region if productivity is larger there. New firms will settle in the small region if productivity is larger there, under the condition that the productivity effect was stronger than the size effect (Ricci 1999).

According Ricci, for the sake of lower costs, each location is more efficient in producing a specific good. If we rule out the transport costs, comparative advantage prompts full specialization in the good produced less costly. According to the assumption of increasing returns, the existence of other rivals in a market context of monopolist competition obligates firms to locate in one spot producing only one differentiated variety of good. Now, if we introduce the transport cost, the more productive good becomes more expensive in the opposite region. Under

the assumption of substitutability of varieties, consumers would prefer to buy the locally produced variety. If such parameters are powerful, we will see that some firms end up producing locally a variety in which the region had originally a competitive disadvantage (Ricci 1997). Conversely, when competitive advantage is strong enough and transport costs are low, the full specialization proclaimed by the Ricardian tradition will predominate in the end.

Brakman et al. (2009) render a simple version of the model exposed by Ricci (1997, 1999), summarizing its parameters. If the model includes two countries and two sectors we must assess the force of comparative advantages regarding each specific sector, in the context of a specific country. We assume that the production function is defined as an increasing return one and, accordingly, each industrial variety is supplied by one producer. Then, the market context is one of monopolistic competition with an identical price elasticity of demand and with a constant mark-up rule which is equal for both sectors.

The revealed advantage of producing A in country 1 is expressed as:

$$l_{A1i} = \alpha + \beta x_{A1i}, \quad (1)$$

$$l_{A2i} = \alpha + \bar{\beta} x_{A2i}, \quad (2)$$

and the revealed advantage of producing B in country 2 is expressed as:

$$l_{B1i} = \alpha + \bar{\beta} x_{B1i}, \quad (3)$$

$$l_{B2i} = \alpha + \beta x_{B2i}. \quad (4)$$

The presence of comparative advantage bounces into the model under the form of the parameter $\pi = \frac{\bar{\beta}}{\beta} > 1$ that suggests a cheaper cost structure when each country concentrates on the production of the commodity with fewer labor requirements. Hence, π represents the ratio of labor requirements between the two countries. Therefore, the higher values of π , the stronger the technological dissimilarities between countries.

In each country, the more disadvantaged sector must charge a higher price than the other one and the ratio of prices equals to π . The conclusion is that the disadvantaged producer ends up selling fewer more productive good in the same country, using the same quantity of factor. In terms of specialization, the Ricardian principles hint that the production of one specific good will locate there where productivity is higher (it means country 1 for A and country 2 for B), and it conveys complete specialization. Ultimately both partners become fully specialized and engage exclusively in an inter-industrial trade (Ricci 1997).

According to Ricci, the introduction of the NEG's principles results in unexpected conclusions. In the presence of transport cost, sales in the other country will be more expensive by incorporating the transport cost. The higher prices of imports will prompt preference for local production, due to a strong parameter

of substitution across varieties of goods. In such scenario, incomplete specialization can emerge. Less productive sectors can be spurred to spread production into another country, pricked by the possibility of competing in segmented markets (Brackman et al. 2009). If this force intervenes forcefully, each country can receive production of both sectors. It means that with suitable values of parameters, the trade partners become engaged in both inter-industry and intra-industry trade (Ricci 1997). Conversely, the final landscape ends up with complete specialization if the strength of productivity and the advantage are stronger than the spreading advantages (low transport cost and weak substitution of one variety for others).

The Ricci's analysis implies that the specialization is increasing along with the strength of the comparative advantage and the returns to scale, but diminishing with transport cost. This can lead to different results depending on diverse empirical cases. Thus, it is possible to interpret the exchange arising between similar countries based on intra-industry trade and the exchange between different commercial partners based on inter-industry trade as well.

1.2. Production pattern and specialization

The conclusions of traditional Ricardian models imply that countries must become completely specialized as a consequence of trade, and that the inter-industry trade predominates in the exchange. This long-lasting explanation based on comparative advantage was unable to figure out empirical evidence about the intra-industry trade, so omnipresent in the exchange among alike countries (similar intensity of factor, similar qualification of labor, etc.). Actually, in such a new reality, the exchange of goods comes about between partners without a visible comparative advantage (Helpman and Krugman 1989). In other words, similar regions can develop unlike productive structures; furthermore, as production factors become more mobile, traditional theories fail to predict the patterns of specialization and trade. Conversely, increasing returns and imperfect competition emerge as a fundamental key for understanding spatial concentration of manufacturing activity.

In fact, the productive profile is the result of a mix of both forces combined. The productive structure relies on the factor endowments, but inside each industry there is a myriad of potential goods that could be produced under conditions of increasing returns. The necessity to exploit economies of scale forces to produce a shorter set of varieties submitted to intra-industry exchanges (Krugman 1983).

Within the NTT tradition, we can interpret the spatial distribution of manufacturing applying similar criteria to those deployed in the models of specialization and the NEG. The relevant categories as mentioned before are the exploitation of economies of scale in the context of monopolistic competition, the intervention of the transport cost and the shifts in the location of manufacturing labor.

The most remote link between international trade and regional specialization dates back to the Ohlin's contribution in the 1960s. The Ohlin's approach, which

is encompassed by a neoclassic view of factor price equalization, includes the economies of scale during the production of a few specific goods (Krugman 1999).

More recently, Ricci (1999) used the categories of specialization regardless of the scope of analysis: country, region or location. In another paper, he developed a combined analysis applying the Ricardian and NEG categories, with regions or locations treated indistinctly, as they can be perceived as countries (Ricci 1997). Krugman (1991) also argues that the same forces explaining the international specialization can be used for understanding the regional distribution of manufacturing. He confessed that having devoted plenty of time to international trade, he realized that the real realm of his efforts had been the geography of production. In fact, the relaxation of the classical immobility of factors poses the discussion in a context of regions, involving the role of footloose labor moving across the territory. This process was recognized in Stockholm on the occasion of the award of the Nobel Prize for Krugman, when it was pointed out that the same basic forces explain the specialization across countries and the location of factors across countries (Royal Swedish Academy of Sciences 2008).

When analyzing the U.S. specialization Kim (1995 and 1998) discerned the forces stemming from comparative advantages or the NEG, relying on scale economies backed by a few large plants serving the entire demand.

In the development of the NTT, an important element that contributed to the progress of the analysis some steps ahead was the incorporation of the interregional labor mobility (Krugman 1991). With this aspect, the theory discovered the key element for conceding endogenous nature to the size of markets in the core–periphery model, and included the final parameter that enabled the strengthening of markets by the mobility of footloose workers. The 11 years that took Krugman to discover such key analytical detail were needed due to the necessity to develop computational simulations which were available only later (Brackman and Garretsen 2009). The assumption of labor mobility had outright implications for the analysis of location and specialization because it weakens the relevance of the original endowments for the spatial concentration of economic activity. An overwhelming corollary is that the stronger the reliance of models on footloose factors, the weaker the influence of factors spatially tied and fixed endowments as key elements in the conventional patterns of analysis. Conversely, when insurmountable barriers to migration are present, the potential of footloose labor for driving the forces of agglomeration is constrained (Ottaviano and Puga 1997).

For our purposes, if we assume the manufacturing labor as footloose, we can drive the attention from international topics of trade to the internal realm of the NEG. This involves a change of assumptions in the model: footloose labor and trade of goods subject to transport cost, inverting the principles of traditional way of thinking. Indeed, the footloose factor assumption is at odds with the basis of Ricardian and Heckscher–Ohlin models which rely on the immobility of factors and the mobility of goods. On the other hand, even with factor immobility, the

open commodity trade contributes to the equalization in factor prices, as the ultimate corollary of the Samuelson model of trade (Kim 1995).

Nevertheless, going back we can find a really worthy contribution in the Mundell paper, already in an era of full validity of the Ricardian principles and predominance of the Heckscher–Ohlin model. Mundell generalizes the idea of factor price equalization and admits that somewhat free mobility of goods is a substitute of free movements of factors, but also the opposite can happen. Mundell asserts that trade restrictions trigger the mobility of factors and, vice versa, the impediments imposed onto the movements of factors stimulate the exchange of commodities. Such assertions lead to stunning conclusions. The assertion that the freedom of trade results in the equalization of factor prices even in the presence of immobility of factors is accompanied by the postulate that free movements of factors lead to commodity price equalization even in the presence of trade restrictions (Mundell 1957).

1.3. Intra-industry trade and the home market effect

An almost imperceptible concept was developed by the Swedish economist Linder (1961). In general terms he hinted that exports tend to expose the conditions of the home market; it means that countries tend to export commodities that previously had large domestic markets. This idea was perfectly suitable for being incorporated into the NEG's frame (Krugman 2008), and further developed by Davis and Weinstein (Brackman et al. 2009).

Grubel (1967) revisited the concept of the “home market effect”, defining the specialization based on varieties demanded by the majority of the home population (while imports are intended for satisfying the demand of minorities). Puga (1999) understands the phenomenon as large markets tending to receive a disproportionately large share of firms producing under increasing returns.

2. Specialization in the Colombian manufacturing and spatial profiles

Colombia is split up in five natural regions containing an array of departments, being the main regional administrative units. The country is made up of 32 departments, and Bogotá as the national capital is simultaneously the capital of the department of Cundinamarca. The distribution of economic activity is severely uneven over the territory due to the intense concentration of economic development and the territorial isolation of eastern and southern natural forests. In practice, the most exploited regions are the Andean and Caribbean Regions in the north fringe and the Pacific Region, a west strip along the Pacific Ocean. Those areas gained population and economic activities during the modern national development. The bulk of the Colombian population was located on the

high lands of the mountain system that stretch across the whole territory. In turn, the flat northern lands span from the Atlantic coast up to the inner plains suitable for breeding cattle. The west Pacific strip encompasses four departments and has the city of Cali as the main regional center; its natural gate for external trade is the port of Buenaventura.

This set of exploited territories located in the mountains and along the coasts is misnamed by some researchers as “the useful Colombia” (Gouset 1998), in spite of being disparaging regarding the rest of the country. As shown on the map given in Figure 1, the east and south parts of the country are covered by a vast virgin forest, almost untouched by human hands. This natural landscape takes up roughly half of the territory. In the Orinoquía and Amazonian Regions the density of population is negligible and there is no manufacturing. Oil activity is spread in some departments, such as Arauca, Casanare, and Meta.

The long path of the theoretical views explaining trade and specialization has evolved into a very compelling way. But now, our task is to analyze the specific traits that are present in the spatial distribution of the manufacturing sector across the Colombian territory, taking as the basic unit the Colombian departments.

Under the assumption of footloose labor and prohibitive transport cost, we can interpret the regional structure of manufacturing in Colombia. In the following exercise, we can find regional structures ranging from full specialization to incomplete specialization, according to the local manufacturing diversity. The observation of productive aptitudes of regions allows us to deduce the kind of regional trade: inter- or intra-industry exchange.

The Colombian manufacturing structure has specific idiosyncratic traits as an outcome of the industrial consolidation that started at the end of the 19th century and the first decades of the 20th century and drew the definitive determinants for a regional location throughout the 20th century. The main feature of the department manufacturing distribution is the historical consolidation of four key centers that influenced the process in the neighboring departments.

Few remarkable metropolitan arrays received the most diversified manufacturing structure, spurred by the size of markets, the availability of suitable labor and the capacity of metropolitan spaces for influencing the “hinterlands”. The national landscape was supplemented by the intervention of some latecomers, with extremely specialized outputs, producing almost exclusively manufactures under the Marshallian concept of “localized industries” or the Krugman’s concept of “first nature” specialization (Krugman 1993b). The Marshallian process strongly dominated since such production based on relatively immobile resources is hard to be reallocated spatially.

As an outcome of historical evolution, the manufacturing structure of four cities hoarded the bulk of the economic activity and political influence: Bogotá (in Cundinamarca), Medellín (in Antioquia), Cali (in Valle del Cauca) and Barranquilla (in Atlántico). The existence of an economic and demographic “quadricephaly” (Gouset 1998) confirms the assertion that actually during the Colombian “manufacturing take-off” the transport cost strongly influenced the

Figure 1
The map of Colombia



Source: own elaboration with layers from IGAC.

consolidation of regional markets that, at least until the middle of the 20th century, operated as self-sufficient systems. We suggest that the prohibitive transport cost that stemmed from the abrupt Colombian geography led to the upsurge of multiple equilibriums and several points of manufacturing concentration.

Theoretically, the spatial distribution can contribute to the emergence of multiple equilibria. According to Pflüger and Tabuchi (2016), the interaction of competitive advantages and increasing returns never predicts full agglomeration due to the dispersion of natural endowments across space. In general terms, this manifold structure of manufacturing centers can be assimilated into the famous Krugman's metaphor: that the metropolitan concentration of industries bends economic space around itself (Krugman 1993b). In analyzing the regional specialization in the U.S., Kim (1998) highlighted the functional principle that preserves the effects stemmed from the regional nucleus within the region.

Due to the forceful influence of transport costs, the Colombian economy could support four cores of activity based on a set of multi-department economies of scale. Furthermore, the degree of diversification of manufacturing activities was reserved to a few traditional departments, and the big majority of latecomer departments host a reduced spectrum of sectors with the access to natural resources.

For analyzing the Colombian case, we will apply the ISIC classification of manufacturing activities (two-digit levels) in order to identify spatial traits in the distribution of manufacturing across the national space. Table 1 shows the sectorial and spatial structure of the Colombian manufacturing reflected by employment data.

Advanced sectors, such as pharmaceutical activities (21), were brought to the four traditional Colombian spots, but also are present in Cundinamarca (the region where Bogotá is located) and Cauca (induced by specific tax incentives). Other capital-intensive activities, such as vehicles fabrication (29), have assembly plants located in Bogotá, some towns of Cundinamarca and Antioquia. Other related activities, such as fabrication of trailers and semitrailers and parts for vehicles, are present in Boyacá, Santander and Risaralda. Motorcycles, bicycles and other transport equipment (30) are produced in Bogotá, Antioquia, Risaralda and Valle del Cauca. The export-oriented manufacture of chemical products (20) is located in two direct ports on the Atlantic Ocean (Barranquilla and Cartagena) and Cali (the nearest cores form the port of Buenaventura). In the productive chain of textiles (13) and wearing apparels (14) traditional centers as Antioquia and Bogotá appear as leaders. A wider spectrum of departments also seems to be taking advantage of the labor intensity of such activities.

The seminal analysis of location contains the identification of sectors exploiting the access to natural resources under the full operation of comparative advantage principles. It is obvious that peripheral departments have been lately connected to national industrial circuits and participate in producing several primary products based on the exploitation of natural resources available locally. Typical examples are food products (10), beverages (11), wood and wood products (16), and many activities included in the residual category entitled "other manufacturing" (32).

20	21	22	23	24	25	27	28	29	30	31	32
Chemicals and chemical products, except pharmaceuticals	Pharmaceutical products	Rubber and plastics products	Other non-metallic mineral products	Basic metals	Fabricated metal products, except machinery and equipment	Electrical equipment	Machinery and equipment n.e.c.	Motor vehicles, trailers and semi-trailers	Other transport equipment	Furniture	Other manufacturing
ANDEAN REGION											
7.5	5.8	11.0	2.7	0.9	5.4	3.4	3.4	2.9	0.1	3.6	3.6
6.1	1.7	7.8	6.9	1.0	6.4	3.1	2.0	1.0	2.1	2.5	4.6
0.0	0.0	3.3	34.2	0.0	5.2	0.0	2.5	0.0	0.0	0.0	13.2
2.9	0.0	4.0	5.6	0.4	6.6	0.0	7.3	1.3	0.0	1.2	4.4
0.0	0.0	0.0	22.9	37.6	0.0	0.0	0.0	4.1	0.0	0.0	24.6
2.4	0.0	7.4	7.3	5.8	14.3	0.0	2.8	3.0	0.0	0.5	18.2
13.1	2.4	12.0	11.9	1.7	3.6	3.8	3.5	4.1	0.0	4.5	6.4
0.2	0.0	3.4	0.7	0.9	0.7	5.4	1.8	7.4	5.1	1.1	11.6
0.0	0.0	0.0	3.1	0.0	1.3	0.0	0.0	0.0	0.0	11.7	48.4
6.4	0.0	0.0	13.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.5
1.4	0.0	0.0	8.4	0.0	2.0	0.0	3.8	0.0	0.0	1.0	11.0
CARIBBEAN REGION											
6.9	6.1	5.5	10.5	4.7	8.0	0.0	3.0	0.1	0.0	4.2	10.5
12.2	0.0	17.9	8.7	4.5	2.4	0.0	2.6	0.0	0.0	0.0	19.1
0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.9
0.0	0.0	0.0	7.4	0.0	6.7	0.0	0.0	0.0	0.0	0.0	40.8
0.0	0.0	0.0	30.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.8
PACIFIC REGION											
9.0	5.6	5.6	3.6	2.3	3.6	1.6	3.1	0.8	1.3	4.2	3.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.5
0.8	8.4	5.5	3.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	20.9
ORINOQUÍA REGION											
0.0	0.0	0.0	9.7	0.0	0.9	0.0	0.0	0.0	0.0	0.0	26.2

Note: Due to statistical confidentiality, tobacco is not included but it is of public knowledge that plants were located in Bogotá, Medellín, Barranquilla and Santander.

Source: DANE – EAM.

A widespread presence of non-metallic minerals (23) can be found all around the territory. Activities such as porcelain and ceramic products, cement, processing of stone and other manufacturing activities have also a direct connection with natural resources. On the other hand, the manufacture of refined petroleum products (19) has also been particularly developed in Colombia, with two large refining facilities built in Barrancabermeja (Santander) and Cartagena (Bolívar). In the first case, there is a port on the riverside of the Magdalena River so that it can provide gasoline to the internal territories. In the second case, the port facilities enabled exports of petroleum products destined to the Caribbean neighboring countries. We can identify a sort of backward linkages bound with fully immobile natural resources anchored to a specific location; that was christened by Pflüger and Tabuchi (2016) as “purely localized Marshallian” intermediate goods. It conveys immobility transmitted also to the production of the final good.

The department of Meta, the most national-integrated department of the remote Orinoquía Region, contains several industrial groups exclusively producing animal oils and fats, dairy products and prepared animal feeds. In addition, there are non-metallic products and other manufactured products. This is a clear example of specialization determined by the access to natural resources, in the natural environment of plain lands is suitable for stock breeding.

Our assessment of the sectorial distribution of manufacturing activities in Colombia follows at a first glance the observation made by Krugman (1992) and Kim (1995 and 1998). The consolidation of the national market continued along with the reduction of transport costs and the development of infrastructure. The degree of integration soared during the consolidation of the national market; however, in all regions the basic specialization has remained. The outcome is that in several departments we find similar profiles in specific sectors, supposedly giving origin to intra-trade industry. A myriad of firms producing similar goods is dispersed around diverse departments, differentiating products according to qualities and brands. Such evidence predominates in basic labor-intensive sectors, e.g. in food products (10), beverages (11), textiles (13), and wearing apparel (14).

Recent developments in the Colombian manufacturing deserve a careful interpretation. We refer to the intervention of centripetal forces that drive out plants from larger cities into hinterlands. Medellín transferred firms to the space of Saint Nicholas Valley and Bogotá expelled some industrial activity into the neighboring department of Cundinamarca. Furthermore, a few sectors underwent a de-industrialization process due to the shutdown of plants and the disappearance of local productive unities. In general terms, the reasons explaining the fading of specific sectors are related to currency appreciation, weakness in internal demand, relocation of international brands at a continental level, de facto disappearance of the neighboring Venezuelan market and the dumping that stems from smuggling¹.

¹ Recent shutdown of the manufacturing plants came about in different sectors: tires (Michelin), pharmaceuticals (Bayer), wearing apparel (Hernando Trujillo), glass (Saint Gobain), food products (Kraft), motor vehicles (CCA–Mazda), tobacco (Coltabaco and Protabaco), and so on.

The analysis of Table 1 indicates some important features. Colombia configured a robust structure of regional systems derived from overwhelming drawbacks in terms of transport cost and tough relief. Such regional systems survived as self-sufficient schemes of manufacturing products according to the endowments of natural resources and, in some cases, exploiting the urban dimensions of the main metropolitan cores, reinforced by the economies of scale at a regional dimension. Even nowadays, such regional manufacturing systems are so robust that they have survived, in spite of the important reduction in transport cost during the 20th century.

Considering the Kim's (1995) analysis, we realize that industries tend to be more localized and have a stronger regional specialization. According to Pflüger and Tabuchi (2016), the strength of advantages causes a spatial dispersion of manufacturing towards the smallest regions – an argument applied to Colombian industrialization, considering the peripheral industrialization based on the exploitation of natural resources.

3. Empirical strategy and panel data

As a consequence of historical events and a long evolution, Colombian manufacturing made up an economic array of producer departments with a strong reference to geography that transmitted its influence in the presence of increased transport costs. The participation of each department in the national manufacturing map responded to a strict specialization in natural resources, strengthening the exploitation of comparative advantages. In other cases, the diversified production structures responded to scale economies and to the migration of footloose labor attracted by urban dynamics. The dispersion of some manufacturing sectors across the territory (textile and wearing apparel) was promoted by the strong effect of market's segmentation and a high elasticity of substitution between diverse product varieties that elevated the locally produced goods as strongly compelling for local customers.

The previous overview emphasized the historic advantages and circular causation that placed the four large Colombian metropolitan centers in a privileged position. The underlying specific features existing in the economic and urban evolution of the main cities induced economic forces of agglomeration that triggered the productive concentration. We must confirm the implicit operation of such kind of fixed effects. We performed a panel data regression in order to control for the presence of possible time-invariant effects that lead to the estimation of biased parameters. Our interest is to model the determinants of regional location of firms, assuming the number of them as a proxy of the spatial attraction force that induces a stubborn process of spatial concentration and in consequence a consolidation of the regional divergences.

We need to bear out the existence of some fixed effects of time-invariant variables that are embodied in some favorable conditions for the advanced manu-

facturing departments. In doing so, we use the technique of panel data and our purpose is to arrange data on a regional scale covering recent years (2011–2016). We constructed a balanced panel with 21 departments participating in the Colombian manufacturing structure.

We presume that regional industry can be located in specific regions following local profitable dynamics and that the action of the accumulative causation enhances the original advantages exhibited by primal centers of industrial agglomeration. Theoretically, such unobserved effects frequently appear in panel data analysis and are interpreted according to the unit of analysis. Regarding the features of an individual, the effects can be interpreted as abilities, the motivation or the family background. In the case of firms such effects can encompass managerial quality or corporative structure (Wooldridge 2002). For our analysis, the unobserved effects are related to the most favorable conditions that more advanced departments can offer for the location of firms, which bestow upon them a stronger advantage for attracting manufacturing activities.

The source of information is the Colombian official annual manufacturing survey (*Encuesta Anual Manufacturera*) conducted by the Colombian statistical office (*Departamento Administrativo Nacional de Estadística*). This source is very reputable and makes up a long-living survey within the Latin American context, highly representative of formal manufacturing firms which hire more than 10 employees.

For our purposes, the number of manufacturing plants located in each department performs as the endogenous variable, as a proxy for the number of industrial establishments that are prone to be established locally. We assume that agglomeration forces intervene in the spatial distribution of plants and that cumulative causation leads to the concentration of industry in the locations where scale economies and linkages could be effectively exploited. As mentioned earlier, for the Colombian case we expect also that several natural conditions gave rise to a spatial process of localization.

When collecting the panel data, we consulted other sources of information in order to capture akin variables to be estimated. Our interest was to model the attributes of industrial plants – namely human capital, resource endowments and external links, as important determinants of the industrial presence in the Colombian regions.

3.1. The treatment of endowments

International literature has been concerned with the link between trade patterns and resource supplies. Conventional models widely use land, labor, and capital as traditional proxies for representing the resource endowments. However, capital, to the extent that it appears as an accumulated stock, can be considered as a variable already settled in the actual definition of trade pattern (Lederman and Colin Xu 2001).

Leamer (1995) deploys an exposition of the potential determinants of trade patterns in an analysis embedded in a Heckscher–Ohlin discussion. He identifies several production factors, such as labor (with different qualification levels), diverse sorts of land, minerals, coal, and oil. Lederman and Colin Xu (2001) give a long discussion about various variables that can be used as proxies for natural advantages and endowments. Any variable selected for the concept of endowments must be related to idiosyncratic characteristics of the analyzed country or region. These locally specific traits must show a differentiation between territories; such traits can be reinforced by the fact these factors are not easily movable between territories (to some extent, even infrastructure can be included). The obvious factors can include the capital-labor ratio, domestic institutions, knowledge, schooling, and macroeconomic volatility. Other variables used as proxies are: technology, skills, patents, and the stock of technical labor. However, some doubts can be posed about the knowledge as a local endowment because it could not be treated as an immobile factor, with the global circulation of scientific and technical skills. Pflüger and Tabuchi (2016) take as exogenous comparative advantages represented by technological potential, natural conditions and institutional factors playing in favor of specific production.

Following the Heckscher–Ohlin approach, there must be a correlation between trade and factor abundance (Leamer 1995). On the other hand, a common stylized fact in Latin-American countries is the evidence of a deep primary and raw material specialization in global markets, after the process of trade liberalization (Lederman and Colin Xu 2001). Therefore, we expect verification of the reliance on natural advantages and endowments typical in the Colombian exports.

Leamer (1995) realized that, in defining the patterns of international specialization, some industries and productive chains enjoy success in performing a commodity aggregation, which means a joint development of the export supply of correlated products. For our case, for instance, exports of raw coffee and processed coffee products should be tightly correlated, likewise exports of raw sugar and candies, and so on.

3.2. The model

We tried diverse calibration of endogenous variables in order to get the best results. As we said before, the final model of the panel data ended up using the number of firms as the endogenous variable. The panel data specification is as follows:

$$y_{it} = X_{it}'\beta + (\alpha_{it} + \varepsilon_{it}), \quad (5)$$

where:

α_{it} collects the unobservable factors that do not change in time,

ε_{it} is the idiosyncratic error collecting all unobservable factors which can change in time.

In such conditions the technique of panel data allows us to find out unbiased estimators even in the presence of omitted variables (Wooldridge 2002). Having the data arranged as panel data, we need to figure out the optimal procedure for estimating the fixed effects. In doing so, we will determine whether the most suitable estimation can be performed by fixed or random effects. In the first case, we assume that α_i can be correlated with X_{it} , so this regressor can be endogenous. In such situation, the OLS estimations of β are inconsistent but the estimators regressed by fixed effects are consistent. In the case of random effects, we assume that α_i is a randomly generated process unrelated to X_{it} ; consequently, such regressor is exogenous and all estimations render consistent parameters.

Table 2
Descriptive statistics

Variables	Mean	S.D.	Min	Max
ln Plants	4.995	1.377	2.639	8.221
ln K/L	5.372	0.818	4.093	7.448
ln X/Pop	6.337	0.747	4.643	8.557
ln Employment	9.222	1.532	6.205	12.276
ln Intermediate consumption	7.715	1.609	3.981	10.204

Source: own elaboration.

The exogenous variables were collected from sources of information focused on manufacturing activities; afterwards, we built some variables bound with some degree of endowments and external projection of productive patterns, such as capital-labor ratio (capital measured as a value of assets) and manufacturing employment. The inclusion of labor endowment is crucial in the discussion about comparative advantages and increasing returns because the first approach assumes that the more industrialized location will have lower wages, while the second one concludes that the agglomeration process will push all the wages upward.

On the other hand, we included the manufacturing intermediate consumption as a proxy of the linkage with upstream firms. Finally, we included the ratio of exports to population pretending to represent the effect of trade intensity (Lederman and Colin Xu 2001) and as an expression of the endowments that conquer international markets. In the tradition of factor endowments, it is possible to expect a tight association between exports and factor abundance (Leamer 1995). We can also assume that factor endowments influence positively the balance of payments.

We realize that variables extracted from the annual manufacturing survey perform very well with the regional number of plants, revealing a sort of internal coherence provided that they come from the same statistical source. Furthermore, we include all variables in natural logarithms to reduce the risk of heteroscedasticity.

As usual, we ran an OLS regression and included all exogenous variables and a dummy intended to incorporate the role of the urban quadricity. In such terms, we suspect that the four top regions in Colombia exert a strong attraction for firms that rely on the advantages of consolidated urban markets and on agglomeration economies. In fact, in the OLS model the dummy variable turns out to be highly significant, making up an insight about the existence of time-invariant characteristics, hinting an intrinsic heterogeneity across departments based on a proper path dependence and a divergent manufacturing history. Later, in the fixed effects models, the influence of regional individual features was confirmed by the significance of rho parameter.

Table 3
Panel data estimations

Variables	Fixed effects ln Plants	Random effects ln Plants	OLS ln Plants
ln <i>K/L</i>	-0.0501**	0.0161	-0.322***
	(0.0185)	(0.0262)	(0.0410)
ln <i>X/Pop</i>	0.0173*	0.0320*	-0.150***
	(0.00866)	(0.0131)	(0.0374)
ln Employment	0.229***	0.658***	0.566***
	(0.0674)	(0.0803)	(0.0635)
ln Intermediate consumption	-0.129**	-0.0926	0.224***
	(0.0475)	(0.0666)	(0.0535)
Dummy			0.338**
			(0.113)
_Const	4.045***	-0.643	0.667
	(0.540)	(0.542)	(0.427)
<i>N</i>	126	126	126
<i>R</i> ²	0.330		0.951

Notes: *t*-statistics in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: own elaboration.

In our fixed effects model, rho indicates that 99% of variance is attributed to the differences across panels. All exogenous variables exhibit interesting interactions with the numbers of regional plants. Variables representing endowments and linkages are highly significant indicating that relevant intensity of trade and endowments have an outright influence when the firms choose a location; this association is particularly relevant given the labor availability.

The mathematical sign of the parameter for the capital-labor ratio may be contra-intuitive but it can be understood due to the relatively low capital intensity

of the Colombian manufacturing. The results of capital per worker endowment can reflect the strength of the comparative advantage in more advanced technical industries but conversely, this can reduce the association with the exports based on labor endowment.

The Brausch and Pagan test allows us to corroborate that in fact there are individual time-invariant effects characteristic for the Colombian departments that influence the number of firms established regionally and the firm's decision about location, reinforcing or weakening the trends to spatial concentration. All exogenous variables are strongly significant and, in the majority, the mathematical signs are consistent with economic intuition.

The Hausman test hints that the fixed effects model estimates in a robust way the interaction between the number of plants established and the exogenous variables. The conclusion of the Hausman test allows us to choose the fixed effect model as the optimal structure of modeling for our problem.

Conclusions

The shape of the industrial regional array in Colombia was strongly impacted by geographical factors and the uneven geographic surface. During the Colombian “Industrial take-off”, the individual regions were barely communicated with each other and, therefore, each set of neighboring departments was acting as a self-sufficient system of production, gravitating towards the nearest industrial city. During this period a strong home market effect spurred regional economies of scale. The inertia of such systems survived even nowadays, in spite of the fact that transport costs have lost slightly their relevance.

As an outcome of history and isolation of regions, four important industrial cores emerged as regional centers of economic activity. There, in four larger cities, diversified economic structures were established and transmitted economic activity towards their hinterlands. We can believe in a “path dependence” process bound with the historical inertia that perpetuated the role of four urban cores, even when the national economic integration offered opportunities for a more specialized structure.

The manufacturing specialization reflects a myriad of subjacent factors. The ‘first nature’ determinants can lead to an isolated and spatially constrained process of industrialization with an excessive reliance on natural advantages while the ‘second nature’ industrialization, based on the exploitation of economies of scale, can induce a productive diversification of peripheries.

We can hypothesize that during the initial awakening of industry in Colombia, the prohibitive transport cost and the incipient technological level promoted the first nature profile of manufacturing. Later, along with technical evolution of the manufacturing profile, the reduction in transport costs and the national economic integration, the “path dependence” in four cores was so strong that the

original quadricephaly did not undergo any substantial weakening. It means that the original attraction of four cities was not transitory at all and such historical performance increases their particular attractiveness.

Our panel data bears a strong suspicion about the existence of fundamental time-invariant effects in the Colombian departments that exert a definitive influence on the manufacturing attractiveness of their spaces. Intuitively, we can bind such time-invariant effects with the historical evolution that determines conditions for receiving new plants and for retaining the ones already placed.

Panel data bears out the strong influence of resource endowments in shaping the spatial structure of manufacturing. The more developed and complex production activities are located preferentially in larger cities with an abundant supply of skilled labor. The recent expulsion of firms from big cities toward neighboring municipalities is induced by the search for cheaper land and better tax conditions. In our model, this phenomenon is not singled out because we apply a departmental approach that involves a reallocation inside the same unit of analysis. Such a situation has been observed in Barranquilla (toward municipalities in Atlántico) and Medellín (toward municipalities in the San Nicolas Valley). In the case of Bogotá, the firms tended to move toward close municipalities in Cundinamarca.

The general process of regional integration must be encompassed by the development of trade. Under the powerful influence of a long-lasting uneven regional development, the reduction in transport cost and the improvement of infrastructure induce a deepening of divergence as long as the peripheral regions lose natural protection against more efficient central production (Puga 1999). Similarities with the divergent pattern of the NEG are evident.

The theoretical stream that analyzes the production localization unambiguously resorts to a combination of comparative advantages and agglomeration forces including a set of parameters as love for variety, substitution among goods, and the dispersion of productivity across outputs, inter alia. In such terms, recent trends confirm the outright influence of natural determinants for starting several Colombian undertakings. Agricultural advantages stimulated the upsurge of the sugar industry, coffee processing, and rice packing, and so on. Likewise, food processing developed on the coast and in flat plains, metallurgic industry located close to coal mines and textiles and wearing apparel came up in regions with large available labor supply.

However, the pervasive strength of quadricephalic urban arrangement relies on a self-reinforced process explained by the increasing returns and home market effect. In these cases, the size of urban markets caused that firms were placed there but the subsequent circular process was fueled by the action of unleashed agglomeration forces that amplified the original incentives.

An efficient model filled with panel data aimed to single out the time-invariant characteristics of departments that induced firms to locate their activities in specific points of space and launched a pervasive process of firm's attraction,

stimulated by the benefits derived from agglomeration. Definitely such time-invariant factors influenced the consolidation of regional manufacturing structure, with urban cores having a long-lasting advantage.

The process of extending the manufacturing activity to Colombian peripheries is a hard task. An abysmal gap in wages and in the supply of public goods between manufacturing cores and the remaining territories reduces the interest of firms for industrializing the lagging territories. Peripheries must accomplish a transition from the ‘first nature’ to the ‘second nature’ development in order to catch up with the most developed regions, based on the strength of markets, productivity and economies of scale. The pervasive territorial divergences can only be reverted by the productive empowerment of lagging departments and prompting their industrial diversification.

A startling characteristic in industrial periphery is its highly specialized quality. In such case the forces of comparative advantage have been predominant and have stimulated inter-industry trade. According to Ohlin, trade is an efficient mechanism for offsetting the big differences in the initial resource endowment among regions and countries, insofar as each part tries to exploit its comparative advantage. We presume that the less industrialized departments have developed a scarce productive structure because they have insisted on a productive insertion based on a specialized pattern. Such insertion promoted the formation of industrial spots with scarce projection to the local economy and weak inter-sectorial linkages.

The most recent developments combining advantages and increasing returns rule out the full agglomeration predicted by core-periphery models. The even intervention of both forces bestows upon the smaller regions a share in manufacturing due to the omnipresent natural advantages. The emphasis on advantages predicts a more spread distribution of manufacturing due to the randomness in the localization of natural resources.

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REGIONAL SPECIALIZATION IN THE COLOMBIAN MANUFACTURING INDUSTRY: A NEW ECONOMIC GEOGRAPHY APPROACH

Summary

The New Trade Theory (NTT) and New Economic Geography (NEG) explain production specialization of countries or regions by benefits stemming from economies of scale, which are available even when trade partners are in similar economic conditions and with even resource endowments. Conversely, the traditional trade theory relies on comparative advantages that emerge from differences in technology and costs. Recently, some authors propose to combine both theories. After discussing the theoretical background, the paper presents an empirical analysis based on panel data which tries to explain the branch and regional structure of manufacturing industry in Colombia. The results confirm the importance of natural advantage, resource endowments, transport costs and the access to national and international industrial circuits in shaping the spatial structure of manufacturing and its development trends.

Keywords: New Economic Geography, comparative advantages, economies of scale, regional specialization, agglomeration, Colombia

JEL: R12, L60, C33

SPECJALIZACJA REGIONALNA W PRZEMYSŁE PRZETWÓRCZYM KOLUMBII – PODEJŚCIE OPARTE NA NOWEJ GEOGRAFII GOSPODARCZEJ

Streszczenie

Nowa teoria handlu i nowa geografia gospodarcza wyjaśnia specjalizację produkcyjną krajów i regionów korzyściami płynącymi z dużej skali produkcji, osiągalnymi nawet wtedy, gdy partnerzy wymiany znajdują się w podobnej sytuacji gospodarczej i mają podobne zasoby czynników produkcji. Natomiast tradycyjna teoria handlu eksponuje przewagę konkurencyjną wynikającą z różnic technologii i kosztów. Ostatnio niektórzy autorzy proponują połączyć ze sobą obydwa te ujęcia. Po omówieniu tła teoretycznego artykuł przedstawia analizę empiryczną opartą na danych panelowych, która próbuje wyjaśnić gałęziową i regionalną strukturę przemysłu przetwórczego w Kolumbii. Uzyskane wyniki potwierdzają znaczenie warunków naturalnych, wyposażenia zasobowego, kosztów transportu oraz dostępu do krajowych i międzynarodowych łańcuchów produkcyjnych w kształtowaniu struktury przestrzennej przemysłu i jej tendencji rozwojowych.

Słowa kluczowe: Nowa Geografia Gospodarcza, korzyści komparatywne, korzyści skali, specjalizacja regionalna, aglomeracja, Kolumbia

JEL: R12, L60, C33

РЕГИОНАЛЬНАЯ СПЕЦИАЛИЗАЦИЯ В ПЕРЕРАБАТЫВАЮЩЕЙ ПРОМЫШЛЕННОСТИ КОЛУМБИИ – ПОДХОД НА БАЗЕ НОВОЙ ЭКОНОМИЧЕСКОЙ ГЕОГРАФИИ

Резюме

Новая теория торговли и новая экономическая география объясняют производственную специализацию стран и регионов выгодами, вытекающими из большого масштаба продукции, достигаемого даже тогда, когда партнеры обмена находятся в похожей экономической ситуации и располагают похожими ресурсами факторов производства. Традиционная теория торговли подчеркивает конкурентный перевес, вытекающий из различий технологии и издержек. В последнее время некоторые авторы предлагают соединить друг с другом оба этих подхода. После обсуждения теоретического фона в статье приводится эмпирический анализ, опирающийся на панельные данные. Этот анализ пытается объяснить отраслевую и региональную структуру перерабатывающей промышленности в Колумбии. Полученные результаты подтверждают значение природных условий, наличия ресурсов, издержек транспорта и доступа к отечественным и международным производственным цепочкам в формировании пространственной структуры промышленности и тенденций ее развития.

Ключевые слова: Новая экономическая география, компаративные выгоды, эффект масштаба, региональная специализация, агломерация, Колумбия

JEL: R12, L60, C33