

## **Direct foreign investment, technological change and local talent building: the case of Lyon-Barcelona**

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### **1. Introduction**

Direct foreign investment (FDI), an intrinsic factor in the economic globalisation process, is a basic pillar in the evolution of modern economic development. In order to explore this relationship it is first necessary to understand the dissemination mechanisms of FDI and assess its real impact on the target economy from a dynamic perspective.

The present communication analyses how foreign investment impinges on talent building in the target economy. The lack of aggregate indicators allowing us to account for this phenomenon forces us to readjust the methodology employed. The option chosen is the historical study of the Lyon-Barcelona company (1933-1981) in Premià de Mar (Barcelona). The dynamic point of view of the case is fundamental to understand the impact of FDI in the target economy.

Lyon-Barcelona was a pioneering company in the introduction of a new printing system in Spain: serigraphy or Lyon printing (screen printing). But its important contribution went further, for it was a true momentum given to the development of local talent, which made it possible to consolidate the specialisation of the printing industry at the heart of the great Catalan textile district.

This paper has been divided as follows: a first section devoted to an overview of the role played by FDI in the building of local talent; afterwards, it analyses the origins of the founding of Lyon-Barcelona thanks to Swiss entrepreneurship and capital; the

technical contribution of serigraphy to the printing industry; the role played by the company in the building of local talent; finally, some conclusions have been drawn.

## **2. Direct foreign investment and talent building in host economies: an overview**

The historical studies on the agents that structure international economic relationships have devoted a careful attention to commercial and business diasporas, which provide an interesting and dynamic view of this phenomenon. Very often, business diasporas have been brought together through ethnic identification elements, for their members are thus able to share the same culture and/or religion, which may become a key factor when establishing economic relations in an unfavourable (foreign) context that requires a framework of trust. The long-lasting existence of commercial and business diasporas have often made people identify them as a phenomenon related to the traditional family company that has slowly disappeared in the contemporary era. Conversely, some recent contributions have reasserted that such identification is contrived, for commercial and business diasporas have been able to readapt over time (Baghdiantz; Harlaftis; Pepelasis; 2005).

Companies may make international business entailing the mobility of factors related to production or goods, but foreign direct investment (FDI) is possibly the clearest modality to ensure the control and interest in the long run of the recipient company.

Foreign direct investment (FDI) and multinational enterprises (MNEs) are not synonyms (Wilkins; 2003:3). The difference should be found in the concept of foreign direct investment, in which the key element is the nature of the capital, whereas we refer to multinational companies as one of the growing strategies of the company. More specifically, FDI is considered a foreign investment that makes the control of the company management possible. Conversely, MNEs refers to companies that carry out added value activities in more than just one country (Dunning; 1974:13).

Nevertheless, the FDI and MNEs concepts are strongly related because the very existence of MNEs necessarily entails, among many other activities, the existence of FDI. Furthermore, the need to make use of the statistical data of foreign direct investment as a proxy in the history of multinational enterprises has made both concepts be necessarily related. However, FDI may be channelled by means of MNEs or other types of companies such as free-standing companies (FSCs). Free-standing companies are companies that have been established to carry out international

business, most generally in just one country, and are not based on a previous business. But, despite the fact that the operational activity is located outside the country, its headquarters are located in the country of the original capital. This type of international company played the main role in British foreign direct investment during the first globalisation, and still exists today (Wilkins & Schröter; 1998).

The case of the company La Preparación Textil SA (of which Lyon-Barcelona was part) is hard to classify, for it refers to a company of foreign capital that is not a multinational enterprise because it doesn't have a foreign parent company. In fact, it is more similar to the concept of free-standing company, although there are still differences: we don't have any evidence proving that its headquarters were in Switzerland despite the fact that it only operated in Catalonia.

A key point in the study of foreign direct investment is to first distinguish the motivations and the opportunity cost of this way of making international businesses, which may lead us to discover different analysis approaches. Business history has focused on the institutional aspects derived from FDI by analysing the evolution of multinational enterprises and free-standing companies. In this regard, the studies in MNEs have emphasised the role played by transaction costs to explain the internalisation of company growth abroad, although business history has made remarkable efforts to specify the origins of multinational enterprises in the first globalisation, to thoroughly analyse case studies and to establish different typologies, according to the origins of the capital and the type of activity carried out by multinational enterprises (Wilkins; 2003; Jones; 2008).

Among the broad literature on this subject, Vernon and Dunning's contribution stands out, mostly because they introduce the role of technology associated to FDI. Vernon's classical text offers a dynamic approach that incorporates the technological differences and the life cycle of the product (Vernon; 1966). Vernon explains that the investing economy is usually much more advanced in the manufacturing of new products. When in the advanced economy the new product begins its mass production stage (its manufacturing process is simplified and its production cost decreases), the market of the manufacturing country starts to be satisfied and a maturity stage is achieved. Then, the shift in the demand towards backward countries takes place, because there, high-income consumers also begin to consume the new product by way of imports. In this context, the manufacturer of a new product in the advanced country will decide to replace exports by FDI. Among the specific reasons for business strategy there is the

threat posed by competing companies that may begin to imitate the product, the lower manufacturing costs and the controls over imports by the government of the backward country. In this way, international production is a way of preventing rival companies from imitating the product, but it is also a mechanism to disseminate new technologies in other countries, which entails, however, that the potential supply of the new product is already available in the target economy. Vernon's approach partially fits our case study when it explains what the motivations of foreign investment are –since the origin of the capital and the technology do not coincide and the industrial life cycle of the product between the original country and the one receiving the technological change are not in different stages either.

Dunning's approach to internationalisation is an attempt to analyse *why*, *where* and *when/how* a company decides to directly manufacture abroad (compared to other alternatives such as export, the establishment of licences, etc.) in terms of ownership, localisation and internalisation benefits (Dunning; 2001). The OLI paradigm, basically applied to the case of the MNEs, may be useful in the case of Lyon-Barcelona if we ignore the company's internationalisation benefits and we focus on the benefits deriving from the property rights of intangible assets (the knowledge in the implementation of a new technique that makes it possible to develop new knowledge in product innovation) and from its location in Catalonia (based on agglomeration economies entailed by the fact of establishing a company in a large European textile district in 1929) (Maluquer; 2004:20). The author's reflections on the technology transfer in the target country based on multinational enterprises are particularly interesting, for he approaches the term from a broad point of view that embraces all knowledge forms, including machinery, organisational and management skills (Dunning; 1988:47).

The analysis of foreign direct investment in the target country is not an easy issue to be studied from the point of view of the multinational enterprise, for it is often difficult to differentiate between the impact it has in the target country and the general context of the field of activity in which the company operates. Nevertheless, it is clear that this subject includes a historical dimension, because, according to the period analysed, the agents of investments flows, the economic activity involved and the current development of the phenomenon, repercussions may vary (Wilkins; 1994).

Based on development economy, the analysis of foreign direct investment has been given priority due to its implications as an eventual factor of economic development.

Some of its empirical contributions emphasise that, by incorporating technological change, FDI not only entails an increase in the stock of physical capital of the host economy, because, since it is accumulative, it may also indirectly foster the development of human resources and better technology (technological upgrading and knowledge spillovers). However, the impact of FDI on growth depends on the degree of complementariness and substitution between foreign direct investment and domestic investment. But FDI is not an independent variable, for the characteristics of the economy that is the target of foreign investment condition the choice of the technology that is to be implemented. "Foreign investors can then be deemed to select the technologies embodied in FDI-related capital accumulation depending on specific productive and institutional characteristics of the host economy." (Mello; 1999:148) Several contributions have proven that the relationship between foreign direct investment and the availability of human resources takes place in two directions. On the one hand, some studies prove that the workforce supply may be one of the causes of the FDI localisation, mostly since and due to the second globalisation (Noorbakhsh; Paloni; Youssef; 2001); however, it was not a determinant factor in previous historical periods (Rhoot; Ahmed; 1979). On the other hand, other authors have noticed that the availability of qualified human resources is a requirement of transnational companies and affects the FDI volume (Zhang & Markussen; 1999). The relationship between human resources and FDI inflows may end up building a true virtuous circle making the training of human resources favour the entries of FDI inflows, while being the mechanism of technological transfer in the recipient country, and, more than anything else, its exploitation in the development process (Miyamoto; 2003:39-41).

Finally, it appears clearly that, by means of technological change, foreign direct investment may impinge on the economic growth of the target economy. The relationship, however, is not automatic and depends greatly on the capacity of the host economy to absorb more advanced technologies (Borensztein; De Gregorio; Lee; 1998). Our case study has been developed within this theoretical framework.

### **3. Foreign investment and entrepreneurship: the origins of Lyon-Barcelona**

In this section we will deal with the founding of La Preparación Textil SA, a basic, previous step in order to understand the founding of Lyon-Barcelona within the context of Swiss investment in Spain before the Civil War. Foreign investment counted on fundamental agents that organised it; without them, it would be impossible to evaluate

its importance and repercussion. This is the reason why we will focus on the main catalyst of this investment, Henri Grebler.

### *Swiss investment in Spain.*

Spain has been and still is one of the main recipient countries of foreign capital in the world, as well as a net importer of technology (Puig; Castro; Álvaro; 2008:20), whereas Switzerland has been one of the first countries in terms of foreign direct investment per capita in the contemporary era. Despite the fact that both countries have occupied diametrically opposed positions with regard to the foreign balance of investments, the paradox is that the direct correspondence of such investment flows did not become important until the second half of the 20<sup>th</sup> century.

The long history of Swiss foreign investment dates back to the 1830s, when the first Swiss investments took place in the textile industry in Germany (Schröter; 1993:49-64). In 1914, the biggest multinational company, Nestlé, with fourteen foreign factories, was one of the main multinational manufacturing companies (Jones; 2005:81). This tradition still continues today, and has been a hallmark of the Swiss economy (i.e., in 1989, a third of the total workforce of Swiss companies was working abroad).

Until 1914, Swiss foreign investment was mostly in its neighbouring countries (Germany, France and Italy). During the years of the First World War, Swiss neutrality played the role of a salutary drive towards the international expansion of Swiss companies, a trend that slowed down during the inter-war period. Among the main target areas of investment, the textile sector stands out, although since 1870, Swiss FDI was increasingly diversified in the food sector, raw materials, chemical industry and machinery. Yet, the Swiss textile cluster has shown competitive advantages in the long run over 150 years, with changes in the competitive product (from textile products to machinery manufacturing (Schröter; 1993).

Switzerland is a small country, and its orientation towards Switzerland's foreign markets, through exports or foreign investment, has been a key element of its strategy of applying its core competencies to foreign markets. The reasons for Swiss competitiveness are based on its emphasis on the quality of Swiss manufacturing, based on R&D, and its technical expertise, based on quality training; stable industrial relationships and investment policy; the strong links between banking and industrial activity; the limited size of the domestic market; and, finally, the multilingualism and

multiculturalism that has provided skills that have been complementary to foreign investment (Schröter; 1993:60).

Against this background, Spain was not a priority area for Swiss investment until the second half of the 20<sup>th</sup> century, although it received many foreign investments from France, Great Britain, Germany and the United States. The failure of the first Swiss investments in Spain did not contribute to this endeavour either, as it happened with the company La Hispano Suiza, fábrica de automóviles SA, founded in 1904 (Nadal; 2010).

**Table 1. Swiss companies in Spain (1916-1966).**

<b>Company</b>	<b>Sector</b>	<b>Date</b>	<b>Place</b>
Estudios y Construcciones Locher SA	Construction	1919	Barcelona
Sociedad NESTLÉ, Anónima española de productos alimenticios (Nestlé AEPA)	Food	1920	Barcelona
Ferd Steiner SA	Food	1920	Tarragona
Europa SA Transportes Internacionales	Transport	1921	Barcelona
Casa Hassinger SA	Other Industries	1923	Barcelona
Materias Colorantes SA (MACOSA)	Chemical industry	1924	Barcelona
Aluminio Hispano Suiza SA	Metallurgy	1927	Barcelona
<b>La Preparación Textil SA</b>	<b>Textile Industry</b>	<b>1929</b>	<b>Barcelona</b>
Winterthur, Sociedad Suiza de Seguros	Insurance	1929	Barcelona
Radio Hispano Suiza SA	Radio equipment	1941	Barcelona
Productos Roche SA	Chemical industry	1930	Barcelona
SA Comercial MAGGI (SACOMA)	Food	1940	Barcelona
Unión Relojera Suiza SA	Clock and watch industry	1945	Madrid
La Suisse, Compañía Anónima de Seguros	Insurance	1953	Zürich

Source: Tortella, Teresa (2008:80). Information source: Banco de España archives.

After the First World War, the strength of the Swiss franc, which harmed industrial exports, and the increasing Spanish protectionism with Cambó's Spanish tariff from 1922, could foretell an increase in Swiss capital flows to Spain. Nevertheless, Swiss investment was limited to covering the vacancies of German investment in the food, chemical and electrochemical sectors. Spain did not interest Swiss investors due to the fact that the Spanish manufacturing structures did not correspond to the predominating sectors of Swiss industry. In addition to this, the financial and technical bonds kept with the German electrical industry limited the field of action towards this unknown and

smaller market than France and Italy. Its importance was more qualitative than quantitative (Broder; 2001:460-461).

The Swiss companies located in Spain from 1916 to 1966 are only a small sample of the companies existing during this period.<sup>1</sup> The sectorial diversity of Swiss investment in Spain and their location in Barcelona stand out. The economic relationships between Switzerland and Barcelona date back to the middle of the 19<sup>th</sup> century, which explains the reason why in 1846 a Swiss trade consulate was opened in Barcelona. Economic relations continued to develop, and, during the inter-war years, the Swiss community in Barcelona became progressively consolidated by establishing its own networks of socialisation (Bauer; 2006).

#### *The founding of La Preparación Textil SA.*

Estampados y Aplicaciones Lyon-Barcelona was a complementary company of another previously established with the name La Preparación Textil SA founded on April 30<sup>th</sup>, 1929. Its partners were Alfredo Tey Marfà (a trader who had settled in Barcelona), Henri Grebler (a Swiss trader who lived in Barcelona), and Achille Laborge, Pierrer Chavier and Alberto Poucet (three French manufacturers from the Rhône-Alpes region).

The initial registered capital stock was 150,000 pesetas. One year later, the capital had increased to 350,000 pesetas, and in 1931 the company bylaws were modified. Initial manufacturing was located at Avenida de Alfonso XIII in Badalona; in 1932 it already had 350 employees.<sup>2</sup> Factories were to be enlarged later on in other towns such as Premià de Mar, Ripoll and Sallent.

In the partnership deed it was established that the aim was to be the preparation of silk thread for weaving, as well as any other textile processing that the management board considered convenient.<sup>3</sup> The activity carried out by the company in the field of publicity and advertising in 1931 was more explicit; it introduced itself as: "it is the most

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<sup>1</sup> The information provided by Teresa Tortella (2008) should be contrasted with that of Tascón and Carreras (2001:478-479), for they are different; however, the sources of information are also different.

<sup>2</sup> An announcement of a workers' dispute in La Preparación Textil SA in Badalona provides the number of workers. ABC (23/1/1932), p. 21.

<sup>3</sup> Simple copy of the deed of La Preparación Textil S.A. CIF A08021008. Registre Mercantil de Barcelona.

important factory of artificial silk twists in Spain, specialised in artificial crapes, voiles, sizing and tinting (for temporary coloration).<sup>4</sup> The purpose of La Preparación Textil SA was different types of weaving processing with artificial silk thread, rayon.

The industry of artificial silk was meant to be an emblematic example of chemical contribution to the broadening of the supply of artificial raw materials, which allowed complementing and/or replacing some natural fibres, with a better price, quality and uniformity in the fibres (Puig; 2002:127). This innovation, which was characteristic of the Second Industrial Revolution, meant a true impulse for the textile industry for it enabled new productive possibilities for the textile cluster, a consolidated industrial sector that was diversifying.<sup>5</sup>

The main innovations and patents of manufacturing were carried out at the end of the 19<sup>th</sup> century and the beginning of the 20<sup>th</sup>, although they were not commercially exploited until the first third of the 20<sup>th</sup>. Three manufacturing corporate groups were hegemonic in this field: the English company Courtlands, the Comptoir of the French group Gillet-Bernheim and the Dutch Algemene Kunstzijde Uni (AKU). These last two corporate groups, with Catalan capital injection, were to catalyse the pioneering endeavours of rayon production in Spain during the 1920s: SAFA (1923), which began manufacturing in the factory in Blanes three years later, and La Seda de Barcelona (1925), located in El Prat de Llobregat. Both companies were to play a key role in textile rayon in Spain until the Spanish Civil War (Puig; 2002:12).

The location of such initiatives was developed within the framework of the Catalan textile macro-district, which in 1936 concentrated more than 75% of Spanish textile manufacturing. The evolution of textile rayon manufacturing was spectacular: between 1927-28 and 1934-35, for the production of textile rayon quadrupled. Therefore, autochthonous production made it possible to reduce the need for imports.

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<sup>4</sup> *Industria Textil*, Barcelona, 5/1931, nº 5, p. 62.

<sup>5</sup> Without the rayon fibre, the emergence of fine hosiery in Spain in the 1920s would not have been possible (Llonch; 2007:107-108).

*Henri Grebler and Lyon-Barcelona (1933-1981).*

Henri Grebler Weissmann was born in Kolomy in 1896. He was the second child of a family whose head was a Polish businessman of Jewish origins. The family emigrated to Switzerland in 1903 and obtained Swiss citizenship in 1911 in Geneva. A large part of the family ended up settling in La Chaux-de-Fonds, a French-speaking canton where a very important clock and watch industry was developed<sup>6</sup>. But the brothers Albert and Henri decided to work beyond the Swiss borders from the very beginning and moved to the neighbouring Rhône-Alpes region in France, where they established strong industrial relationships. On July 3, 1922, the two brothers were expelled from France accused of carrying out businesses with enemy countries during the First World War. It was then forbidden for them to open a factory of the Auer forreecerium system in France. The sentence was so irreversible that only thanks to a Swiss diplomatic intervention in Paris in August 1923 and 1924 were they allowed to travel through French territory to go to Barcelona as long as they did not stop in France. Fate made them take different paths: Henri settled in Barcelona, whereas Albert Grebler was to settle in another place that since 1925 was an international zone, the city of Tangier.

But the business relationships of Henri Grebler with traders and manufacturers of the Rhône-Alpes region were strong, which made it possible that in 1929 he had achieved the support of three manufacturers from this French region in order to found together La Preparación Textil SA in 1929. The relationships with French manufacturers were to continue to be fruitful later on. His position in La Preparación Textil SA grew, and in 1936 Grebler was already in possession of a third of the share capital of the company. In 1952 he owned factories that provided work for more than 3,000 workers, and he was one of the leading political figures of the time.<sup>7</sup> Grebler proved to be a smart businessman, who weaved a thick network of companies in several manufacturing areas, such as the textile industry, the paper industry and metal production, among others. The business relationships with Catalan manufacturers also grew, especially with the Torras Hostench family.<sup>8</sup>

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<sup>6</sup> Mireille, Henri's younger sister, was the director of the watch company Cauny Watch, founded in 1927.

<sup>7</sup> Archives Fédérales Suisses. History Service of Swiss DFAE.

<sup>8</sup> Enrique Grebler supported the construction of the new factory in Sarrià de Ter of the Torras Hostench company; Juan Torras Hostench was the president of the Management Board of La Preparación Textil SA in 1948, and in 1970 Grebler presided over the Fundación Torras Hostench (Gutiérrez; 2006:295-301 and *Anuario Financiero y de las Sociedades Anónimas 1948-1949*). The relationship between both businessmen began in 1940, when Henri Grebler registered the brand Enri and used its headings; this trademark was to become one of the most popular ones in manufacturing metal spiral notebooks. Later on,

Since the foundation of La Preparación Textil SA, there is an attempt to organise the manufacturing of the vertical cycle by including the combined textile cycle, from spinning (in the factories in Badalona and Ripoll) to woven fabric (in the factories in Sallent and Premià de Mar) and textile-finishing (in Premià de Mar). In 1933, Estampados y Aplicaciones Lyon-Barcelona SA started to operate in Premià de Mar. Regarding textile-finishing, his aim was to introduce serigraphic printing, a technique that was growing in the French area of Lyon, more specifically around the town of Bourgoin-Jailleu (most curiously, in the same place in which Pierre Chavier, one of the founding partners of La Preparación Textil SA, was born). In Bourgoin, Grebler was also supported by another Jewish businessman who knew and was applying this new printing technique in his factories, Jean Badoy, with whom since 1931 he was to strengthen his business relationship.

The founding of Estampados y Aplicaciones Lyon-Barcelona SA in Premià de Mar was the result of the purchase of some already-existing premises (the Puiggrós factory), of the presence of a mine of high-quality water, indispensable for printing, and of the optimal communication that its location offered. The location of the factory was more by accident than what we could imagine, for originally it was located in Sant Celoni (Barcelona), but when the establishment of it was already well advanced, La Preparación Textil SA accepted the purchase offer of the textile entrepreneur Josep Pamias. The common element of both locations was the easy access to high-quality water.

#### **4. Technological contribution: the introduction of screen printing**

Printing is a complex process (art, chemistry and technology take part in it), which can be carried out on different media (fabric, paper, ceramics, among others) and that enables to better differentiate the final product. Fabric printing is a production activity that involves “migrating or transferring a drawing, with pigments or colorants, by using a mould or a roller” on an already-woven piece of cloth.

Together with bleaching and tinting, printing is another step in the final stage of the textile production process, which is noted for contributing high added value to the final product (Nadal; 1991:34-35). Among the different activities of textile finishing, printing is the most valued one. Given the fact that it is an auxiliary and determinant stage in the textile production process, it is located around textile-manufacturing industrial areas.

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the Enri brand was to be divested to the Torras company, in which Grebler participated as a partner (Trademark nr 0121316). See BOPI.

Printing can be integrated or not integrated into the textile company. It may also be established in not too large vertical-cycle textile companies, or it can even be located in standalone companies specialised in finishing.

Textile printing requires a previous preparation of the woven fabric once it has been bleached. The printing motif requires a previous design or drawing, the colours to be used and the printing of the drawing on the printing moulds (one for each colour of the drawing to be reproduced). Engraving includes one of the most important stages in the printing process: the adjustment of the drawing to the dimensions of the rapport. Finally, the printing technique that is most suitable for each case is applied.

Printing can be carried out by applying different techniques simultaneously: However, over time, different progresses have been made in this field. Printing stamps were the more disseminated handmade technique during the 18<sup>th</sup> century due to the success of the *indianes* (chintz), a production that is regarded as the origin of the modern cotton industry.<sup>9</sup> But the advances that finally led to the mechanisation of printing were introduced by Thomas Bell (who invented the roller printing machine in 1783) and Jérôme Perrot (who invented a new machine with several blocks over a rotating drum in 1835). Perrot's machine made more combinations of colour possible, achieving a more perfect printing than with the roller machine, but its elaboration was slower; this is why its use didn't last for long (Cabana; 1992:26).

During the 19<sup>th</sup> century, different printing techniques were used, which varied depending on the type of drawing and the fabric: printing moulds and printing rollers, although mechanisation originated in the latter. Mechanical printing arrived in Catalonia during the second third of the 19<sup>th</sup> century by adopting steam energy as the source of industrial energy.

The mechanisation of printing was to modify some key factors in the localisation of this industrial activity, giving priority –in addition to significant water requirements– to coal availability (Nadal; 1991:24-25). This is the reason why the water cluster showed, since 1861, preference for a special Catalan location close to the Harbour of Barcelona, in Sant Martí de Provençals, an independent population centre aggregated to the city of Barcelona in 1897 (Nadal; Tafunell; 1992:69-73).

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<sup>9</sup> For the Catalan case, see Sánchez (2013).

Serigraphy originated in Antiquity with the use of printing by means of stencils in Japan, most probably at the end of the 18<sup>th</sup> century. This technique was used in detailed drawings by using paintbrushes. As regards printing on fabric, we may find antecedents in the batik manufacturers in the United States.<sup>10</sup>

Screen printing was the method that made it possible for the silk industry to print new designs. “According to research carried out by a writer for *CIBA Review*, the first stencil prints which make the change-over to silk gauze, or, in other words, to a continuous form of support, were made in 1850 in Lyons. Only very small quantities of each design were made. In 1870 screen prints began to appear in Switzerland and Germany, but none of them was any more than experimental.” (Storey; 1992)

During the second half of the 19<sup>th</sup> century, in Lyon, printers used this method to print fabrics on screens of very finely woven silk. This was not by chance, for the Lyon area was the second largest textile region in France and it had specialised in the French silk industry since the 16<sup>th</sup> century. During the 19<sup>th</sup> century, Lyon’s silk industry increasingly developed around the clothing industry, closely linked to French fashion. The high added value of the silk fabric complemented the finishing that incorporated differentiated printings that provided design and fashion. In addition, from the last third of the 19<sup>th</sup> century, the industrial region of Rhône-Alpes also developed a strong chemical industry that was to introduce new artificial colorants from German and Swiss chemistry, which increased the availability of colorants.

In fact, serigraphy developed together with the introduction of new chemical materials – artificial fibres such as rayon and viscose–, as well as the supply of artificial colorants, which made it possible to give versatility to the printing process and enlarge the production and creative possibilities of the fashion industry.

In addition to being a more versatile technique, it was also cheaper. “This method entailed a good balance between economy and flexibility for the fashion market, which could not always prove the cost of the preparation of the engraved rollers for fashions that were becoming increasingly ephemeral.” (Marshall; 2005:51) That is to say, the

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<sup>10</sup> In paper format, serigraphy disseminated during the inter-war years in the United States in order to meet the new manufacturing needs of the production of large advertising posters.

key factors that serigraphy incorporated were that the cost of engraving was much lower than printing using rollers, it adjusted well to the different scales of the printing production and to the different dimensions of the fabrics and textures, it speeded up the production process and it achieved higher quality printing. Printing was no longer limited to the dimensions of the stamps or to the diameter of the rollers. It was then already possible to print large-size designs in different textures and effects. “From this time onwards, the advantages of screen printing became increasingly appreciated, especially in fashion houses. Designs are relatively easy to transfer to screens and the frame size can be readily varied. This provided a greater freedom for the designer to choose and repeat sizes, compared with the restrictions of copper rollers. In addition, the pressure applied in screen printing is much lower than in roller printing with the result that surface prints with an improved ‘bloom’ or colour strength are obtained. For the same reason, textured surfaces are not crushed.” (Hawkyard; 1981:30)

The industrial application of serigraphy dates back to the inter-war years; during the 1930s serigraphy spread all over Europe from Lyon. This is the reason why it was called *estampación a la lionesa* (Lyon printing). A handmade technique displaced the technical modality, often spontaneously associated with modernity, thus fostering 20<sup>th</sup>-century printing.<sup>11</sup>

Initially, the screen printing technique that was introduced in Catalonia was that of flat printing, which consists in printing an image that has been engraved on a mould, made of a screen or a fabric inserted in a wood or iron framework. As Mònica Dòria and Assumpta Dànglà explain: “The screen of the framework receives several layers of emulsion that cover its whole surface. Previously, the printer has dissociated the colours of the original drawing that is to be printed, and has prepared one or several acetate clichés with the drawing that he wants to transfer to the mould. Each cliché shows the silhouette of the part of the drawing that corresponds to each mould, and each cliché is fixed on the corresponding screen and goes through an insolation process. The screen will keep the insolated parts, now already solidified, and will lose, by means of a water bath, that layer of the emulsion that has been covered by the cliché...” (Dòria; Sanglà; 2006:403) Each mould is placed on a piece of fabric spread

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<sup>11</sup> Looking at the revenue office sources, *Contribución Industrial y de Comercio*, this technical change from the roller machine to serigraphy is very poorly registered, since manufacturers began paying by printing benches instead of making it as they did previously depending on the machinery. This might explain the paradoxical evolution of printing machinery in Sant Martí de Provençals over the first third of the 20<sup>th</sup> century, as observed by Nadal and Tafunell (1992:144).

on the table, and, by using a blade, the colorant is spread, applying pressure so that the colorant soaks through the screen. The operation is repeated with each mould until the printed drawing is completed.

Flat screen printing was handmade until the flat screen printing machine was invented in 1954. During the 1960s, two important innovations were made: the automatic scraper and the rotational serigraphic machine (1963). The mechanisation of serigraphy consolidated screen printing as the predominating textile printing method. Serigraphic mechanisation made the great dissemination undergone by screen printing for all types of fabric and textures from the 1960s on possible. Already at the end of the 20<sup>th</sup> century, the printing process was simplified by means of computer digitalisation, which has allowed printers to shorten again the time employed in printing production (Canals; Dòria; Fernández; 2009:10-17).

### **5. Lyon-Barcelona, a talent building factory**

The introduction of serigraphy in Catalonia began in 1931 with the invention patent number 122,214 granted in Spain in favour of the Lyonnais printer Jean Badoy for “Mejoras en el material que sirve para la aplicación o para la impresión sobre los tejidos, por medio de placas o modelos perforados” (Improvements in the material used for the application or the printing on fabrics by means of plates or perforated models.” (BOPI) It was precisely at the company that Badoy owned close to Lyon (in Bourgoin-Jailleu) where high-quality printing was being carried out; initially, there began the training of the Lyon-Barcelona staff. The knowledge learned through this training was to become very important in setting up the company in Premià de Mar. However, the contacts between Jean Badoy and Lyon-Barcelona –thanks to Roman Piera Arcal– remained close and frequent until the death of the Lyonnais printer in 1950.<sup>12</sup>

If we take a look at the initial staff that worked at Lyon-Barcelona since October 1933, we may see that some fundamental figures that played a key role in the consolidation of the company stand out. Roman Piera Arcal was its driving force throughout its life. After being attorney-in-fact at La Preparación Textil in 1933, he was to become its

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<sup>12</sup> Since 1943, Sederías Ibéricas was integrated into the same factory of Lyon-Barcelona in Premià de Mar with 100 looms. Until 1969 it supplied the fabrics needed by the printing company (Amat; 2001:23).

entrepreneur and manager in 1964.<sup>13 14</sup> Another fundamental figure with a more technical profile was Jordi Sancho Roca, a draughtsman and engraver from Barcelona; some documents prove that he was trained in France with Badoy as he was only 19 years old. His position in the company (from October 1933 until May 1950) and his high salary confirm his professional profile, which was to become determinant in the introduction of the new technique of serigraphy. The third professional figure is Ramon Izquierdo Penedés, born in Valencia, an experienced printer who was in charge of the printing section. The core of the original team worked together until the consolidation of the company in 1950, after some initial weak and uncertain steps that were abruptly nipped by the Spanish Civil War, once the production was normalised again and the harsh post-war situation was left behind.

The initial personnel included very young people (the average age was 20 years old) who joined the company between October 31, 1933, and May 11, 1935, therefore, with great learning capacity. The first employees hired by Estampados y Aplicaciones Lyon Barcelona SA included 30 male workers and 20 female workers. Men performed several tasks, whereas women mostly helped in the printing and storing ones. The best-qualified staff came from Barcelona, but most employees lived in Premià de Mar. Family bonds were frequent among the company's staff, as it happened with several couples.<sup>15</sup>

The registers of the beginning and termination of contracts show that professional mobility was very high, most particularly since the 1950s.<sup>16</sup> The grounds given for voluntary departure include a variety of reasons depending on gender. Among women, marrying or giving birth was the most common reason, which entailed giving up their jobs or becoming housewives. Conversely, among men, we may discover great

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<sup>13</sup> The fact that when the factory was collectivised during the Spanish Civil War his position as director was respected is good proof of his professional and personal competence (Amat; 2001:200).

<sup>14</sup> During the 1950s, La Preparación Textil closed its fabric factories, sold the printing company in Premià de Mar and focused its activity on the spinning preparation at the factory in Ripoll, where the company continued to manufacture its products until 2004. In 2014, La Preparación Textil SA is under liquidation.

<sup>15</sup> Museu de l'Estampació de Premià de Mar. Fons Lyon-Barcelona. *Libro de Registro de Productores nº1. Estampados y Aplicaciones Lyon-Barcelona SA. Premià de Mar*, which embraces the 31-10/1933-31/12/1954 period.

<sup>16</sup> Museu de l'Estampació de Premià de Mar. Fons Lyon-Barcelona. *Ministerio de Trabajo, Sanidad y Previsión. Inspección del Trabajo. Registro de Personal de Estampados y Aplicaciones Lyon-Barcelona*, which includes the 31/10/1933-5/12/1955 period.

mobility towards other printing companies in Catalonia or towards becoming self-employed, most particularly from the 1950s on.

### **Employees of the company Lyon-Barcelona in the 1940s.**



Source: Margarita Garreta

In 1967, the personnel of the Lyon-Barcelona SA already comprised 300 employees working at about 50 printing tables. Only 10% of the personnel working in 1935 remained. Staff mobility and turnover had become widespread; as a result, hiring new workers coming from other areas of Spain was necessary.

A first approach to the new companies established in the field of printing in Premià de Mar tells us that in the registers of industrial taxes from 1953, two printer-engravers appear (Salvador Cisa and Josep Estrada), both former employees of the company Lyon-Barcelona where they had been working since its foundation until they became self-employed. Salvador Cisa Gallofré joined the company in January 1934 and was to remain there for nine years working as an assistant to the drawing-engraving section. Josep Estrada Almorín had worked as a printer there since 1934.

“After these two cases, each printing workshop created its own engraving until it began to grow.” (Hermínia Miralles)

In 1960, the number of engravers in Premià de Mar had grown and it included nine new printing companies (Maria Sardà Roca, Cristobal Ferrer Ferrà, Carmen Luezas Cubero, Pedro Martínez Girona, Laura Miralles Jimeno, Juan Navarro Siscart, Gustavo Paradell Civantos, Mariano Puighermanal Devesa and José Rovira Brull); most of them had been previously –directly or indirectly– linked to Lyon-Barcelona.

**Table 2. Textile industrial activity in Premià de Mar in 1972**

TEXTILE PROCESS	COMPANY
YARNS	HILADOS TEJIDOS SERRA OLLÉ SA JUAN ESPIN CATLLA
FABRICS	TAKER SA SAMPERE SA
KNITTED FABRICS	JUAN BORRELL ANTONIO FERNÁNDEZ,
SHEARING	BALDOMERO OLIVA JORGE FERNÁNDEZ
YARN BLEACHING	BLANQUEO TEXTILES SA
YARN STARCHING	JUANA ESPIN
FABRIC PRINTING	ANTONIA AGUILÓ BENJAMÍN CAMACHO LORENZO CASTELLANO M. TERESA CERREDELO PEDRO GONZÁLEZ LYON BARCELONA SA ALEJANDRO MIRALLES GUSTAVO PARADELL
ROLLER ENGRAVER  PRINTING MOULDS	JAIME MELCHOR JAIME PARRA JAIME DURAN JAIME ESTIVILL ROBERTO ESTRADA DIEGO GIL SANTIAGO MANENT JUAN MARTINEZ JUAN NAVARRO, MARIA PUIGHERMANAL FRANCISCO TUDELA

Source: Arxiu Municipal de Premià de Mar. *Padró Industrial* (Industrial Census), 1972.

Thanks to tax data, we have been able to understand the industrial structure of Premià de Mar in 1972.<sup>17</sup> In the following table, we may observe the textile specialisation in Premià de Mar related to printing, and, especially, to the preparatory tasks of engraving, which started to be carried out by elaborating moulds with flat serigraphy (already mechanical), and, from the 1960s on, based on engraving by means of rollers applied to the serigraphy of the rotational machine.

We should remember that in the serigraphy technique printing required a whole series of very specialised production activities that involved the artist or designer that carried out the original design or drawing, the draughtsperson that made the report of the drawing, the draughtsperson that carried out the decomposition of the drawing by colours, the engraver that carried out the moulds, the carpenter or smith that manufactured the moulds, and, finally, the printer who introduced the colorants to the fabric through the moulds. The engraving process (from the original drawing to the mould ready to be printed) included a whole series of specific tasks of this printing technique that had to be located close to the printing factory.

Learning these tasks could be done through formal training, in schools of vocational training, or in an informal one, within the context of the workplace. Given the fact that the curricula were not incorporating new techniques over the post-war years, it made this first option impossible. What we would like to highlight is that Lyon-Barcelona was not only leading the way for serigraphy in Catalonia; its contribution went far beyond it. The company trained many experts in the difficult technique of printing; a true reproduction of the printed design required many good skills, precise knowledge and a long experience. We should mention the draughtspersons that carried out the design report, the designers who drew on different media (paper, glass, polyester, etc.), the people who made the clichés, the engravers of the moulds, the carpenters that carried out the wood frames (that were to be made in metal later on), the specialists who covered the frames with the cloth, and, finally, the printers who also required technical and chemical knowledge. Many specialised technicians trained at the Lyon-Barcelona, some of which ended up being self-employed outside the company; many of them remained in Premià de Mar. Only some of these new companies continued to work for Lyon-Barcelona. Most of them had their own independent customer base. This entails that the technical skills were complemented by the management and entrepreneurship skills of the new companies.

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<sup>17</sup> Arxiu Municipal de Premià de Mar. Industrial tax data from several years and fiscal tax from 1972.

An important part of the production activity of the companies, workshops and the work made in printing has not always appeared in the official records. At the end of the 20<sup>th</sup> century, the Museu de l'Estampació de Premià de Mar made the effort of documenting the setup of at least 45 engraving workshops.<sup>18</sup> If we take into account that, for each engraving, at least 12-15 draughtspersons were needed, the extreme concentration of this industrial activity in this town of the Maresme area in the Province of Barcelona stands out, and even more so if we take into consideration its small demographic dimensions.

It is more difficult to find written documents proving the work carried out by the draughtspersons who worked at engraving workshops and/or at home, an option chosen by many women. The high skills of these male and female workers were well known; the work followed a strict hierarchy and was paid according to the workers' skills. The women that carried out the drawings and that have been interviewed explain that they used to take work home, for it required very little infrastructure (a table with a light from below, which was called a *caiman*). It was not so rare to work at the workshop and at home, keeping the simplest tasks to be done at home. From the 1970s onwards, the work done at home and paid according to a fixed rate began to be regularised and ended up being a daily wage in the factory.<sup>19</sup> To a great extent, the whole series of these activities led to seasonal work (summer and winter), under pressure, stressful and very intensive.

The industrial life in Premià de Mar in the second third of the 20<sup>th</sup> century turned around printing, "to print metres and metres of fabric, for orders came in great numbers and were urgent, and all the people in Premià made their living and worked from this industry, which contributed and followed the trends of fashion in clothes and home

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<sup>18</sup> Companies and workshops that were operating in Premià de Mar between 1953-1997: Gravats Cisa, Gravats Puighermanal, Gravats Palau Duran, Gravats Farré, Gravats Botella, Gravats Botella Gómez, Gravats Reunits, Gravats Martínez, Gravats Estivill, Gravats Juman, Gravats Manent, Gravats Sierra, Gravats Ansó, Gravats Samper, Gravats Gravimarc, Gravats Gravomars, Gravats Silvio, Gravats Fergrab, Gravats Macsa, Gravats Robert, Gravats Vallès, Gravats Gironès, Gravats Escumar, Gravats Rotomarc, Gravats Lyonestyl, Gravats Gravastil, Gravats Marta, Gravats Emsa, Gravats Artigas, Gravats Gilbe, Gravats Amsi, Gravats Maresma, Gravats Navarro, Gravats Palacios, Gravats Dot, Gravats Fermín, Gravats 2000, Gravats Mateu, Gravats Petit Marc, Gravats Redondo, Gravats Estadies, Josep Estrada, Gravats Unió, Gravats Printel and Gravats Alcalà. Museu de l'Estampació de Premià de Mar. *Catàleg de l'Exposició de Llorenç de la Varga i la construcció de motllos per estampar* (around 1997).

<sup>19</sup> Interviews with Hermínia Mallorquí and Margarita Garreta.

decoration in our country.” (Llanas; 1984)<sup>20</sup> “In Premià, people said that each home had its engraving workshop. One could walk along the streets and see the moulds..., exposed to the sun, drying out, in every street one could see the moulds. Many tee-shirts and silk products were made...” (Hermínia Miralles) The printing and mould engraving activity continued to be carried out after Lyon-Barcelona was shut down in 1981.

In this regard, the company Lyon-Barcelona was a key point in the development of local entrepreneurship and talent. The quality level achieved by these companies was quite remarkable, and was even acknowledged by other Catalan companies working in this field. Its skilfulness and competency not only served the whole Spanish textile market but also many orders coming from abroad.<sup>21</sup>

On the one hand, new entrepreneurs appeared that knew the technique and that, within the context of increasing supply, created their own companies. On the other, the introduction of serigraphy contributed workforce and trained many workers that specialised in Lyon printing, and, especially, in the production of moulds for serigraphy, which made it possible to consolidate the specialisation of the printing industry in Premià de Mar, in the knitted fabrics district of Maresme and in the large Catalan textile district given the total lack of formal, official training.

From the 1990s on, the digitalisation of printing simplified the preparatory tasks of serigraphy. Based on an elementary process of the technique of analogical photography, digitalisation became simple by using scanners. Despite the improvements undergone in the price and speed that this change entailed, handmade engraving still continued to provide better quality and accuracy in printing.

## **6. Conclusions**

The founding of Lyon-Barcelona was part of a business strategy of vertical integration that began with the founding of La Preparación Textil SA in 1929, initially devoted to the spinning of artificial silk. This process continued with the setting up of a new textile

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<sup>20</sup> Joan Gómez's private archive, folder nr 1984, typewritten text by Joan Llanas, “Estampació premiarenca”.

<sup>21</sup> According to Margarita Garreta, rollers were engraved for Germany. She also remembers that Joan Rafegas, from Industrial Sedera, opened up the Asian market: photocopied stencils sent there to be engraved and printed.

factory in Ripoll, Premià de Mar and Sallent. The location of the different factories around the large Catalan textile district favoured agglomeration economies, for there was a base of suppliers, manufacturing centres, mechanical workshops and a consolidated auxiliary industry, which made the exchange of factors related to production and goods possible. The context for these business relationships also fostered an optimal concurrency and collaboration framework among textile companies. The economies that were external to the company but internal to the industrial district were an essential part of it.

The project of La Preparación Textil SA incorporated two innovative elements: the twine of artificial silk and a new printing technique of the final product: serigraphy. The technical innovation of Lyon-Barcelona was initially planned as an internal strategy of the company, for printing allowed it to provide higher added value to the products of the company with a greater differentiation of the fabrics. The new printing system provided better, cheaper and more versatile printed fabrics, and it was better adapted to the renewed fashion trends, which required a wider range of textile products, not only in pattern design, but also in a greater variability of the finishing.

Lyon-Barcelona was founded around three unique figures: Henri Grebler (entrepreneur and capitalist), Jean Badoy (who provided and conveyed the technical knowledge in serigraphy and trained the Lyon-Barcelona staff), and Roman Piera (the manager and soul of the company throughout its history). The location of the factory in Premià de Mar was due to the availability of high-quality water, the exploitation of previous industrial textile premises, the textile tradition and the good communication with other production centres.

Foreign direct investment was a key factor in structuring the project. The company was more similar to a free-standing manufacturing company than to a multinational corporation. However, given the importance of enterprise networks, based on common economic, cultural and religious interests, it was never an isolated free-standing company.

Seen from a dynamic point of view, the impact of foreign direct investment in talent building is strongly related to the contribution of new technical changes. We often associate technical changes with the application of new machinery and greater economic performance. But a new technical procedure has very important multiplying effects. The application of a new technique requires new training, which introduces a

new knowledge that otherwise would not make its application possible, and takes a specific form by introducing new professional skills and hiring new employees. Since we are referring to an innovative procedure, its dissemination leads to a horizon of growth that fosters entrepreneurship and the setting up of new companies in the same field of activity. This, in turn, may give momentum to a concentration of specialised production in a specific location, as long as the economic conditions are good.

The consequences and durability of DFI in local building cannot be dissociated from the contribution brought about by the technical change in the target economy. However, as Borensztein, De Gregorio and Lee have pointed out, this relationship is not automatic and depends on the capacity of the target economy to absorb and transform the technical change into new applied knowledge of high added value. Much before the second globalisation, the conditions of the target economy already shaped the impact brought about by the technical change based on foreign direct investment, which was also complemented with domestic investment. In fact, implementing a new technique in a final stage of the textile process within the framework of a large specialised industrial agglomeration favoured its quick development and multiplied its disseminating effects on the target economy.

## **Acknowledgments**

Many people have collaborated in the research presented here. In the first place, I would like to thank Joan Enric Vidiella and Marta Prevosti for their enthusiasm and encouragement in the study of the introduction of serigraph in Spain. The testimony of Roman Piera Boleda, son of the Lyon-Barcelona manager, has been a key element for understanding the organisation of the Lyon-Barcelona project. I am also thankful to Margarita Garreta and Hermínia Marroquí for sharing with me some glimpses of their extensive professional expertise. I am grateful to Joan Gómez for allowing me to consult his private archives. I also acknowledge Ronald Rietmann, Cultural Aggregate of the Swiss Consulate in Barcelona, who put me in contact with Marc Perrenou, Research Assistant in the History Service of the Swiss DFAE, who in turn gave me first-hand information about H. Grebler. I should also mention Jordi Catalan and Beatriu Krayenbuhl for useful remarks during my research.

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- Joan Enric Vidiella (printing entrepreneur; among other companies, he was the director of the company Vidiestil SA in Barcelona, 1971-2006). (Interview dates: November 2012 and January 2013)
- Margarita Garreta (designer at Lyon-Barcelona where she was in charge of the drawing section. Later on, with her husband Antonio Sierra Serena, a printer at Lyon-Barcelona between 1935 and 1950, they became self-employed and established their own engraving workshop: Grabados Sierra). (Interview date: July 2013)
- Hermínia Marroquí (designer, she worked at the company Gravats Miramar, among others). (Interview date: June 2013)
- Joan Gómez (former director of the Museu d'Estampació de Premià de Mar). (Interview dates: December 2012 and February 2013)

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