

New Economic Geography and Economic History: a survey of recent contributions through the lens of the Spanish industrialization process

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Abstract

This paper aims to provide a synthesis of a number of articles that over the last few years have explored the industrialization process in Spain from the perspective of the new economic geography (NEG). To this end we present some of the seminal theoretical papers of the NEG literature from which originated the main theoretical predictions that have been tested through empirical analysis applied to the case of Spain. We also look at those papers on the economic history of Spain that – through the use of an economic geography framework – have analysed how the location and regional concentration of manufacturing has evolved over the years. Altogether, this paper aims not only to present the determinants of the industrial map of Spain, but also to highlight the positive externalities that stem from the interaction between the NEG and economic history, showing the usefulness of a cliometric approach based on economic theory and empirical testing to give us a more detailed knowledge of the past.

Keywords: economic history, economic geography, manufacturing, Spain

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“One approach is the neoclassical model of production and trade, in which production is determined by factor endowments, technological differences, and the freeness of trade. We contrast this with a new economic geography approach, in which locations derive some of their comparative advantage from scale, and ability to exploit scale is in turn limited by the extent of the market. In this approach firms seeking profitable locations will be drawn to locations with good market access and proximity to clusters of related activities, as well as locations with appropriate factor endowments. We show that this alternative view provides a broad-brush picture that, in many respects, seems consistent with the historical record.”

Crafts and Venables (2003, p.324)

1. Introduction

The last two centuries have seen unprecedented economic change. Since the start of the Industrial Revolution in Great Britain at the end of the eighteenth century, the spread of industrialization and technology has meant that more and more countries have been able to participate in modern economic growth. This type of growth is characterized by a high self-sustained increase in per-capita income, often accompanied by a rise in population and structural change (Kuznets, 1966). In such a context the industrial sector is the engine of growth because this is the area that generates and adopts the technological change that enables an economy's productivity and income to grow. Thus structural change, i.e. the progressive transfer of resources from low-productivity agricultural activities to high-productivity industrial sectors, created the conditions for economic growth. However, each country began its industrialization process at a particular time, and therefore countries have undergone modern economic growth at different points in history and at different speeds. As a result, differences in growth rates have brought about an increase in income inequality across countries. This means that the time element is a key factor in any analysis of economic development, since the spatial inequalities in the distribution of economic activity and income that we see today are the result of a long-term evolution that can be traced back at least to the industrialization processes of the nineteenth century.

Studying the industrialization processes of various countries over time has made it possible to establish one of their main characteristics from a spatial point of view: they are notable for their marked regional character (Pollard, 1981). Not all the regions in the same country became industrialized at the same time, and therefore spatial inequality is also present within countries as well as between them. A good many examples illustrate the regional nature of the industrialization processes in history. These include Lancashire in Great Britain, the Ruhr in Germany, the industrial triangle in northern Italy and the manufacturing belt in the US, to name but a few. In addition, many of the industrialization processes that began in the nineteenth

century occurred at the same time as the economic integration of national markets. Trade costs not only between different areas of the same country but also between countries decreased because the institutional obstacles that slowed down the free movement of goods and factors between them were eliminated, while at the same time haulage costs became cheaper due to technological improvements resulting from the Industrial Revolution being applied to transport.

Considering all the above, it follows that economic geography also plays an important role in the analysis of economic development. Space is heterogeneous, which means that the conditions in some areas could initially be more suitable for human settlement and economic activity. Economic history, on the other hand, shows us that the reality can change and that the opportunities initially offered by these conditions may be strengthened or modified over time due to human activity. For example, as economies have developed and non-agricultural activities gained in relative weight, new technologies have appeared. In each wave of technology there have been changes in the use of raw materials or new sources of energy that have given advantages to some locations over others, thus bringing about changes in the location of economic activity. In addition, new means of transport and new transport networks have appeared over time, making it possible to increase the size of the domestic market and connect markets that were previously far apart. With this changing scenario, it is not only companies that can relocate to more attractive areas. People have also tended to migrate, mainly towards dynamic urban settings, generating increased economic density in certain areas.

The emergence of the new economic geography (NEG) (Krugman, 1991; Fujita et al., 1999; Ottaviano and Thisse, 2002; Combes et al., 2008) provides an invaluable analytical framework for studying the location of economic activity in the geographical space and its evolution over time. NEG models are based on various alternative assumptions to those used in the literature which adopts a more neo-classical approach. Taking into account the presence of increasing returns and transport costs, NEG models highlight the existence of a circular, cumulative process in which the initial advantages of a location become stronger over time. They therefore stress the importance of understanding the historical processes that have shaped the spatial distribution of economic activities. This would appear to be a theoretical framework particularly suitable for undertaking historical studies.

One aspect that the NEG may help to explain is the spatial distribution of manufacturing in the course of the industrialization process. NEG models suggest that the relationship between market integration and the spatial concentration of manufacturing follows a bell-shaped curve. In the early stages of the process and with the integration of the domestic market under way,

agglomeration forces lead economic activity to become concentrated in a limited number of locations. However, as integration continues, economic activity becomes more dispersed across the geographical space and a pattern of convergence is expected to follow. But where will production take place? According to Krugman (1980, p. 955), “...*in a world characterized both by increasing returns and by transportation costs, there will obviously be an incentive to concentrate production of a good near its largest market, even if there is some demand for the good elsewhere. The reason is simply that by concentrating production in one place, one can realize the scale economies, while by locating near the larger market, one minimizes transportation costs*”. Large markets will therefore be more attractive to both companies and workers, and access to demand or market potential becomes an essential variable in the NEG analysis.

In this framework, therefore, most of the empirical research has focused on the industrial sector, in which economies of scale, a key feature of NEG models, tend to be more present. These theoretical models can thus shed some light on the forces behind the spatial concentration of economic activity in a context characterized by decreasing transport costs and the increasing presence of economies of scale. And to a large extent, this is what has happened in the world economy over roughly the last two hundred years. Since the Industrial Revolution the continuous advance of technology has generated increasing returns to scale in production, and this in turn has brought about considerable reductions in trade costs both within and between countries. While in 1800 the crossing from London to New York by sailing ship took over 30 days (as did postal communications), today these cities are connected by plane in eight hours and online instantly thanks to communication technologies.

In such a context it is no surprise that economic historians looked towards recent developments in the new economic geography and vice versa. The seminal NEG models, most of them published in the 1990s, offered a number of theoretical predictions that needed to be empirically verified. Thus an initial wave of studies produced a set of empirical works that aimed to test the main predictions arising from these early NEG models. Among this extensive literature the case of Spain stands out for the abundant empirical research analysing the long-term evolution of its economy and its industrialization process from a regional perspective adopting an economic geography viewpoint. Indeed, in the context of Europe, the case of Spain has probably received the most attention when combining history and economic geography. The relevant investigations that we will present in the course of this paper have looked at various points in Spanish history ranging from the recent past back to the mid-nineteenth century, when the country was undergoing the early stages of modern economic growth.

The case of Spain is particularly appealing from an NEG perspective. Situated on the geographical periphery of Europe, the country sought from the early decades of the nineteenth century to join the race towards industrialization in which most of the countries of mainland Europe were taking part. This period (normally extended up to the outbreak of the First World War) saw Spain, a latecomer to industrialization despite the efforts made, lagging behind the leading European countries without its economy having undergone the profound changes that industrialization implies (Nadal, 1975). However, in connection with the regional nature of the industrialization processes, two exceptions to this general view of economic backwardness emerged: Catalonia and the Basque Country. Both regions achieved a high degree of industrial development in the nineteenth century, even compared to the rest of Europe, and specialized in two of the sectors that had driven the Industrial Revolution in Great Britain, namely cotton and iron and steel, respectively.

As a result there was a definite spatial concentration of manufacturing during the early stages of modern economic growth in Spain, at a time when the domestic market was becoming more and more integrated. This took place in a context in which, from the final decades of the nineteenth century, the Spanish economy was affected by a more protectionist trade policy, which would become stricter during the first half of the twentieth century, preventing the economy from becoming integrated into the international markets. It was only in the second half of the twentieth century and especially after Spain joined the EC in 1986 that this trend was reversed and the Spanish economy unambiguously opened up. It is in this historical context that various studies have been carried out to empirically test and verify some of the main theoretical predictions stemming from the NEG models as applied to Spain. In the following pages we provide an overview of the different pieces that made up this research agenda and assess the results obtained.

We introduce some of the main early theoretical works of the NEG that have guided empirical research in the fields of both regional economics and economic history¹. These initial investigations, in which the founding theoretical models are presented, set out the main theoretical predictions that were eventually tested. Guided by previous theoretical works, we also aim to present as systematically as possible a survey of the various contributions from the study of Spanish industrialization in a historical perspective through NEG. By doing this we hope to

¹ The theoretical and empirical NEG literature has continued to grow since the 1990s. Nevertheless, in the present paper it is enough to present just a few of the early models from this literature, since these cover the main predictions that have been empirically tested in research exploring the case of Spain and are included here. For some of the more recent contributions and surveys that summarize the main lines of research and results within the NEG literature of the last few years, see for example Redding (2013), Combes and Gobillon (2015), Karlsson et al. (2015), Redding and Rossi-Hansberg (2017), Gaspar (2018), Henning (2019) and Brackman et al. (2019).

provide an overall view of industrialization in Spain over the long term and at the same time highlight the positive externalities arising from the interaction between the NEG and economic history. NEG makes it possible to analyse the changes that took place in the location of industrial activity over the years as technology advanced and both the internal and external markets became more integrated. In this survey we therefore aim to show the usefulness of economic geography as a tool to help us better understand economic history and to prove that this economic history is just as useful as a laboratory in which to test and in many cases provide empirical evidence in support of the theoretical predictions that emerge from the NEG models.

The rest of the article is organized as follows. In the next section we briefly present some historical background on the economic integration of the Spanish market and the industrialization process. Then in Section 3 we introduce the seminal theoretical papers of the NEG literature that explain the relationship between economic development, market integration and the spatial distribution of economic activity (i.e. manufacturing) over time. In Section 4, we look at the papers on the economic history of Spain that – through the use of an economic geography framework – have analysed the historical evolution of location and regional concentration of manufacturing. Indeed, many of these economic history studies have empirically tested some of the predictions from the NEG theoretical models presented in the previous section, thus establishing a link between economic geography and economic history. Section 5 incorporates trade policy into the analysis, presenting both theoretical and empirical works as applied to Spain. The article closes with some brief conclusions.

2. The integration of the domestic market and the industrialization process in Spain

As in the rest of the continent, during the nineteenth century the Spanish economy began to experience the early stages of modern economic growth (Prados de la Escosura, 2017). These were years during which two of the key elements from the NEG models were present: the completion of domestic market integration (i.e. lower internal trade costs) and the start of the industrialization process (i.e. increasing returns). Nevertheless, despite these first steps taken towards industrialization, in the context of Western Europe Spain can be characterized as a latecomer. Industrialization only took off in some regions, and this process coincided with the integration of the domestic market. A reduction in trade costs between different areas of the country came about as a result of the removal of institutional obstacles that had hindered the free movement of goods and factors between regions, and also because transport costs fell as technological improvements stemming from the Industrial Revolution were applied. This section

briefly introduces the major advances in these two fields, firstly describing the main characteristics of Spanish market integration, then presenting the country's industrialization process from a regional perspective.

The economic integration of the domestic market was completed during the second half of the nineteenth century². Before then the Spanish market was spread out among various local and regional markets that were largely unconnected. Historians have emphasized two key elements to account for this situation: the persistence of institutional obstacles to interregional trade, and the relative backwardness and deficiencies characteristic of Spain's transport system (Madrazo, 1984; Ringrose, 1970; Tedde, 1994). Nevertheless, the second half of the century saw the progressive integration of the domestic market due to institutional reforms introduced by the various liberal governments. These were aimed at strengthening property rights and encouraging a reduction in the trade costs that interfered with economic relations and impeded the free movement of goods within Spain's borders.

Improvements to the transport system proved to be a determining factor in market integration thanks to the introduction of the railway and advances made in other means of transport. Spain has traditionally had to overcome serious geographical (and financial) obstacles that hinder the development of the transport system. Certainly the greatest boost to the integration of the Spanish market was the construction of the railways³, although their radial design reproduced the unsuitable radial pattern of the road network that had made connections between the various regional markets difficult in the past. Nevertheless, the result was the convergence of regional prices on the grain markets, a sign that the Spanish goods market was more integrated (Peña and Sánchez-Albornoz, 1983). Integration of the factors markets also advanced notably. On the capital market there was a fall in the interregional variation in the interest rates of short-term bills of exchange (Castañeda and Tafunell, 1993), and Rosés and Sánchez-Alonso (2004) claimed that the reduction in interregional differentials in real wages between 1860 and 1930 was proof of the gradual integration of the labour market in that period.

In addition, the integration of the domestic market was accompanied by a gradually increasing economic openness to international markets. From 1869 onwards tariff protection was reduced, and in the 1880s Spain signed several trade treaties with its main trading partners. Thus the degree of openness of the Spanish economy increased in the context of the first globalization that was taking place during the final decades of the nineteenth century (O'Rourke

² See Rosés et al. (2010, p. 245 and 246) for a detailed account of the integration of the Spanish market between 1860 and 1930.

³ According to calculations made by Herranz (2005), in 1878 haulage costs fell by up to 86% thanks to the introduction of the railway.

and Williamson, 1999). However, this integration into the external markets came to a halt in 1892 with the return to protectionism after the Cánovas tariff was introduced. This was the beginning of a trade policy devised to encourage domestic production and industry through protectionism and increasing public intervention. This new development model was consolidated with the introduction of the Salvador tariff in 1906 and the Cambó tariff in 1922⁴. This policy change made Spain one of the most protectionist countries in the interwar years with the highest tariff levels in the world, followed closely by those of the United States (League of Nations, 1927)⁵. After the disruption caused by the Civil War (1936-39), an autarkic policy was established and the Spanish economy only began to slowly open up to trade in the second half of the twentieth century, a process that would culminate in its entry into the EC in 1986.

As regards the industrialization process, this advanced slowly throughout the nineteenth century and it is generally accepted that it mostly failed before the First World War. Nevertheless, two regions bucked the overall trend. In Catalonia, in the north-east of the Peninsula, and in the Basque Country, in the north, manufacturing activities prospered in the context of a mainly agrarian country, which is what Spain was at the time⁶. In Catalonia the cotton industry, with a tradition stretching back to the eighteenth century, gradually became mechanized in the nineteenth to such an extent that by the end of the century both it and, by extension, the textile industry were concentrated almost exclusively in that region. It was during these years that Catalonia became ‘the factory of Spain’⁷. In the Basque Country the iron and steel industry underwent rapid growth in the last quarter of the nineteenth century, exploiting its proximity to the sources of iron ore minerals that supplied the factories in Bizkaia and the advantages of the non-phosphoric nature of these ores after the invention of the Bessemer converter in the 1850s.

Thus in the second half of the nineteenth century a few regions were becoming industrialized. While industrial development gradually appeared along the Mediterranean coast and in the north, other regions underwent a process of deindustrialization (see Table 1). Apart from Madrid, provinces in the interior of the peninsula along with those of Andalusia became weaker in economic terms (Sánchez-Albornoz, 1987; Nadal, 1987; Parejo, 2001). As a result

⁴ Although the Cánovas tariff (1892) was characterized by the imposition of a high duty on imports of cereals, textile products and iron and steel goods, the tariffs of 1906 (the Salvador tariff) and 1922 (the Cambó tariff) focused especially on the protection of a growing group of industrial production sectors (Sabaté, 1995; Tena, 1999).

⁵ A more complete view of the Spanish economy’s integration into the international markets between 1860 and 1930 can be found in Tirado et al. (2013, pp.301-304).

⁶ In 1910 over two-thirds of the total active population of Spain still worked in the agricultural sector. The evolution of the different regional economies can be found in Nadal and Carreras (1990) and Germán et al. (2001).

⁷ For more details on the origins of Catalan industrialization in the late eighteenth century, see Martínez-Galarraga and Prat (2016).

there was a gradual shift of industrial activity towards the coastal provinces on the geographical periphery of Spain. However, this pattern of localization changed over the early decades of the twentieth century when certain inland regions (Madrid and Aragon) and large areas of the north experienced an upsurge in industrial activity. In general terms the second half of the twentieth century was marked by a certain degree of stability in the spatial distribution of manufacturing across Spain's regions.

Table 1. Share of manufacturing by region, NUTS2 (%), 1860-2000

	1860	1900	1930	1960	2000
Andalusia	23.5	16.8	11.2	8.2	8.2
Aragon	3.4	2.8	4.5	3.8	4.1
Asturias	2.0	2.1	4.1	5.3	2.5
Balearic Islands	1.6	1.2	1.2	1.9	1.0
Basque Country	2.0	12.0	9.2	11.8	9.2
Canary Islands	0.4	0.8	1.0	1.9	1.8
Cantabria	1.1	1.5	2.2	2.6	1.4
Castile-La Mancha	6.4	3.5	2.8	2.9	3.4
Castile-Leon	11.1	5.7	4.7	6.4	6.3
Catalonia	23.2	32.0	34.6	24.5	26.1
Extremadura	3.5	2.3	1.5	1.1	0.8
Galicia	5.0	3.1	3.5	4.7	5.5
Madrid	4.9	5.0	9.3	10.5	13.6
Murcia	2.0	1.5	1.3	2.0	2.0
Navarre	1.0	1.3	1.0	1.8	2.7
Rioja, La	1.2	0.9	0.9	1.0	1.1
Valencia	7.7	7.3	7.1	9.6	10.4
Spain	100.0	100.0	100.0	100.0	100.0

Source: 1860-1930, Tirado et al. (2013, Table 3); 1960-2000, Parejo (2001, Table 4)

3. Industrialization and agglomeration. What does economic theory have to say?

The new economic geography models: domestic market integration, manufacturing and agglomeration.

The uneven spatial distribution of economic activity is one of the main characteristics of economic development both within and across countries, and this activity tends to concentrate in certain areas. The NEG concerns itself with studying the uneven spatial distribution of human activity. In its models, transport costs and increasing returns interact in a framework of monopolistic competition that favours the spatial agglomeration of economic activities and then

reinforces it once it is under way. In this context the gradual market integration of goods and factors plays a key role, since lower transport costs may encourage the spatial concentration of economic activities. The spatial distribution of economic activity in this theoretical framework depends on the interaction of two types of forces operating in opposite directions: the *centripetal* or *agglomeration forces* and the *centrifugal* or *dispersion forces*. The seminal model developed by Krugman (1991) describes a cumulative process similar to both that envisaged by Hirschman (1958) and the cumulative causation described by Myrdal (1957), in which the concentration of economic activity results from the interaction of two centripetal forces linked to market access. In turn, agglomeration is subject to a snowball effect that results in a continuous strengthening of this spatial concentration once it is set in motion.

To account for this process, Krugman (1991) extended the new trade theory models (which assumed that labour is homogeneous and mobile between sectors but not between countries) by considering two regions in which the immobile factor (farmers) was used as an input in the agricultural sector and the mobile factor (workers) was used as an input in the manufacturing sector. The labour factor was thus divided between unskilled farm workers (immobile) and skilled manufacturing workers (mobile). Thus when skilled manufacturing workers are mobile, individuals live and work in the same region (of destination), so this is where both production and consumption also take place. Migration therefore modifies the relative size of the markets, while the regional distribution of demand changes with the distribution of skilled manufacturing workers, which is now endogenous.

Two main effects linked to the factors of production operate in Krugman's (1991) core-periphery model, one related to companies and the other to workers. To study the location decisions of these two elements it is assumed that one region becomes slightly larger than the other, thereby increasing its number of consumers. This increase in the market size of one region leads to an increase in its demand for manufactured goods, so it becomes advisable for companies to be located close to the higher demand in order to save on transport costs. This means that activities with economies of scale become concentrated in locations with good market access (backward linkages). The home market effect then ensures that this increase in market size generates a more than proportional increase in the number of companies in that location, pushing up nominal wages. The presence of more companies means a greater variety of locally-produced goods, with consumption benefitting from lower transport costs. A lower local price index and the consequent increase in real wages in the region attract new flows of workers to the big urban industrial centres (forward linkages). These two centripetal forces feed off each other and encourage agglomeration, with proximity to large markets standing out as one of the

main mechanisms, since producers and workers, *ceteris paribus*, both prefer locations with good access to demand. Market access therefore becomes a key element in NEG analyses because it has a positive influence on the location decisions of companies and workers alike and induces factor mobility – of capital in the case of backward linkages and of labour in forward linkages.

The result of economic integration is the emergence of a core-periphery geographical pattern. When transport costs are high, trade is so expensive that companies sell their products on the local market. As a result a symmetric pattern emerges, in which companies are spatially dispersed and the manufacturing sector is distributed evenly between regions, which have the same nominal wages and price indices⁸. However, when transport costs become low enough, there is a shift to an asymmetric equilibrium characterized by agglomeration. Thus economic integration gives rise to a geographical concentration of manufacturing resulting from worker mobility, which enables a cumulative causation to appear that strengthens the agglomeration by increasing the market size advantage. The greater demand generated in the core region means that all companies in the manufacturing sector – where increasing returns operate – locate to the same region, and this simultaneously leads to deindustrialization in the periphery. In other words, economic integration generates an abrupt transition from dispersion to agglomeration.

The shift to a core-periphery structure leads to an increase in regional inequalities. Thus Krugman (1991) provides a theoretical explanation for the substantial and persistent territorial inequalities seen in the real world. In this case, regions that initially present similar characteristics end up diverging considerably, since even a small transitory *shock* can give rise to permanent regional imbalances⁹. Finally, Krugman (1991) emphasizes the pecuniary as opposed to the technological externalities. When companies and workers move from one region to another, this unintentionally affects the welfare of all agents. The shift from a dispersed structure to an agglomeration structure is caused by microeconomic decisions, where agglomeration is the involuntary consequence of the accumulation of many individual decisions. Agglomeration therefore has to be considered a man-made economic factor.

In this model agglomeration lies in the mobility of the labour factor. However, one limitation is that agglomeration is also present in areas characterized by a low spatial mobility of labour, both between and within countries. Later developments in the NEG have provided more detail. Krugman and Venables (1995) and Venables (1996) explained the emergence of big

⁸ Together with the *market-crowding effect*, a further force could lead to the dispersion of manufacturing activities; since unskilled farm workers are immobile, a proportion of them will be located on the periphery and their demand for manufactured goods has to be satisfied.

⁹ By assuming that regions are symmetric, the NEG does not take primary geographical elements into account, and therefore the theory does not establish which region will become the industrialized core and which the periphery.

industrial regions in economies characterized by low labour mobility, assuming that the labour factor is immobile. Their studies have the virtue of adding a key element to the analysis that was not present in Krugman's (1991) pioneering study: the existence of intermediate goods. In this case companies produce differentiated varieties incorporating labour and intermediate goods supplied by other firms. Labour is now homogeneous (with no distinction being made between skilled and unskilled workers) and, as there are no intersectoral mobility costs, workers can be employed in either of the two sectors.

Taking into account the existence of intermediate goods provides a better fit to real patterns and implies that, when they make their decisions, the producers of intermediate goods prefer to locate where the final goods are produced. Likewise, the producers of final goods tend to locate to where the suppliers of intermediate goods are. This reciprocal influence captures the Marshallian externality related to the availability of specialized intermediate inputs, which Marshall (1890) considered a fundamental element for the existence of industrial clusters¹⁰. When firms concentrate in a region, the high demand for intermediate goods attracts producers of these types of goods. In addition, the lower price indices of the regions that produce more varieties lead to a decrease in production costs for firms in the manufacturing sector. As a result, intermediate goods are supplied at a lower price in the core region, and this leads more producers of final goods to move there. Thus producers have an incentive to locate to the region with the highest number of varieties because they will benefit from lower production costs, and this results in agglomeration. On top of this, the higher nominal wage in the region where manufacturing is concentrated generates an increase in final demand, and this also becomes an agglomeration force, although in this case the increase in demand comes from the increase in the wages of the workers (who are immobile), without there being an increase in population as in Krugman (1991)¹¹.

Thus Krugman and Venables (1995) and Venables (1996) provide an alternative mechanism to help explain agglomeration when there is no labour mobility: the presence of input-output linkages. If the production of intermediate goods represents a large proportion of industrial output, companies will have an incentive to locate near their suppliers and consumers, and this can favour agglomeration in a given region. If up to this point agglomeration had

¹⁰ As well as this externality, Marshall (1890) noted a further two: informational spillovers and the formation of a skilled labour market.

¹¹ Unlike new trade theory, the NEG can explain the mechanisms whereby sizeable differences can be generated in regions' productive structures and income levels, even when these regions present similar factor endowments. What makes the NEG models attractive is the fact that the cost parameters and level of demand are endogenous and vary between locations as they depend on location decisions taken by all the agents. This distinguishes these models from those of international trade with imperfect competition, in which the location of the factors of production is given and fixed (exogenous). Combes et al. (2008, p. 47).

occurred endogenously because of the size of the local markets and was caused by consumer/worker mobility, then the presence of input-output linkages in industry leads to the emergence of new forces that play an important role in shaping the spatial pattern of manufacturing and economic activity.

Among these new forces we find not only those that tend to favour agglomeration, but also centrifugal or dispersion forces. There is more competition in the core region's manufacturing sector because of the greater number of companies located there as a result of agglomeration (*market-crowding effect*), but there is also a dispersion force linked to the increase in the region's nominal wages and the consequent increase in labour costs. And given that the workforce is immobile, it needs to be taken into account that there is still a substantial demand for manufactured goods in the periphery. Together these factors can lead to the relocation of industry from the core to the periphery, where lower wage costs can offset the lower demand for the company's goods. By choosing the periphery a producer will face less competition, since fewer firms are located there and wage costs are lower. Then again, the company will have to deal with lower demand because of the workers' lower purchasing power, plus a lower demand for intermediate goods and therefore higher costs when acquiring intermediate inputs, since transport costs affect a bigger fraction of the varieties used.

With the inclusion of these new forces in the analysis, the relationship between economic integration and the spatial concentration of manufacturing is no longer monotonic and shows a bell-shaped evolution. While in Krugman's (1991) model the reduction in transport costs led to the emergence of a core-periphery pattern, here the pattern is different. When transport costs are high, a symmetric equilibrium is recorded in which manufacturing is distributed equally between the two regions, without there being any spatial inequality. When transport costs fall, the symmetric equilibrium is broken and a core-periphery structure like that described by Krugman (1991) appears. However, industrial specialization in the core will only occur when the manufactured good's share in the final consumption is high. As a result of the high demand for the manufactured good, agglomeration forces cause the regions to diverge. However, this asymmetric equilibrium is no longer stable when transport costs reach a sufficiently low value because dispersion forces bring the agglomeration process to a halt or even reverse it, resulting in the reindustrialization of the periphery and the simultaneous deindustrialization of the core. Market integration therefore initially brings about an increased concentration of manufacturing, but as integration continues, this concentration tends to decline.

Puga (1999) confirms this result, according to which the relationship between the regional integration process and the degree to which activity is concentrated in the territory can describe a non-monotonic bell-shaped evolution. The author combines the two previous cases by assuming interregional labour mobility (Krugman, 1991) and input-output linkages (Krugman and Venables, 1995; Venables, 1996), and also takes into account the presence of intersectoral mobility. This setting is therefore particularly suitable for studying regional matters. In the long-term equilibrium when there is labour mobility, by incorporating input-output linkages and intersectoral migration (while enabling the determinants of economic agglomeration to be understood), the results provide a similar pattern to the one described in Krugman (1991), i.e. an initial dispersion and a subsequent concentration of economic activity.

However, when labour mobility does not exist, the bell-shaped evolution between economic integration and manufacturing is confirmed. When transport costs are high, manufacturing is dispersed across the regions, but when they fall, companies can decide to locate to wherever there is a larger market, where they can also take advantage of possibly locating near other companies and purchasing cheaper intermediate goods because they incur no transport costs. Nevertheless, although the comparative savings generated from buying intermediate goods decrease as transport costs fall, interregional wage differentials persist. When transport costs reach sufficiently low levels, firms may benefit from relocating to the deindustrialized region on the periphery where the immobile factors are cheaper, combining imported intermediate goods with cheaper local labour. In this case a company might choose to delocalize production in order to reduce production costs, bringing about its spatial fragmentation insofar as production activities are transferred to regions with lower wages, while certain strategic functions will remain concentrated in a few urban regions.

Therefore, as the domestic market becomes increasingly integrated as transport costs change, the relative intensity of the agglomeration and dispersion forces vary, giving rise to different degrees of spatial inequality. In the early stages of integration centripetal forces predominate, bringing about an increase in the spatial concentration of manufacturing. Once a certain level of integration is reached, this trend reverses and leads to a dispersion of manufacturing. However, this result depends to a large extent on the assumptions made regarding the existence of worker mobility at regional level in response to wage income differentials. When the workers decide to migrate to where there are more companies and higher real wages, agglomeration intensifies. But when the workers stay where they are, interregional wage differentials persist. Consequently the relationship between integration and agglomeration is no longer monotonic, since reductions in transport costs make companies more sensitive to

the cost differences generated by the wage differential, leading to the spatial dispersion of manufacturing¹².

All factors limiting interregional labour mobility become *dispersion* or *centrifugal forces*, which work against the concentration of manufacturing. These forces can be diverse, such as the appearance of congestion costs deriving from agglomeration, and include pollution, higher housing prices due to the increase in land competition in large urban areas and the commuting costs that an increasing number of workers have to meet in order to get to work every day. Also, workers are heterogeneous, which means that each potentially mobile individual will react differently to interregional economic differences such as wage differentials. Furthermore, an individual's decision to migrate is based on a variety of considerations, many of which are non-economic (*amenities*). These might include reasons in connection with their personal life or the attributes of their region of origin, such as proximity to their family, climate or ties to the land¹³. It would also be reasonable to assume that as workers' incomes rise and their basic needs are satisfied, they will put a higher value on these non-economic factors linked to quality of life.

The initial impact of market integration could therefore be the concentration of the manufacturing sector and the strengthening of regional disparities. Nevertheless, greater economic integration leads to a dispersion of manufacturing and a reduction in regional inequalities. The theoretical models suggest that reindustrialization of the periphery may occur when the dispersion forces start to act once transport costs have reached a low enough level. However, market integration must have progressed sufficiently in order for this to happen. The political implications of all this are not as alarming as regards the consequences of the market integration process, and the theoretical predictions seem to more closely match the patterns observed in the real world. Rather than a catastrophic shift from a regular spatial distribution of industry to its complete concentration in a single region, which was typical of previous models, here the process of change is gradual and regions have industrial sectors of different sizes. Indeed this is in line with a number of empirical studies and therefore the theoretical predictions of the NEG seem to fit this evidence better.

¹² It is interesting that, when considering the presence of urban costs (Ottaviano et al., 2002) and the heterogeneity of individual attitudes as regards migration (Tabuchi and Thisse, 2002), to which we can add the transport costs that are positive for agricultural goods (Picard and Zeng, 2005), not only are some of the more restrictive or less realistic assumptions from earlier NEG models relaxed, the existence of a bell-shaped evolution in the relationship between economic integration and inequality in different contexts is also confirmed.

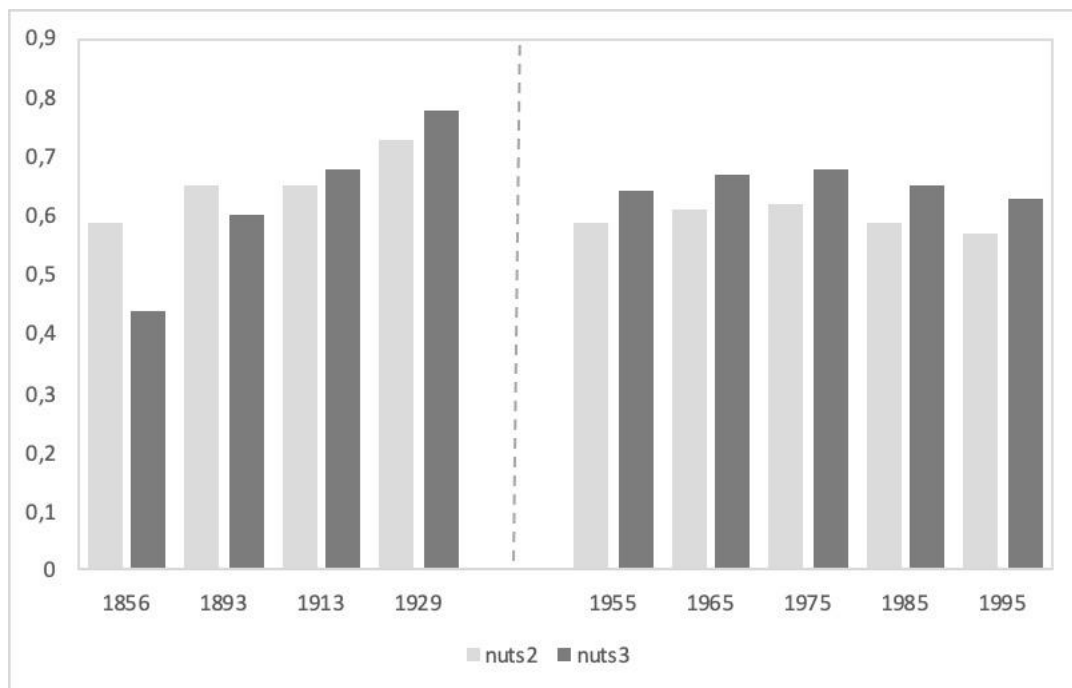
¹³ On this matter, see also Rodríguez-Pose (2018, p.200).

4. Linking economic geography and economic history: the industrialization of Spain

The concentration of manufacturing over time

In Section 2 we briefly introduced the economic integration of the domestic market in Spain and described how it gradually advanced throughout the nineteenth century. In parallel with this process there was a marked increase in the concentration of industry in Spain from the mid-nineteenth century until the Civil War (1936-1939), which can be related to the take-off of industrialization in a limited number of regions, mainly Catalonia and the Basque Country, as also described in Section 2. In other words, as the NEG models suggest (Krugman, 1991), the decrease in trade costs and the consequent integration of the markets may have given rise to a core-periphery pattern which, in the case of Spain, resulted in a handful of industrialized regions while the vast majority remained agricultural. Paluzie et al. (2004) provided a long-term overview of the geographical distribution of Spain's manufacturing industry, drawing on various sources and indicators (Figure 1)¹⁴.

Figure 1. The concentration of manufacturing in Spain, 1856-1995. Gini indices.



Source: Paluzie et al. (2004)

¹⁴ The Ginis for the period 1856-1929 are calculated using information from fiscal sources, while for 1955-1995 they come from direct estimates of gross value added. Therefore they are not directly comparable, and this makes it more practical to divide the presentation of the results into two blocks and analyse the tendencies within each. Nevertheless, given what we know qualitatively and quantitatively about the evolution of Spanish industry, it would not be too unrealistic to assume that the geographical distribution of industry in 1955 was not very different from that of 1929 (Carreras, 1990).

Interestingly, the gradual concentration of the country's manufacturing in a small number of areas between 1860 and 1930 did not stop at the end of that period. While no information is provided for 1930-1955, the results of the study show that spatial concentration continued to increase slightly between 1955 and 1975, although since then there has been a clear tendency towards the geographical dispersion of manufacturing. To put it another way, greater economic integration (in connection with lower transport costs) gave rise to a dispersion of manufacturing to other regions. Therefore, as suggested by the NEG models (Krugman and Venables, 1995; Venables, 1996; Puga, 1999), the spatial distribution of industry in Spain over the long term presented a bell-shaped evolution, with an initial phase characterized by an increase in industrial concentration, and a shift in trend towards a broader spatial dispersion of industry since the 1970s. Although the timeline is different, this evolution is similar to that found by Kim (1995) for the US, with the turning point in that case being in the 1920s. So what are the forces that determined this evolution over time? Can NEG models be useful in assessing what the main drivers behind the industrial map of Spain actually were?

The search for agglomeration and NEG effects

One of the predictions that emerge from the theoretical NEG models is the existence of agglomeration effects linked to market size and therefore to a higher density of economic activity. Indeed the relationship between economic density and productivity lies at the heart of most debates on agglomeration economies. Ciccone and Hall (1996) and Ciccone (2002) made a pioneering contribution to the field by identifying an agglomeration effect linking the density of economic activity to interregional differences in labour productivity in both the US and Europe respectively. Describing the mechanisms that explain the link, the authors (Ciccone and Hall, 1996, 54) wrote that: *“Density affects productivity in several ways. If technologies have constant returns themselves, but the transportation of products from one stage of production to the next involves costs that rise with distance, then the technology for the production of all goods within a particular geographical area will have increasing returns – the ratio of output to input will rise with density. If there are externalities associated with the physical proximity of production, then density will contribute to productivity for this reason as well. A third source of density effects is the higher degree of beneficial specialization possible in areas of dense activity. Although the idea that denser economic activity had advantages from agglomeration was implicit in a large earlier literature, there does not appear to be any earlier work on which density was an explicit element of the theory, nor has there been empirical work based on measures of density”*. In Ciccone and Hall (1996), the average effect of

doubling employment density in a US county at the end of the 1980s was a 6% increase in labour productivity, while Ciccone (2002), using a sample of five European countries (France, Germany, Italy, Spain and the UK) at regional level, found values slightly lower than those for the US, fluctuating between 4.5% and 5%.

Since then several studies have sought to quantify the effect of economic density on productivity. Although the results may vary depending on the level of aggregation, the period of study and/or the estimation method, it is basically accepted that density increases labour productivity (Combes and Gobillon, 2015)¹⁵. However, most empirical studies that analyse this link do so using a static or short-term perspective and thus ignore the long-term dynamics, which is a big limitation. A notable exception is the paper by Combes et al. (2011), where a long-run perspective of the location of industrial activity in France at the territorial level of the *départements* is offered. First, they show that the fall in transport costs since the middle of the 19th century led to a bell-shaped evolution in the spatial distribution of activity in the manufacturing and services sectors, which underwent an increase in concentration between 1860 and 1930, before dispersing between 1930 and the year 2000. They also found evidence of an agglomeration effect in the French economy between 1860 and 2000. The intensification of economic density led in turn to an increase in labour productivity in both manufacturing and services. The parameters estimated in this study suggested that doubling the employment density in a French *département* would result in labour productivity gains of around 5%.

Another paper that did give a long-term picture for the case of Spain is that by Martínez-Galarraga et al. (2008), which provided evidence of the existence of an ‘agglomeration effect’ linking the spatial density of economic activity and interregional differences in industrial labour productivity for the period 1860-1999. In line with Ciccone and Hall (1996) and Ciccone (2002), the study showed that the estimated elasticity of employment density with respect to labour productivity – which is how the agglomeration effect has been defined – was already playing a key role from the mid-nineteenth century, i.e. during the early stages of industrialization.

However, its evolution presents a progressive decline over time and, in the final period they consider (1985-1999), the agglomeration effect is no longer significant. Their results show that the estimated elasticity between economic density and labour productivity in the industrial sector was 5.2% in the period 1860-1900. It then decreased to 4.4% during the interwar period (1914-1930) and then dropped to 3.7% between 1965 and 1979. In other words, NEG-type

¹⁵ Combes and Gobillon (2015) survey the existing literature and report that the elasticity of productivity with respect to density usually ranges between 4% and 7%. Recent studies show that agglomeration economies seem to have more impact in developing economies such as China and India (Chauvin et al., 2014).

agglomeration effects were already present in Spanish industry from the mid-nineteenth century and remained strong until at least the Civil War (1936-1939), which would explain the increased concentration over that period¹⁶. But the intensity of the effect declined over time until it disappeared in recent years (1985-1999). Nevertheless, in a companion paper Paluzie et al. (2007) showed the reappearance of the agglomeration effect from the 1980s, but this time in connection with labour productivity in the services sector, i.e. in the context of the tertiarization that is taking place in Spain like in all the developed economies. Agglomeration economies therefore seem to be present again today, especially in the services sector and above all in services with high value added that are technologically advanced and make intensive use of ICTs¹⁷.

Although the above paper examined the intensity and evolution of agglomeration effects in Spanish industry, concluding that they were of particular importance in the stage prior to the Civil War, other studies have focused more on an analysis of industry in this period. Using a variety of approaches and methodologies, they all confirm in one way or another the importance of the mechanisms indicated by the NEG as explaining the increased concentration of industry described for Spain during the early stages of industrialization.

Following the line of analysis proposed by Davis and Weinstein (1999, 2003), Rosés (2003) identified the existence of a 'home market effect' around the mid-nineteenth century. He concluded that during the rise of Catalonia as a centre of industrial production in the early stages of Spanish industrialization, two types of basic explanatory elements came together: factor endowments, in connection with the availability of human capital, and home market size, which resulted in advantages for the location of manufacturing around Barcelona. Tirado et al. (2002), focusing on the second half of the century, carried out an analysis of the explanatory factors of spatial concentration in Spain in line with Kim (1995). They identified economies of scale and market size as determinants of industrial geography in 1856. At the end of the century, factor endowments (in this case the accumulation of human capital) also contributed to explaining industrial location, while at the same time NEG elements (economies of scale and market access) increased their explanatory power with the advance of the economic integration process. Similarly, Betrán (1999) studied the interwar period and suggested that the relative increase in

¹⁶ This hypothesis is confirmed by Díez-Minguela et al. (2016), who, following an alternative empirical strategy based on a Barro-style empirical analysis (Brühlhart and Sbergami, 2009), stress the importance of agglomeration economies in the manufacturing sector between 1870 and 1930.

¹⁷ Agglomeration effects were also present in the population, helping to shape Spain's particular spatial demographic pattern characterized by a population concentrated on the coast and a growing depopulation process in the interior except for Madrid, which just keeps on growing. Ayuda et al. (2010), González-Val et al. (2017) and Beltrán Tapia et al. (2018) stress the importance of increasing returns, market potential and the existence of an agglomeration effect respectively in the spatial distribution of the population since the beginning of the twentieth century.

industrial activity in provinces such as Bizkaia, Gipuzkoa, Madrid and Zaragoza was linked to the presence of agglomeration economies deriving from market size.

Taken together, these studies suggest that agglomeration forces were already present in Spain by the second half of the nineteenth century and that they grew stronger as time passed, maintaining much of their impact into the interwar years. Adopting the approach developed by Midelfart-Knarvik et al. (2000, 2002), Martínez-Galarraga (2012) confirmed the previous findings for the period 1856-1929¹⁸. As the domestic market became integrated and industrialization continued, NEG forces grew to be the main determinant of Spain's industrial landscape. In particular, although comparative advantage factors were also a feature of the Spanish case, the scale effects suggested by Krugman (1991) and captured through the interaction between economies of scale and market potential played a decisive role, insofar as industries with increasing returns tended to concentrate in provinces with better access to demand up to the 1930s¹⁹.

In short, the importance of market access as increasing returns became ever more present in the economy as industrialization advanced – all in a context of market integration – is a key aspect for understanding the greater concentration of industry in Spain before the Civil War (1936-1939)²⁰. Now, however, we move the focus away from the industrial sector for a moment. The impact of NEG effects during this period was not limited exclusively to industry, but also affected the economy as a whole in this early stage of Spanish economic development, a stage that – like in the case of industry – was characterized by an upswing in regional income inequality (Rosés et al., 2010). There are two papers that explore the relationship between the presence of agglomeration economies and regional economic growth in Spain during the period 1860-1930, examining whether the existence of agglomeration economies could explain this upswing in regional income inequality during the early stages of development. Following Ottaviano and Pinelli (2006), Martínez-Galarraga et al. (2015) find a direct relationship between market potential and regional economic growth in the early decades of the twentieth century.

¹⁸ This empirical strategy relies on a measure of market access. Following Harris (1954) and Crafts (2005), a measure of market potential for Spain's provinces was calculated (see Martínez-Galarraga, 2014).

¹⁹ Using a similar framework but in an investigation over the long term at NUTS2 level, Betrán (2011) finds that comparative advantage (agricultural and mining resources) was important between 1856 and 1955, and skilled labour from 1965, while NEG factors were important between 1929 and 1973, although even then their impact was smaller than the impact of factor endowments and was decreasing over time. The same kind of approach has been employed for analyzing the Polish case in Wolf (2007), for UK in Crafts and Mulatu (2005 and 2006) and Crafts and Wolf (2014), for the US in Klein and Crafts (2012) and Crafts and Klein (2017), for the Italian regional industrialization in Daniele et al. (2016), Basile and Ciccarelli (2017) or Missaia (2018) or for the former Yugoslavia in Nikolic (2018).

²⁰ For more recent periods the importance of agglomeration economies is underlined in various papers, including Alonso et al. (2004), Viladecans (2004), Alañón-Pardo and Arauzo-Carod (2013) and García-López et al. (2015).

Likewise Díez-Minguela et al. (2016), following Brülhart and Sbergami (2009), find that, in line with the NEG models, agglomeration economies in a context of market integration increased regional inequality in the second half of the nineteenth century and hindered its reduction during the early decades of the twentieth.

Attracting production factors: backward and forward linkages.

While the literature reviewed in the previous section proves the importance of the factors used by the NEG to explain the location and concentration of economic activity in the territory, other papers have focused on the specific mechanisms that generated these agglomeration processes, i.e. the backward and forward effects described in the NEG literature.

One of the predictions in the NEG models is that if the region with the best market access attracts capital and more companies to locate there, then the increased demand will push nominal wage levels up, thereby increasing the return to labour. The main empirical studies in this field are based on Krugman's (1991) wage equation, which establishes the relationship between factor prices and market access. In particular, it determines the zero-profit condition for companies and implicitly defines the maximum factor price level that a representative company can pay in each region given its market access. To put it another way, it captures the idea that regions with better market access can pay relatively higher wages. Hanson (1998, 2005) pioneered the empirical wage equation test, studying the impact of market access on the spatial distribution of regional wages within countries²¹. To do this he focused on the 3,075 counties of the US in the 1970s and 1980s and found the existence of a wage gradient in which a county's wage positively correlates with its market potential²². Following this line of research, many studies have confirmed the existence of a within-country spatial wage structure, proving the success of the empirical testing of the wage equation, an important mechanism within the NEG²³.

This type of analysis has also been carried out for the Spanish economy. One of the first aspects studied is whether wage gradients took shape and existed in the early stages of economic growth. Tirado *et al.* (2006), following Hanson (2005), analysed and verified the existence of a

²¹ By focusing on interregional inequality, he assumed labour mobility as in Krugman (1991) and replaced the agricultural good in household consumption with housing costs as in Helpman (1998). Redding and Venables (2004), on the other hand, sought to explain differences in cross-country wages in terms of GDP per capita within the NEG framework.

²² However, the parameters estimated show that agglomeration forces are limited to geographical scale. The economic influence of wages in the neighbouring areas of any county falls rapidly with distance and is only effective in a radius of less than 1000 kilometres. Income in areas outside this limit does not exert a positive influence on the determination of local wages.

²³ See Roos (2001) and Brakman et al. (2004) for Germany, Knaap (2006) for the US, Combes et al. (2008) for France, Mion (2004) for Italy, and Head and Mayer (2006) and Niebuhr (2006) for the European Union.

wage structure in Spain in 1920 by estimating a reduced form of the wage equation. To do this the authors used data for 1920 for nominal industrial wages for unskilled workers, for provincial GDP and for the distance by rail between provincial capitals. The estimates for the wage equation confirmed the existence of a wage gradient in Spain in 1920. It can therefore be said that a greater market potential was associated with higher wages and that an increasing distance between the main markets had an increasingly negative effect on them.

This relationship not only existed in the early stages of economic development in Spain. Studies focusing on the second half of the twentieth century also show the existence of this type of relationship in which wages are higher in regions with greater market potential, and this is an unequivocal sign of an effect associated with the size of the domestic market. Paluzie et al. (2009) proved that nominal wages in industry at a provincial level depended positively on proximity to large markets in the period 1955-1995. The results showed a) that a high market potential had a positive influence on nominal wages, and b) similarly and in line with the theoretical hypothesis, that greater distances to the markets had a negative influence on nominal wages in a region. This evidence of the existence of a wage structure in Spain's provinces was confirmed in Garcia Pires (2006) for the period 1981-1995.

All in all, these papers show the presence of backward linkages and a spatial structure for nominal wages since the early stages of Spanish industrialization and economic development. However, as discussed in the theoretical review above, the spatial agglomeration of economic activity in Krugman (1991) is the result of the interaction of two centripetal forces related to the two production factors: capital (backward linkages) and labour (forward linkages). Of the empirical tests for the existence of forward linkages, the research carried out by Crozet (2004) merits attention²⁴. He examined whether market access and real wage differentials in Europe had a positive influence on the decisions of migrant workers. To do this he assumed that workers choose locations on the basis of real wage differentials between regions, with these workers being considered heterogeneous and bearing in mind the effects that regional unemployment can have. Also taken into account was the fact that those workers who decide to migrate have to deduct the costs of migrating, and that these grow in proportion to the distance between the regions.

The structural estimation of an equation derived directly from a theoretical model was applied to the study of five European countries (Germany, Italy, the Netherlands, Spain and the

²⁴ While Crozet (2004) combines an NEG model based on Krugman (1991) with a discrete choice model of migration à la Tabuchi and Thisse (2002) to obtain a tractable migration equation, Kancs (2005) derives a similar equation from another NEG model, devised by Pflüger (2004), which is an analytically solvable version of Krugman (1991).

UK) during the 1980s and 1990s. The results Crozet (2004) obtained provide solid evidence of the existence of a forward linkage, i.e. that regions with greater market potential attract workers. However, the simulations based on the parameters estimated showed that agglomeration forces are limited geographically, and the study predicted that the distance at which a region is likely to begin to attract workers from distant areas is small. These forces are therefore too weak to overcome the obstacles to migration that affect the location decisions of individuals in Europe. Consequently, and partly due to the low propensity towards migration, it does not seem likely in the short term that forward linkages would give rise to core-periphery-type structures on a large spatial scale within the European Union, at least not while workers continue to be so sensitive to mobility costs.

Pons et al. (2007), following Crozet (2004), verified the presence of forward linkages in internal migrations between Spanish provinces in the interwar years. They established a direct relationship between workers' location decisions and the market potential of the host destination. However, although Spanish workers were attracted by industrial agglomerations, this attraction was limited to relatively nearby areas. It would appear that the high costs of migration reduced the intensity of migratory flows and were a key factor in the workers' location decision. This would explain the seemingly low intensity of internal migrations in Spain until the 1920s and their geography in the interwar years. Migratory flows to the main industrial centres did not originate in the poorest regions in the south of the peninsula that were furthest away, and this was due to migration costs that grew in relation to the distance the workers had to travel.

Paluzie et al. (2009) conducted the same type of analysis for three different periods: the 1920s, the 1960s and the beginning of the twenty-first century. Their results showed that a forward linkage was present both in the periods of concentration and in the stages of spatial dispersion of economic activity after the 1970s. Spain's internal migrations increased in the 1950s and again, more markedly, in the 1960s and early 1970s. During this period these migrations did originate in the most economically backward regions (Andalusia, Extremadura and Castile-La Mancha). In comparison with earlier and later periods, the period 1950s-1970s was the high point of unskilled migration from rural areas to growing urban and industrial destinations within Spain. After this time, however, the intensity of migrations decreased and the spatial pattern changed due to a weakening of the attraction exerted by those regions that had traditionally received migrant workers²⁵. In this case the changes in the migratory model can be explained by

²⁵ Rates of internal migration rose in the early 1980s, in particular those over a short distance. However, unlike in previous decades, and due to the increase in the spatial dispersion of emigration and immigration (that is, the increase in the number of important places of both destination and origin), the increase in the gross number of migrations was not accompanied by an increase in net migrations.

the industrial sector's loss of weight to the advantage of the services sector as regards their capacity to generate migratory flows, the increase in the territory defining a region's market potential, and the reduction in the explanatory power of migration costs. In short, these papers confirm that forward linkages were present in Spain's economy and were a key element for understanding the intensity and direction of internal migratory flows over time.

5. International economic integration and the internal geography of countries.

How does trade affect manufacturing?

So far the NEG models we have reviewed (Section 3) have used an analytical framework comprising two regions, where worker mobility or immobility has different consequences for the spatial distribution of manufacturing. When considering more than two regions, however, market accessibility may vary between them²⁶. Each region's capacity to attract companies and workers depends on its position in relation to the markets, so size and market access as well as competition from other firms will affect company location. In addition to the integration of the national economy, the integration of national economies into international trade also needs to be considered because it too has a significant impact on the location of economic activity in each country. The question that interests us now concerns the impact of trade policy on patterns of regional development within countries, an aspect that has been analysed theoretically in a number of studies.

One of the first theoretical contributions to the debate inside the NEG was the study by Krugman and Livas Elizondo (1996), who sought to explain how trade policies had affected the formation of large metropolises in developing countries in the preceding decades. Before the Second World War the largest cities were to be found in industrialized countries, but since then there has been a proliferation of big urban centres in developing countries. Drawing on the experience of Mexico and the research undertaken by Hanson (1996, 1997), Krugman and Livas Elizondo (1996) developed a theoretical model to explain the effect of trade policies on the internal economic geography of countries. In Mexico, import-substituting industrialization (ISI) policies adopted since the 1940s led to the agglomeration of economic activities in the capital, turning it into one of the world's most populous metropolises. This economic agglomeration was linked to political decisions aimed at protecting the domestic market. However, the situation began to change in the 1980s. The abandonment of ISI policies and the liberalization of the

²⁶ "...the new fundamental ingredient that a multi-regional setting brings about is that the accessibility to markets varies across regions. In other words, spatial frictions between any two regions are likely to be different, which means that the relative position of the region within the whole network of interaction matters". Behrens and Thisse (2007, p. 462).

Mexican economy led to increased decentralization of manufacturing, mainly away from Mexico City to northern areas of the country near the border with the US.

Using a formal model comprising two countries and three regions, Krugman and Livas Elizondo (1996) showed that a low level of openness in an economy leads to the spatial concentration of manufacturing activities due to the strong backward and forward linkages that arise from selling in a small domestic market. When an economy becomes more open, the effect of this liberalization is a spatial dispersion of manufacturing activities in which the dispersion forces involved are land rents. As the importance of domestic demand decreases, companies will have fewer incentives to locate near it.

However, another series of studies suggests that the opposite is true. Focusing on developing countries, Monfort and Nicolini (2000) and Alonso-Villar (2001) argue that the reduction in trade costs deriving from trade liberalization leads to an increase in the agglomeration of manufacturing. Since manufactured goods produced in developing countries have to compete with those produced in the rest of the world, companies do not seek proximity to foreign markets in which they might have difficulty competing with foreign products, so they locate to a site that best allows them to supply the domestic market. In a European context, Paluzie (2001) concluded that trade liberalization can give rise to polarization in the distribution of manufacturing and consequently to an increase in regional inequalities within a state.

Crozet and Koenig (2004a) suggested that the impact of increased foreign trade on an economy's spatial distribution depends on the country's internal geography. They devised a model with two countries and three regions, two domestic and one foreign, and considered two alternative scenarios. First they examined the effect of a reduction in international trade costs on the spatial distribution of activity for a homogeneous country in which the two domestic regions are equidistant from the border and therefore have the same access to foreign markets. The different simulations showed that international economic integration gives rise to a spatially concentrated domestic manufacturing sector.

They then assumed that one of the two domestic regions had better access to the foreign market, in which case the existence of two heterogeneous regions modified the forces affecting the domestic economy. On the one hand, access to a bigger foreign market reduces local firms' incentive to locate near domestic consumers, since they now represent a smaller share of their sales. In this case, one potential effect of trade liberalization would be to push domestic firms towards the regions closest to the foreign markets so as to benefit from better access to foreign demand, which not only means better export opportunities but also provides the possibility of

importing cheaper inputs. On the other hand, however, trade liberalization also brings about an increase in competition from foreign firms in the domestic market and may therefore push domestic firms to locate to interior regions away from the foreign market in order to protect themselves from foreign competition.

Thus a gradual liberalization of trade can generate two effects: a *pull-effect* towards the regions of the geographical periphery near the foreign markets and a *push-effect* towards the regions of the interior that are better located for supplying the domestic market. The impact of these forces depends on various factors. If the foreign demand for domestic products is high, domestic firms will tend to locate in the region with better access to international markets, but if there are a large number of foreign firms exporting to the domestic market, this can favour the development of interior regions that are more protected from international competition. Therefore trade liberalization gives rise to the appearance of economic forces that can operate in different directions, although on the basis of simulations performed using different model parameters, Crozet and Koenig's (2004a) results suggest that regions nearer the foreign markets are more attractive for the location of companies. Thus trade liberalization would lead to an increase in the concentration of economic activity that would be more inclined to locate in the regions closest to foreign markets. The only situation in which agglomeration would occur in the interior region would be when the initial distribution of activity strongly favoured that region.

In conclusion, there would appear to be no consensus regarding the theoretical predictions on how trade liberalization might affect the distribution of manufacturing within a country. As noted earlier, it is claimed that one effect of liberalization is the dispersion of economic activity within a country (Krugman and Livas Elizondo, 1996), but the other studies reviewed conclude that a possible outcome of trade liberalization is an increase in agglomeration within the country. This would mean that there is a link between the trade policy adopted by a country and the location of manufacturing within it²⁷. And given the lack of consensus in the theoretical predictions, this is an area in which empirical evidence – especially from economic history – can be particularly useful, given the many changes and experiences that have resulted from the trade policies applied by different countries in the past.

²⁷ A survey of this literature can be found in Brühlhart (2011). For studies that analyse this subject from a different perspective, see Ades and Glaeser (1995), Behrens (2003) and Behrens et al. (2006).

Trade policy and the wage equation in Spain

Various international studies have aimed to empirically test the effect of trade liberalization on factor prices and the distribution of economic activity in countries that open up to foreign trade. Hanson (1996, 1997) focused on the effect of changes in trade policy on regional wages in Mexico, although in this case the study was not based on a structural estimation deriving directly from the NEG models. In the 1940s, Mexico introduced an import-substituting industrialization policy and in the course of the following decades most of its manufacturing activity was concentrated in the capital. In the 1980s, the turnaround in Mexican trade policy and the country's gradual opening up to foreign trade after joining GATT (1986) and then NAFTA (1994) led to a change in the location of manufacturing, which gradually moved from Mexico City to the north of the country, to areas close to the US border. Thus by altering the spatial structure of market potential, trade liberalization contributed to dispersing economic activity along the lines suggested by Krugman and Livas Elizondo (1996).

In Hanson (1997), the dependent variable was the relative wage in different industrial sectors in each Mexican region with respect to that of Mexico City. The explanatory variables included distances to the capital and to the border crossings with the US. The results showed the existence of a spatial wage structure in which relative regional nominal wages fell as the distance from these two industrial centres increased: a 10% increase in distance from the capital reduced wages by 1.92%, while a similar increase in the distance from the US border reduced wages by 1.28%. So again we see that regional wages are related to market accessibility. Trade liberalization in the mid-1980s should also therefore have contributed to a weakening of the wage gradient around Mexico City. In this case, however, the evidence of a change in the gradient was weaker²⁸.

Continuing along the same lines, for the case of Spain an analysis was carried out regarding the impact of trade policy on the spatial distribution of industry in the context of the wage equation discussed earlier. Tirado et al. (2006) had already verified the existence of a wage gradient in 1920 centred on Barcelona (the peninsula's main industrial centre in the interwar years). This gradient had taken shape in the preceding decades in a situation where the first stages of the industrialization process in Spain were accompanied not only by the integration of the internal market resulting from heavy investment in railways and ports facilities, but also by increasing integration into the international markets, especially with the introduction of a liberal trade policy. This reached its peak in the 1880s. However, with the onset of the agricultural crisis at the turn of the century, the dynamic changed and, with the Canovas tariff of 1892, Spain

²⁸ A similar analysis, but in the context of European integration, can be found in Brühlhart et al. (2004) and Crozet and Koenig (2004b).

gradually started on the path to protectionism that continued until the second half of the twentieth century. Aspects that need to be analysed are therefore not just the presence of this wage gradient but also whether it changed over time as a consequence of, among other things, the intensification of the protectionist trade policies applied during this period²⁹.

The paper by Tirado et al. (2013) examined whether this gradient changed at a time when protectionist policies became stronger following the introduction of the Cambó tariff in 1922. It is therefore the opposite of the case studied by Hanson (1997) as regards the Mexican economy, which was characterized by economic liberalization from the mid-1980s. Following Hanson (1997), the exercise was carried out using wage data for four points in time (1914, 1920, 1925 and 1930), 7 industrial sectors and 47 Spanish mainland provinces.

The results confirmed the existence of a wage gradient centered on Barcelona over the period 1914-1930. The parameter estimated for the variable associated with distance was both significant and negative. However, and this is the most important contribution, the results also showed that its absolute value is lower in the observations for the wage variable for 1925 and 1930. This means that the relative market potential of Barcelona was decreasing in line with the gradual closing of the Spanish economy. In other words, the growing importance of the internal market due to regulation of the external market weakened the economic centrality of Catalonia and strengthened that of other regions away from the coast, favouring provinces that had a better location from which to supply products to and obtain raw materials from the Spanish internal market. Therefore during the 1920s there is evidence of a weakening of the wage gradient centred on Barcelona, a province located close to the French border and thus to foreign markets. The authors also suggest that the shift towards protectionist trade policies might explain the relative rise in the early decades of the twentieth century of inland areas such as Madrid, which, due to their location in the geographical centre of the peninsula, were better placed to supply the protected domestic market³⁰.

These protectionist policies continued throughout much of the twentieth century, not just from 1892 and during the interwar period but also in the early years of the Franco dictatorship with its policy of autarky. From the 1960s and especially towards the end of the century there was a gradual movement in the direction of economic openness that culminated with Spain's entry into the EU in 1986. This is the historical context in which Pons et al. (2004)

²⁹ An overview of the integration of the Spanish economy into international markets before the Civil War (1936-39) can be found in Tirado et al. (2013, 301-308).

³⁰ As shown in Table 1, the participation of Madrid in total industrial production in Spain remained stable between 1860 and 1900. However, this participation virtually doubled between 1900 and 1930. In the theoretical debate, these results come close to the predictions deriving from the model proposed by Crozet and Koenig (2004a).

analysed the existence of a wage gradient centred on Barcelona in the period 1955-1995, studying whether it became stronger over time, i.e. in parallel with the Spanish economy's re-opening to the exterior. The analysis followed the same empirical strategy as Tirado et al. (2013), who, as mentioned earlier, followed the strategy suggested by Hanson (1997).

The parameter estimated for the relationship between relative provincial salaries and the distance to Barcelona was both negative and significant, thus confirming the existence of a wage gradient. Also, the evolution of the absolute value estimated for this parameter, identified through interactions with temporal dummy variables, was growing over time. The results therefore confirmed the existence of the wage gradient centered on Barcelona throughout the period analysed. The results also confirmed, as would be expected, that the gradual opening-up of the economy strengthened, *ceteris paribus*, the centrality of Barcelona as the main industrial region in Spain.³¹

6. Conclusions

The world is a very unequal place. One of the key questions traditionally posed in economic history concerns how we arrived at this situation, marked by huge differences in per-capita income between countries. Why are rich countries rich? Why are poor countries poor and why do they stay poor? The usual answer to these questions, though complex and taking into account multiple causes and explanations, has looked for the origins of this inequality in the beginnings of industrialization in the nineteenth century. The Industrial Revolution brought with it the introduction of general purpose technologies, and their application to production processes generated progressive advances in productivity. These advances in production and productivity over time resulted in social improvements and better living standards in those countries that had participated in industrialization. Moreover, these improvements have been self-sustaining over time, and so in many cases they have perpetuated and even increased existing differences. The consequence of all this is that the countries that underwent industrialization in the nineteenth century – mainly European and the Western offshoots – are today prominent members of the select (i.e. small) club of the richest countries on the planet.

Some south-east Asian economies such as the Four Asian Tigers had to wait until the second half of the twentieth century to experience intense industrialization processes. In other

³¹ In line with the strengthening of the wage gradient centred on Barcelona, Table 1 shows that the participation of Catalonia in total industrial production in Spain rose from 24.5% in 1960 to 26.1% in 2000. Nevertheless, the Madrid region's participation also continued to increase, rising from 10.5% in 1960 to 11.6% in 2000, overtaking the Basque Country to become the second biggest industrial region in Spain.

cases like China, the transformation did not come about until the closing years of the century. The result is that, while among the former we find countries that have almost caught up in terms of per capita income, China still has quite a distance to go. Despite the rapid industrialization and economic progress of the last few decades that have transformed China into a leading actor in the world economy, its income per capita lags behind that of the most developed countries. However, things are much worse in Africa, where industrialization overall has been very limited.

Industrialization with its increasing returns and economies of scale does not take place at the same rate and at the same time in every country, and neither does it in all the regions of the same country. This can result in the generation and persistence of profound regional inequalities. Concern about territorial inequality in developed economies such as those that make up the European Union is still present today, as shown by the fact that the EU as a whole allocates much of its budget (almost a third) to territorial cohesion policies. Furthermore, the successful growth experiences of emerging countries like China and India in recent decades have been accompanied by big increases in territorial economic inequality, especially between coastal and inland regions (Kanbur et al., 2005; Milanovic, 2005; World Bank, 2009).

We have shown in the course of this article how the NEG literature makes it possible to identify a number of elements that are essential for understanding this reality. This line of research provides an economic foundation for the existence of a relationship between the economic development processes and the advance of production sectors characterized by the presence of economies of scale (i.e. manufacturing), market integration and the genesis of an unequal distribution of economic activity across the territory. The NEG literature thus considers that the inequality that today characterizes the most developed economies has its roots in the early stages of their economic development processes, brought about almost 200 years ago by the technological change typical of the first and second industrial revolutions and the integration of the national markets.

In this paper we have summarized the main empirical contributions that, within NEG, have aimed to analyse the industrialization process in Spain from a historical perspective. Considered as a whole, the papers reviewed show that the forces highlighted by the NEG were present – although they were not the only ones – throughout much of the development process in Spain from the earliest stages of industrialization, although their intensity varied over time. Therefore, along with explanatory factors proposed from viewpoints other than economic geography, the NEG provides an analytical framework that is extremely useful for understanding

the long-term industrialization experience of Spain and for examining the key elements of economic development in more depth from the perspective of economic geography.

All this has shown how studying the industrialization processes from a historical perspective using an economic geography framework is essential in order to verify the hypotheses deriving from this type of modelling and to understand some of the explanatory elements of territorial inequality thus generated. In other words, in the course of these pages we have aimed to show how the connection between economic history and economic geography contributes not only to a better understanding of the geography of the historical industrialization processes, but also to the identification of the elements that explain the current unequal economic geography of the world.

This connection between economic geography and history has been spreading over the last few years along different lines of research that have produced interesting results and may point towards future avenues of research in this field. Without going into too much detail, a good number of papers have explored shocks and other historical events in search of an exogenous source of variation to study agglomeration economies (e.g. Davis and Weinstein, 2002; Redding and Sturm, 2008; Bosker et al., 2008; Ahlfeldt et al., 2015; Rueda and A'Hearn, 2020). Another line of research has focused on the asymmetric territorial impact of the building of infrastructures – such as the railways – on transport costs, and thus on the relative changes in market access experienced by the different regions (e.g., Redding et al. 2011; Hornung, 2015; Donaldson and Hornbeck, 2016; Bergen and Enflo, 2017; Donaldson, 2018; Büchel and Kyburz, 2018). Another field to explore in the future that may turn out to be particularly fertile is the relationship between market access and agglomeration economies on the one hand and the accumulation of human capital on the other, about which historical-type evidence remains scarce (Redding and Schott, 2003; Fallah et al., 2011; Matas et al., 2015; Diebolt and Hippe, 2018). It might also be mentioned that, from today's perspective and given the structure of most of the developed economies, any analysis of agglomeration economies needs to carry out a thorough exploration of the services sector, the driving force behind much of today's economic growth.

The advance in research that combines economic history and economic geography will therefore not only improve our understanding of the historical circumstances under which the industrialization processes developed (knowledge that may be useful for making economic policy decisions now that a large number of developing economies are industrializing), but will also identify key elements for explaining the advance of territorial inequality in a context of technological change and international economic integration such as we have today. We should learn from the lessons of history.

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