

A Kingdom for Small and Medium Entrepreneurship.

An Approach to the Study of Catalan Metal Industries in the 20th century

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Paper submitted to the
XIVth International Economic History Congress, Helsinki, 21-25 August 2006

Innovation and Networks in Entrepreneurship

Session No. 78

Organizers: Javier Vidal Olivares, María Inés Barbero, Mario Cerutti

A Kingdom for Small and Medium Entrepreneurship. An Approach to the Study of Catalan Metal Industries in the 20th century.¹

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I. Perception of SMEs at the end of the 20th century

Studies about Small and Medium Enterprises (SMEs) and about SMEs growth are no short in supply at all.² However, academic studies do not agree at all about a universally acceptable definition of SMEs. In the UK, and according to David Jeremy, during the late 1990s a micro-firm had less than 10 employees, a small firm between 10 and 99, a medium one between 100 and 499, and a big one more than 500 employees.³ However, in Australia a small firm is one with less than 20 employees, and a medium one has between 20 and 199.⁴ In a recent study about Spanish SMEs the authors considered a wide range until 250 employees, without clearly differentiating small from medium firms, but indicating that a micro-firm has less than 10 workers and that this category was 95% of all firms.⁵ Spanish and Catalan statistics of firms in 2003 did not

¹ Research for this study has received funding from the Ayuda a la Investigación en Ciencias Económicas, Fundación BBVA 2003, and from the research project SEJ2005-02788 of the Spanish Ministry of Education and Science. A preliminary version was presented at the seminar “Small and Medium Enterprises in Europe from 1880s to our days” organized by Michel Lescure, Sorbonne University, Paris, 20-21 January 2006.

² For an overview of recent works see Per Davidsson and Leona Achtenhagen, “Research on Small Firm Growth: A Review”, unpublished paper of the 35th EISB Conference “Sustaining the Entrepreneurial Spirit Over Time”, IESE Business School-University of Navarra, Barcelona, 16 Sept.2005. Also *Journal of Small Business Management*, *Journal of Small Business and Enterprise Development*, *International Small Business Journal*, *Small Business Economics* and *American Journal of Small Business*. In the last five years the Spanish journal *Economía Industrial* has devoted several special issues to SMEs and innovation in Spain.

³ Jeremy (1998), p. 329.

⁴ Geoffrey R. Durden, Vijaya Thyil and Marcel Truche, “Mapping innovation and entrepreneurial spirit in Small and Medium-sized Enterprises: Inputs, process and management”, unpublished paper at the 35th EISB Conference “Sustaining the Entrepreneurial Spirit Over Time”, IESE Business School-University of Navarra, Barcelona, 16 Sept.2005.

⁵ Obesso and Saiz (1999), 89-91.

consider firms with less than 20 employees, and established classifications only according to numbers of employees in a more neutral way.⁶

Definitions vary enormously depending on the country and time period under consideration, and usually do not take into account the life cycle and dynamism of the firms. Many tend to disappear, and only a few manage to become bigger or survive a century, as organizational studies and firm demographers indicate.⁷

Despite the lack of a universal definition and despite the high death rate of SMEs, most of the recent available work by politicians and entrepreneurial institutions repeat the outstanding importance of SMEs in most EU countries and worldwide, and their aggregate significant role for economic growth either taking into account employment or GDP contribution. Probably the key distinguishing feature of Spanish SME's economic role in contrast with the average EU SMEs would be their poor contribution to exports. Thus, in the late 1990s the percentage of micro-firms of less than 10 employees over total number of firms was 95 in Spain and 93 in the EU, SMEs sales over total sales 64% in Spain against 70% in the EU, SMEs employment over total employment 70% in Spain and 66% in the EU, though SMEs exports over total exports were only 44% of total in Spain against 61% in the EU.⁸ The contribution of SMEs to national exports is a very important theme, particularly for academics and politicians worried about competitiveness, cause exports are an indicator of comparative advantage of an economy.

⁶ I.N.E. (Instituto Nacional de Estadística), *Encuesta Industrial de Empresas*. 2003 (Madrid, 2004), and I.E.C. (Institut d'Estadística de Catalunya), *Estadística, producció i comptes de la indústria 2003* (Barcelona, 2003).

⁷ Philippe Jobert and Michael Joss, eds., *The Birth and Death of Companies. An Historical Perspective*. Lancaster and New Jersey, The Parthenon Publishing Group, 1990. Also papers presented at the *Workshop on Demography of Firms and Industries*, Universitat de Barcelona, 16-17 November 2001.

⁸ In 1998 according to Jeremy in the UK the percentage of SMEs over total number of firms would be 50%, whereas according to Obesso and Saiz in 1999 the percentage in Spain would have been around 99 per cent. See David J. Jeremy, *A Business History of Britain* (Oxford, 1998), p.329; and Mercedes Obesso and Jesús Saiz Saiz "Estrategias empresariales de las PYMES industriales españolas" in *Economía Industrial* 330 (1999), VI, 89. EU figures in Obesso and Saiz (1999) p.91.

Modern evolutionary theory and economic geography outline the importance SMEs located in metropolitan cities may have in the innovation process, which is the root of the creation of such a comparative advantage.⁹ This is because in metropolitan cities geographic and time proximity allow informal gatherings in multiple situations of TNCs (transnational corporations), big firms and SMEs, which favour knowledge-transfer and other positive spill-overs. Also, public and private investments and promotion of big and small firms mutually benefit both types of firms, particularly by increasing the qualification of the regional labour force, by improving the endowment in infrastructures, and by reducing the impact of particular firm's crisis through managerial intermediation (SEAT is today a good example). And, finally, geographical proximity of big firms and SMEs also potentially stimulate cooperation, trust, and collective learning, something which in SMEs is more important than it is for TNCs due to SME's internal innovative limitations.¹⁰

Doubtlessly changes in the global markets are having a direct impact in the way politicians and economic institutions perceive SMEs. In the case of Spain for at least three very recent reasons: 1) the decline of foreign investments as an engine of economic growth; 2) the social unrest de-localization is starting to create; and 3) the reduction of the role of European public funds as an engine of massive low-qualified job creation.

According to a recent report of the World Bank (Dec. 2005) about investment abroad in the world, Spain is increasingly considered less attractive for foreign

⁹ James Simmie, "Innovation and Space: A Critical Review of the Literature" in *Regional Studies* (August 2005), 39.6, pp.789-804.

¹⁰ James Simmie, "Innovation and Space: A Critical Review of the Literature" in *Regional Studies* (August 2005), 39.6, pp.789-804 (particularly p.796). Some factors that would help firms that operate in close geographical proximity are good labour force and inputs endowment, and knowledge and information exchange, according to Marshallian criteria commonly accepted, as in M. Fujita and A.J. Venables, *The Spatial Economy: Cities, Regions and International Trade*, Cambridge, The MIT Press, 1999.

investors, not just for economic reasons but above all for institutional conditions.¹¹ In this context national entrepreneurship and national capital will have to take a leading role in the near future as regards investment and employment. Secondly, the late 1990s has witnessed an increase in the process of de-localization of productive centers of national firms, and also of transnational corporations at a worldwide scale. This process, which affects all industrial countries, is in Spain starting to mean that thousands of people (fired workers and their families) apply for early retirement or unemployment subsidies, and therefore an increase in public expenses and social unrest is starting to take place though in a less dramatic way than in Germany or France. And finally, the transfer of European funds for Spanish development is being profoundly altered due to Spanish convergence in per capita income and the membership of new Eastern European countries in the EU. Spain is no longer the poor neighbour of the South, the fundamental contribution of European funds of the last two decades to the Spanish economy is going away, and Spain will have to pay instead of receiving in the coming years. The end of European subsidies for Spanish infrastructure and public construction (the big engine of Spanish employment and growth in the last decades), and the end or the reduction of subsidies for social programs of professional training and firm creation will require dramatic changes and alternatives to the massive creation of low-qualified jobs linked to these funds.¹²

These three recent developments will mean for the State less income and more expenses, and troubles to finance the Spanish welfare State and support the competitiveness of the Spanish economy. According to the President of the entrepreneurial association Foment del Treball Nacional Joan Rosell around 2.000

¹¹ A critical overview of this report appeared only in a few Spanish newspapers. See for example *Expansion* (Dec. 2005).

¹² For a general recent approach to Spanish economic history, Albert Carreras and Xavier Tafunell, *Historia Económica de España* (Barcelona, 2004)

Spanish firms are solidly connected to foreign markets, but only in Catalonia there are more than 34.400 industrial firms. What's the future for the more than 32.000 firms that are not well linked to foreign markets?¹³ It is against this framework that SMEs are today perceived in Spain by politicians, entrepreneurial associations, and a few academic scholars, as a central piece on which to try to base in solid grounds for the next decades innovation and competitiveness in Spanish industrial districts, and social peace regardless gender and social status.

The ways SMEs are perceived are extremely diverse depending on the associations and interests behind public discourses about them.

For Spanish Chambers of Trade and Industry, which are mainly composed of SMEs, this kind of low-added value firms are the key to social stability and urban life, and Chambers actively lobby to obtain protection particularly to stop the spread of big commercial malls, and to favour tax reductions. Also, Chambers of Trade and Industry are participating in collective efforts like the NEXIA Foundation, which tries to spread innovative managerial tools among SMEs with a family ownership structure.¹⁴

Also with a positive outlook academic scholars from management and sociological departments tend to stress the role of SMEs as very important actors in the promotion and success of innovative districts which would lead regional economic growth and national competitiveness in combination with political institutions and educational centers.¹⁵

¹³ Joan Rosell in *El País* 26 May 2006. The figure of 34.400 Catalan industrial firms corresponds to industrial census data for 2003 (Institut d'Estadística de Catalunya, *Estadística, producció i comptes de la indústria*, 2003, Barcelona, Generalitat de Catalunya/IEC).

¹⁴ Fundación Nexia is the result of the alliance of three institutions: Segasco, the Instituto de la Empresa Familiar (specialized in lobbying for big Spanish family firms) and the Consejo Superior de Cámaras. They also have the sponsorship of Fundación José Manuel Lara, Fundació Puig and GrupoRodés. Their offices are in Barcelona. Information available through www.fundacion-nexia.org

¹⁵ Some recent conferences and publications about this issue financed with either public or private funds are: The 35th EISB Conference "*Sustaining the Entrepreneurial Spirit Over Time*", IESE Business School-University of Navarra, Barcelona, 16 Sept.2005; CIDEM (Centre d'Innovació i Desenvolupament Empresarial) Conference "*Forum de la Innovación*", Centro de Convenciones Internacional de

Innovation and SMEs have also been during the last 10 years at the very center of political discourses that want to stimulate a culture of innovation and competitiveness in Spain. A recent and relevant example has been the discourse of President José Luis Rodríguez Zapatero in mid Nov. 2005, in which he announced a tax reform (of the “Impuesto de Sociedades”, recently approved in May 2006 in the Spanish Congress) which will lead to a significant 5 per cent tax reduction for SMEs and big firms (so it will be 25% on benefits for SMEs and 30% for big ones), with the aim of stimulating in this way entrepreneurship and investment in R+D, in which Spain is clearly behind its European neighbours. The background in this case is not only competitiveness but also the reduction of the percentage of public funds for Spanish R&D+i. In 2004 Spanish firms only were responsible of 52 % of total research in the country, in contrast with an average of 65% in the case of EU firms (78% Sweden and 71% Germany), whereas University research developed 30% of total research in contrast with 21% in average EU and 14% in the more developed countries. Former president of the Council of Nuclear Security in Spain Juan Manuel Kindelán used these figures to defend the need for private firms to lead future research and reduce the traditional leading role of the State in this area.¹⁶ President Rodríguez Zapatero’s tax reform doubtlessly fits in Kindelán’s line of thought, attempting to be more effective in promoting private firm investment in R&D than the last conservative government tax reforms related to R+D (headed by Minister Josep Piqué in the late 1990s) that were extremely complex to be implemented by SMEs.

Barcelona, 1-2 December 2004; Alfredo Martínez Bobillo, Miguel Fernández Temprano and Fernando Tejerina Gaité, *Innovación tecnológica y desarrollo regional* (Valladolid, 2003); and the special issue “Los retos empresariales en la sociedad del conocimiento. Catalunya innovadora” in *El Periódico*, 28 February 2004.

¹⁶ Juan Manuel Kindelán “La investigación y la empresa en España”, *El País* 30 November 2004,p.63.

Academic scholars are not blind to the problems of competitiveness of SMEs derived from their size, which limit or block the development of their potential capabilities. Among such problems economists in Spain have outlined the management of complex information, the ability to add value to their products and processes, the creation or transfer of R&D+I, the search of strategic technological partners, and a weak financial structure.¹⁷

However, the perceived need of finding alternatives in declining traditional industrial regions with thousands of SMEs, and the existence of a few Silicon Valley-style areas and firms that have become leading innovators in some sectors, growing from small workshops to high-tech medium or big firms in declining traditional industrial regions, are feeding an ideal and universally applicable image about the potential of SMEs.¹⁸ Industrial districts in regions of Ireland, England, France, or Italy, with a strong connection between path-dependent entrepreneurial needs and institutional support are models to follow. In fact Spanish Governments in the last years are increasingly devoting more and more resources to the creation of these technological parks and high-tech districts, trying to promote the creation of SMEs in TIC and biomedical or air-space industries, as it is being the case in the city of Barcelona. In agricultural regions, technological parks also try to promote innovation in SMEs in the

¹⁷ Obesso and Saiz (1999), 90-91. Similar arguments were indicated for the dominant family-owned SMEs in Vicente Salas and Carmen Galve in *La empresa familiar en España*, Madrid, FBBVA, 2003.

¹⁸ There are not many published studies about successful cases of SMEs that have grown and structurally changed from low to high added value production or services, though there are some like the case of the Mier family in electronics and TIC industries in Barcelona. From repairing and building radios in the 1950s, the small shop of Barcelona led by the two Asturian brothers Pedro and Ramón Mier Allende slowly expanded to build car, house and office electronic accessories (antennas, communicators, TVs); their intense networking with local and foreign firms and institutions allowed extensive knowledge-transfer in air-space electronics, which led to European contracts in air-space missions of the European Space Agency E.S.A. in 1985 and afterwards. Mier Comunicaciones, *Llegar más lejos* (Barcelona, 2002). The Rubiralta family, dealers of metal products from the Manresa area, also managed to build two industrial TNCs in two different areas: metal production and metal transformation (Francisco Rubiralta and his firm CELSA) and medical high-tech equipment (José María Rubiralta and his firm IZASA). For the case of Francisco Rubiralta see the forthcoming biography by Paloma Fernández in the collective book edited by Francesc Cabana *Los 100 empresarios catalanes del siglo XX*, LID, Madrid, in print.

agroindustrial sector.¹⁹ Autonomous Governments like the Catalan Generalitat are investing in the creation of institutions like CIDEM (Centre d'Innovació i Desenvolupament Empresarial) which promote formal and informal connections between academic scholars, entrepreneurs, and politicians, and a similar model is followed by declining industrial areas like the Vallès area with its own technological park.

The danger of public investments and academic sponsoring of artificially-created new industrial clusters is precisely the lack of attention to the fact that clusters are path-dependent and that social networks of trust and knowledge-transfer take historical time to develop and be geographically effective. In traditional clusters, often such networks led to formal associations of knowledge transfer, protection and identity creation in times of crisis, not in times of economic expansion and institutional support. The example of recent Irish or Finnish clusters cannot always be replicated in every region or country due to differential path-dependent institutional constraints. On the other hand, in traditional industrial regions, as in new successful service regions, clusters have tended to associate big and SMEs firms that want to respond to market challenges and not to institutional demands.

This study wants to present an example of such a traditional industrial cluster in which big firms have co-existed with SMEs in very successful, mutually fruitful ways. The example is the metal firms of the Barcelona district during the 20th century. The main objective of the following section is to provide evidences of 1) the long history of existence of this district, 2) the relevant role of the Barcelona metal district and firms at a national level, 3) the outstanding importance of personal and family SMEs in competitive branches of this district, like it is the case today of specialized machinery

¹⁹ An example, Alfredo Martínez Bobillo, Miguel Fernández Temprano and Fernando Tejerina Gaité, *Innovación tecnológica y desarrollo regional* (Valladolid, 2003).

production. And 4) that future policies that try to foster regional competitiveness in this sector should take into account recent theories and empirical research about innovation in European SMEs. According to these ideas radical innovation is more difficult to take place in SMEs located in territories that had not traditionally pioneered such kind of innovations. In these cases incremental innovation is more likely to take place, in connection with the existence of networks and clusters that had historically constituted the basis for change and advance in such firms and territories. Incremental innovation has been, besides, very important in sectors where a few big firms and many SMEs do coexist, and where technology favours convergence among productive branches –as it is the case of the metal mechanic industries-.²⁰

Data from industrial censuses, tax registers, and entrepreneurial institutions are scattered and difficult to compare, though they clearly indicate the historical specialization of Barcelona firms in metal transformation, in whose diversified production it took an outstanding role at Spanish level. Data comes from 20th century sources, though 19th century tax registers like the Contribución Industrial used by historian Jordi Nadal also show the important concentration of metal producers that had existed in the Barcelona province since at least mid 19th century.²¹ Metal firms during the 19th and 20th century had traditionally been SMEs in Catalonia, with few exceptions

²⁰ Mike Parsons and Mary Rose, “Communities of Knowledge, Entrepreneurship Innovation and Networks in the British Outdoor Trade 1960-1990”, *Business History*, vol. 46, no. 4, October 2004. Diverse literature applying to industrial and services companies in different European countries in Paloma Fernández Pérez, coord., *Innovation and Entrepreneurship in Europe: Keys to International Competitiveness*, Unpublished Fundación BBVA Report, March 2006. The particular case study of the metal mechanic industries in Spain is addressed in Pere Pascual and Paloma Fernández, eds., *Del metal al motor. La evolución de las industrias de transformados metálicos, maquinaria y transportes en España, siglos XIX-XX*. Madrid, FBBVA, en prensa.

²¹ Jordi Nadal i Oller, “La metal.lúrgia”, in J.Nadal, J.Maluquer, C.Sudrià and F.Cabana, dirs., *Història Econòmica de la Catalunya Contemporània*. Barcelona, Enciclopèdia Catalana, 1991, vol. III, 159-201.

in transport material industries (La Maquinista, SEAT) and light metal transformation (Rivière, CELSA).²²

Twentieth-century data are the main source of information for this paper, and they suggest the importance of Barcelona's metal leadership in Spain until the Civil War, and afterwards despite the effects the Francoist period, when sources indicate a significant reduction in the number of relevant incorporated firms that had a legal residence in the Catalan capital and an unprecedented increase of public firms and added value of this industrial branch in Madrid due to State intervention (see Statistical Appendix). The persistent relevance of metal manufacturers in Catalonia between the 1940s through the 1970s can doubtlessly be interpreted because of the localization of the big car factory SEAT in Barcelona and its auxiliary industries.²³ Also, though it is less known, because of the existence of a very diverse number of firms that had historically been producing specialized manufactures well adapted to specific needs of manifold market niches, like the weaving machinery of the Bages and Osona villages, or machinery for the food and beverages industries of the Gironès, Alt Penedès, and Maresme areas.

²² In general, about the scarcity of big firms in Spain, Albert Carreras and Xavier Tafunell, "La gran empresa en España 1917-1974. Una primera aproximación", in *Revista de Historia Industrial*, no. 3, 1993, pp. 127-143. An approach to light metal industries in Catalonia in Paloma Fernández, *Un siglo y medio de trefilería en España, Barcelona*, MRTSA, 2004. Jordi Catalan has published about these topics in J. Nadal, dir., *Atlas de la industrialización en España 1750-2000*, Barcelona, Crítica-FBBVA 2003; and also in *L'Avenç*.

²³ Jordi Catalan is currently studying the history of SEAT. The car industry in Spain has attracted the attention of several scholars (José Luis García Ruiz, Jordi Catalan, Luis German, Jordi Nadal, Salvador Estapé, Elena San Román, Ester Sánchez, among others).

II. Family SMEs and big firms: A century-old history of neighbourhood in the Barcelona metalmechanic district

The concentration of SMEs in small specialized machinery and of big firms in transport material is today the main picture which best describes Catalan metal industries. Specialized machinery made in Catalonia represented in 2000 around 35% of this branch of activity in Spain. In this year Catalonia alone manufactured 90% of Spanish textile machinery production, 80% for Spanish machinery for plastic production, and 57% of food and beverages machinery. Catalonia is also one of the main European automobile regions, with three manufacturers (Seat, Iveco, Nissan) that employed almost 250.000 persons, had sales for 25.000 million euros, in 2002, and concentrated several outstanding centers of technological innovation of MNCs like Lear, Daimler Chrysler, Delphi, Frape Behr and Volvo. Catalonia is also the center of one of the most important European steelwire producers: CELSA.²⁴

The evidences we will provide in this section reveal that the entrepreneurial structure of the metal industries in Catalonia has been consistently characterized by the century-old coexistence of a few relatively big firms and thousands of small and medium firms, at the beginning of the 20th century as it is still the case at the beginning of the 21st century.

Table 1 below shows that in 1916 almost half of the metal manufacturing centers in Spain with more than 10 employees (247 productive centers, of the total number of 752) were located in the Barcelona province. The table also shows that Barcelona concentrated a good number of big productive centers, as well as a good number of the total SMEs specialized in metalmechanic production.

²⁴ Juan Ortega Galán y Angel Herмосilla, *Cincuenta años del CEAM y de la metalurgia catalana*. Barcelona, CEAM, 2002. On the car industry in Catalonia, Jordi Vilardell Sánchez, *Catalunya com a regió del sector de l'automòbil: opcions per a un clúster?* Barcelona, COPCA, 2004 (available through internet). On CELSA and the steel wire industries, Paloma Fernández Pérez *Un siglo y medio de trefilería en España: Moreda y Rivière*, Barcelona, MRTSA, 2004.

Table 1. Number of Metal-Mechanic “Enterprises” in Spain by size (number of productive centers by number of employees), 1916

	from 10 to 40	from 41 to 200	more than 200	Total number of centers with +10 empl.
Alava	5	3		8
Albacete		1		1
Alicante	6	2		8
Almería	4			4
Badajoz	6	3		9
Baleares	4	1		5
Barcelona	175	53	19	247
Cádiz	4	1	1	6
Canarias	3	4		7
Castellón	4			4
Ciudad Real	1	1		2
Córdoba	4	4	1	9
Coruña	6	2		8
Cuenca	1			1
Girona	9	4		13
Granada	6	1		7
Guipúzcoa	17	10	1	28
Huelva		5	3	8
Jaén			4	4
León				
Lérida	3			3
Logroño	3	2		5
Madrid	25	12		37
Málaga	6	6		12
Murcia	3	8	3	14
Navarra	8	3		11
Orense	2	1		3
Oviedo	18	20	6	44
Palencia	1	1		2
Pontevedra	6	4		10
Salamanca	5	3	2	10
Sevilla	17	11		28
Tarragona	13	1		14
Valencia	32	12		44
Valladolid	6	3		9
Vizcaya	45	39	19	103
Zamora	1	1		2
Zaragoza	15	6		21
TOTAL SPAIN	465	228	59	752

Source: Own elaboration from Archivo Militar de Segovia “Comisión Movilización Industrial. Ministerio de Guerra, 1916-1921” and José Marvá (1917) “Ligero bosquejo de las industrias en España en su relación con las necesidades militares en general, y en particular con las del material de ingenieros” in Memorial de Ingenieros del Ejército, 1917. The source only took into account centers with 10 or more employees. Original information came from questionnaires sent to the firms and from entrepreneurial local associations and chambers of trade and industry. Military officers appointed to gather the answers were sent and depending on their previous experience with the industry they added –as in Catalonia’s case- (or reduced as in the case of the Basque Country) information about local conditions and problems influencing the development of metal-mechanic centers. Not every firm provided information about employees, and the table offers only data for centers that provided such data.

The list of firms located in Barcelona in 1916 (see Table 6 in Appendix) includes information regarding their name, size, location and specialties, and reveals a great diversity, and a great proximity in the city, a geographical indication of the existence of an industrial district specialized in metal mechanic manufacturing. In 1916 Barcelona had around 19 big productive centers (more than 200 employees) and around 175 small and medium centers with more than 10 employees.

Industrial census data for 2003 confirms this is still the picture. In 2003 Catalonia had a 11.417 metal mechanic firms (7.340 in metallurgy, 2.616 in mechanical

production, 791 in office machinery and 670 related to transport material production): between two-thirds and 86 per cent of them had less than 20 employees, and only in transport material 13 per cent of the firms had more than 100 employees.²⁵

The conclusion is that data for 1916 and 2003 shows a compact Barcelona metal mechanic district with few relatively medium firms in transport material, and thousands of small firms in light metal and mechanic transformation.²⁶

According to these sources (military reports and official industrial censuses) most of the small and medium firms in Catalonia have been manufacturing products for special market niches: machinery for local dynamic sectors (printing workshops, textile industries, other metal workshops, agricultural industries, leather treatment) and “light” metal manufacturing like nails, wires, springs and wirecloth for diverse clients (mining, paper-makers, agricultural industries, domestic consumption). Now small specialized machinery and transport material industries in Catalonia have a national relevance they didn’t have during the early years of the 20th century, when they were more limited to a few regional markets. Another change in 2000 regarding 1916 is that light metal production in some branches like the wire industries have witnessed the end of SMEs and the creation of a big Catalan TNC which is CELSA.²⁷

On the other hand, evidences for 1916 (military reports), 1958, 1978 (industrial census), and 2000 (industrial census and reports from metal producers’ association in Catalonia CEAM –Centro de Estudios y Asesoramiento Metalúrgicos-) unveil a sector whose ownership structure has historically been dominated by personal and family ownership (in metal transformation and machinery construction for special market

²⁵ Institut d’Estadística de Catalunya (2003), *Estadística, producció i comptes de la indústria*, Barcelona, Generalitat de Catalunya/IEC, p. 119,table 4.1.10.

²⁶ For 1916 source is the same of table 1. For 2003 Institut d’Estadística de Catalunya (2003), *Estadística, producció i comptes de la indústria*, Barcelona, Generalitat de Catalunya/IEC, p. 119,table 4.1.10.

²⁷ On CELSA and Spanish iron and steel wire industries, see Paloma Fernández, *Moreda y Rivière. Un siglo y medio de trefilería en España, 1854-2004*, Barcelona, MRT-Trivium, 2004.

niches). An impressive 97% of the 3.000 firms in specialized machinery and mechanic production of Catalonia in 2000 had in average less than 50 workers each, and were dominantly family-owned (only two had more than 400 workers), with more than 50% of its production going to foreign markets.²⁸ Transport material (manufactures for railways and the car industry) has attracted the few big incorporated metal firms that have historically concentrated metal employment in Catalonia.

The predominance of personal and family ownership is well-known, though difficult to support with statistical evidences for the past decades. But there are some we have gathered in the Appendix. Table 6 of this Appendix presents the names of all the Barcelona metal-mechanic firms with more than 10 employees registered by military officers in 1916, and most of them clearly suggest family ownership: Hijos de Jaime Planas, Hijos de Francisco Lacambra, Francisco Rivière e Hijos, Hijo de I. Damians, Hjos de José Preckler, Herederos de Alexander Hermanos, Hijos de Emilio Detouche, Hijos de Dionisio Escorza, Hijos de Ramon Boris, Hijos de José Canela, Augusto Klein e Hijo, Hijos de Luciano Llechós, Hijos de Federico Ciervo, Enrique Cardellach y Hermano, Hijos de Brisó, Hijo y Yerno de Andrés Oliva, Hijos de José O. de Sentmenat, Valls Hermanos, Herrera Hermanos, and others.

Tables 19 and 20 of the Appendix present additional revealing data for 1958 and 1978. According to them in 1958 only 1.666 of a total of 70.717 metalmechanic enterprises in Spain were joint-stock companies (in Barcelona province 630 of a total of 8.802 metalmechanic firms). In 1978 after the big crisis of prices a big number of metalmechanic firms had disappeared but still only a minority were joint-stock companies: 2.635 of the 39.973 firms in Spain, and 1.012 of the 7.688 in Barcelona.

²⁸ Juan Ortega Galán y Angel Hermosilla, *Cincuenta años del CEAM y de la metalurgia catalana*. Barcelona, CEAM, 2002, p. 131 to 136. Also Statistical Appendix, tables based on industrial censuses with data on relevance of machinery industries with very small size (by number of workers) for year 2003.

Table 20 in the Appendix indicates that personal firms were the great majority of firms in the sector in 1978, more than 80 per cent in Spain.

These informations suggest that since 1916 until 2000 personal and family ownership has remained dominant in metalmechanic industries in Spain, and in Catalonia in particular, despite technological revolutions, price crises, internationalization and globalization, and big mortality cycles for the firms of the sector. Why? The answer requires another paper, but there are some hypothesis we can here present for discussion.

Barcelona has historically been an industrial district with a diversified services sector. The city, and the nearby cities of Terrassa, Sabadell, Manresa, Granollers and Mataró, have constituted centers of an “industrious” population in the meaning given some years ago by Jan De Vries. With a relatively poor endowment of natural resources in comparison with the Northern Italian or French industrial districts, though with a strong path-dependent process of human capital formation starting in the early modern period, these industrious cities of Catalonia were able to create long-lasting networks of entrepreneurs and firms through which capital, goods and services flowed providing sources of wealth that remain to our days among the most outstanding ones of the country.²⁹

Catalonia’s and Barcelona’s sources of industrial wealth have often been related to the strength of the textile industries, particularly cotton, in which the region remained for centuries as the leading Spanish territory in this branch of activity. However, Catalonia also was the most important region of the country in important added value branches of the metal industries during the 20th century. This is a relevant fact, cause we should not forget that metal industries have led Spanish industrial

²⁹ *Història Econòmica de Catalunya*, Fundació Enciclopedia Catalana, several years. Michael Porter included Catalonia as one of his case studies about the competitive advantage of nations in the 1980s-1990s.

modernization and technological transfer during most of the 20th century, and that according to such different scholars like M. Berg or N. Rosenberg the metal transforming industries are sources of technological convergence and economic growth.³⁰

Syderurgy has been basically concentrated in the Northern regions of Asturias, Cantabria, and the Basque Country.³¹ The most important firms and factories in metal production were located in these two regions during most of the 20th century, as shown in the “Most important metal mechanic S.A. firms in Spain” of the Appendix, with data coming from the “Anuario Financiero y de Sociedades Anónimas de España”: *Altos Hornos de Vizcaya, Duro-Felguera, Cía. Siderúrgica del Mediterráneo, Industrial Asturiana Santa Bárbara, Fábrica de Mieres, Nueva Montaña, Basconia*.³²

Nevertheless, metal industries are not at all limited to metal production. In fact, in countries and regions with lack of raw materials metal production is not at all the king star of the metal industries, but metal transformation.³³ The ranking of most important limited firms in Spain before the Civil War (1936-1939) in the metal mechanic industries reveal that 23 of the 35 most important firms specialized in metal mechanic transformation:

³⁰ Maxine Berg, *La era de las manufacturas 1700-1820. Una nueva historia de la Revolución Industrial británica*. Barcelona, Crítica, 1987. Nathan Rosenberg, *Dentro de la caja negra. Tecnología y economía*. Barcelona, Hogar del Libro, 1993. On the role of metal industries for technological convergence and economic growth in backward countries see Pere Pascual and Paloma Fernández, eds., *Del metal al motor. La evolución de las industrias de transformados metálicos, maquinaria y equipo de transporte en España, siglos XIX y XX*, Madrid, FBBVA, en prensa.

³¹ The most important research about this has been done by Jordi Nadal, Antonio Escudero, Germán Ojeda, and Emiliano Fernández de Pinedo. More recently contributions by Carmen Erro, Mikel Sáez, Eduardo Sánchez, and articles in *Revista de Historia Industrial*.

³² A general study about the development of metal production in Spain, in J. Nadal, dir., op.cit.

³³ Pere Pascual and Paloma Fernández, eds., *Del metal al motor. La evolución de las industrias de transformación metálica, maquinaria y equipo de transporte, siglos XIX y XX*. Madrid, FBVVA, en prensa.

Table 2. Most Important Metal-Mechanic S.A. Firms in Spain, 1935

Ranking/Name	Year registration S.A.	Knominal(Mpts)	Province	Specialty
1. Altos Hornos Vizcaya	1902	125	Vizcaya	Siderurgy
2. S.M. Duro-Felguera	1900	77,5	Madrid	Siderurgy
3. Cía. Sid. Mediterráneo	1917	75	Vizcaya	Siderurgy
4. S.E. Construcción Naval	1908	60	Madrid	Ship-Building
5. Echevarría	1920	30	Vizcaya	Mach/Metal Constr.
6. Fábrica Mieres	1879	25	Oviedo	Siderurgy
7. Cía. Auxiliar Ferrocarriles	1917	23	Guipúzcoa	Mach/Metal Constr
8. Babcock & Wilcox	1918	20	Vizcaya	Mach/Metal Constr
9. La Maquinista T. y M.	1855	20	Barcelona	Mach/Metal Constr
10. Ind. Ast. Sta Barbara	1895	20	Oviedo	Siderurgy
11. Unión Naval Levante	1924	17,2	Madrid	Ship-Building
12. Ajuria	1914	15	Alava	Mach/Metal Constr
13. Unión Cerrajera	1906	15	Guipúzcoa	Mach/Metal Constr
14. Basconia	1892	14	Vizcaya	Siderurgy
15. S.E. Constr. Metálicas	1901	12,5	Vizcaya	Mach/Metal Constr
16. La Hispano-Suiza	1904	10	Barcelona	Cars/Airplanes
17. La Hispano	1917	10	Guadalajara	Cars/Airplanes
18. Firestone Hispania	1932	10	Vizcaya	Cars/Airplanes
19. Nueva Montaña	1899	10	Santander	Siderurgy
21. Ford Motor Ibérica	1921	9	Barcelona	Cars/Airplanes
22. Euskalduna	1900	8	Vizcaya	Ship-Building
23. Laviada	1919	7	Oviedo	Mach/Metal Constr
24. Talleres Miravalles, Palencia e Ibaizabal	1925	6,7	Vizcaya	Mach/Metal Constr
25. Fábrica Sn Fco. Desierto	1892	6,5	Vizcaya	Siderurgy
26. Aceros Lasarte	1928	6	Guipúzcoa	Mach/Metal Constr
27. Aluminio Español	1925	6	Madrid	Mach/Metal Constr
28. Elizalde	1927	4,5	Barcelona	Cars/Airplanes
29. General Motors Peninsular	1925	4	Barcelona	Cars/Airplanes
30. Nacional Pirelli	1924	4	Barcelona	Cars/Airplanes
31. Sn Pedro Elgoibar	1918	3	Guipúzcoa	Siderurgy
32. Fundiciones Alsasua	1920	3	Navarra	Siderurgy
33. Fundiciones de Vera	1919	3	Navarra	Siderurgy
34. Talleres del Astillero	1913	2,5	Santander	Ship-Building
35. David	1914	2	Barcelona	Cars/Airplanes

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

According to available data and our research in progress, Catalonia was through all the 20th century “the” leading region in Spain as regards metal transformation. The number of productive centers in 1900 and 1916, in Barcelona, were 341 and 302, a third of the total Spanish ones (933 in 1900 and 904 in 1916).³⁴

In mid 20th century value added data confirm this importance, as shown in table 3 below:

Table 3. Added Value of Metal-Mechanic Industries (current million pesetas) in selected Spanish Provinces

Province	Metallic Products and Machinery			Transport material		
	1955	1965	1975	1955	1965	1975
Álava	323	1.999	10.045	12	721	2.561
Asturias	233	1.298	5.662	148	453	2.806
Ávila	5	45	270	0	49	550

³⁴ For 1900 Dirección General de Contribuciones (1901), *Estadística Administrativa de la Contribución Industrial y de Comercio para 1900*, Madrid, Establecimiento Tipográfico Hijos de J.A. García, 1901. For 1916 Archivo Militar de Segovia. Legajos Comisión Movilización Industrial 1916-1921. Región Militar de Cataluña. Data for 1900 are originally taxpayers (“contribuyentes”), and for 1916 productive centers with more than 10 workers, so care must be taken when making comparisons between both years.

Barcelona	3.841	26.923	111.668	906	7.441	40.269
Cantabria	403	1.601	7.927	84	285	1.037
Guipúzcoa	1.172	8.236	36.553	276	1.204	3.323
Jaén	29	212	1.242	0	372	1.897
Madrid	2.288	16.029	67.529	23	6.714	24.674
Navarra	166	1.616	12.447	0	51	1.819
Palencia	18	125	1.017	0	0	0
Pontevedra	126	527	3.634	181	1.806	10.894
Sevilla	248	1.480	7.331	151	1.007	3.477
Tarragona	149	1.089	5.247	0	14	142
Valencia	868	3.904	17.141	97	704	2.988
Valladolid	72	277	1.716	0	1.660	18.218
Vizcaya	2.282	9.031	35.411	371	2.524	7.936
Zaragoza	604	3.196	14.576	0	460	667
TOTAL	14.639	86.441	393.456	2.938	29.965	143.448
MetalMechInds/Total	11,07	18,23	20,20	2,22	6,32	7,36
Ind. (%)						

Source: José Luis García Ruiz in "La industria de la automoción en Madrid: ¿hubo oportunidades perdidas?", Pere Pascual and Paloma Fernández, eds., *Del metal al motor: la evolución de las industrias de transformados metálicos, maquinaria y equipo de transporte en España, siglos XIX y XX*, Madrid, FBBVA, forthcoming, with original data from Fundación BBV, *Renta Nacional de España y su distribución provincial. Serie homogénea. Años 1955 a 1975*, Bilbao, 1999.

In 2003 Catalonia still has the most important concentration of employment of Spanish metal industries:

Table 4. Industrial Labour Force of Metal Industries. Selected Spanish Autonomous Communities, 2003

Activity	Spain	Catalonia	Basque Country	Madrid	Valencia	Andalouisia	Aragon
Metal Products							
*Total workers	423388	91187	81422	34792	36653	36474	15096
*Workers in firms 20 or + workers	264439						
Machinery							
*Tot.workers	190201	50409	35064	19302	18193	12678	11018
*Workers firms 20 or + workers	142806						
Transport material							
*Tot.workers	218079	51458	20404	23331	15844	17360	16822
*Workers firms 20 or+ workers	202822						
TOTAL Workers	831668	193054	136890	77425	136890	66512	42936

Source: INE. *Encuesta industrial de empresas 2003* (Madrid, INE, 2004).

For this accumulated concentration of firms, employment, and knowledge, a good number of the most important big firms in machinery, metal construction, and transport material of Spain have chosen to be located in the Barcelona province through the 20th century, particularly before Franco's dictatorship and the unfair competition of the industrial public sector and the favoured location of its firms in Madrid. Tables of the Appendix entitled "Most important metal-mechanic firms in Spain" confirm this

argument, though you must take into account important firms like SEAT and Roca Radiadores had legal residence in Madrid but factories in Catalonia.

Why Barcelona has created a clear specialization in light metal manufacturing, small specialized machinery, and transport material, with many SMEs and a few big firms?. The hypothesis of this paper are that:

1. These three different branches have developed consistently in this territory because of the previous diversification of the Catalan economy, and because of the accumulation of knowledge and human capital in the territory.
2. Because of the dominance of SMEs and the scarce presence of big firms innovation has probably been historically incremental and not radical, very linked to the specific demands and needs of diverse clients.³⁵
3. Because institutions (the Mancomunitat, Francoist dictatorship, Autonomous Governments) have contributed to preserve family ownership in this sector, in this region, the death rate of metalmechanic SMEs in Catalonia probably has been lower than in other regions with less institutional protection. For this possible reason the associations of family SMEs may have been stronger to preserve autonomy against big firms than in other countries. And possibly also for institutional reasons the coexistence of many SMEs and a few big firms has been mutually beneficial, and not a race against SMEs.

³⁵ Jan Fagerberg, David C Mowery and Richard R Nelson *The Oxford Handbook of Innovation*, Oxford, Oxford University Press, 2005. Paloma Fernández, coord., *Innovation and Entrepreneurship in Europe: Keys to International Competitiveness*. Unpublished Fundación Banco Bilbao Vizcaya Argentaria Report, March 2006.

III- Some final remarks

This study is a first approach at the study of SMEs and the Metal Transformation Industries in Catalonia in a long-term perspective. The elaboration of a few data with statistics that confirm the importance of SMEs in this industrial sector in Catalonia throughout a century has been the main contribution of the paper. Some remarks regarding the importance of the coexistence of these firms with a few big ones can lead argue that SMEs can be considered like legal shells within which individual capabilities are created and combined. The shells can be modified throughout time, they can disappear (demography of firms consistently indicates the short life-cycle of SMEs), and their members can participate in different new shells. The important point to remark is that individual capabilities and their combination in close spatial proximity, in a very dynamic and diversified local economy like Barcelona and its surrounding area, seem to have provided human capital that has been available for renewed innovative activities across technological revolutions in the 20th century. This fits with current district-literature approaches to the competitive advantage SMEs gain from innovative spillovers they get from geographically close big firms.³⁶

There's still a lot of research to be done of a qualitative kind, to dig a bit in the strategies and performance of SMEs in specialized machinery and light metal manufacturing in Catalonia. What we at least have revealed is that the Barcelona cluster in these two branches of activities has had an outstanding importance at the regional and national levels, that they specialized small firms and big firms have lived together for

³⁶ Works by Parsons-Rose, Popp-Wilson.

more than a century in a mutually beneficial relationship created more than a century ago in a limited spatial proximity.

Politicians are now worried about investing in new industrial clusters and high-tech parks (there are 60 in Spain now), and it seems as if historical institutional support that has helped preserve the coexistence of small and big firms in metal-mechanic industries in Catalonia is starting to loose strenght.

APPENDIX

1. Structure of Spanish Industry 1900-1973 (%)

	1900	1955	1973
Agroindustries	40,33	16,19	11,61
Textiles	26,68	19,19	7,34
Metal industries	8,11	25,51	38,73
Chemicals	5,57	12,84	14,38
Paper&Publishing	5,03	3,97	6,17
Construction	4	4,67	6,00
Wood	2,45	9,04	6,07
Leather	2,93	8,59	9,70
Others	4,9		
Total	100	100	100

Source: J.Nadal,A.Carreras,C. Sudrià (1987), *La economía española en el siglo XX. Una perspectiva histórica*. Barcelona, Ariel; Banco de Bilbao, *Renta Nacional de España y su distribución provincial*.

Note:Data for 1900 is tax information that excludes Basque Country and Navarre, regions which are considered for years 1955 and 1973. Metal industries include siderurgy and machinery construction but do not consider metal constructions. Leather in 1973 includes shoes. According to added value data for 1997 agroindustries had grown to become 20% of total, transport material 12%, 8% each of several activities (electric material, office machines, textile-leather,non-metallic minerals, and metallic products), and around 5% the other industrial activities.

2. Relevance of SMEs in Catalan Industry, 2003

	Number of industrial firms
Total	34.436
Less 4 employees	11.535
4-19 employees	16.753
20-49 employees	4.079
50-99 employees	1.030
100-499 employees	859
500 and more	179

Source: Institut d'Estadística de Catalunya (2003), *Estadística, producció i comptes de la indústria*, 2003 (Barcelona, Generalitat de Catalunya/IEC,2003).

3. Number of Enterprises in Catalan Industry by Subsector and Dimension of the Firm, 2003

Activity	% Industrial Firms (by number employees)				total firms
	-20 e.	20-49 e.	50-99e.	100 or +e.	
Mining&Energy	81,1	9,8	4,3	4,8	100 (440 firms)
Agroindustries	75,0	15,8	4,1	5,2	100(2727 firms)
Textiles&Shoes	83,4	11,7	2,8	2,1	100(5849 firms)
Wood	94,8	4,2	0,6	0,5	100(2113 firms)
Paper&Publishing	85,5	9,5	2,5	2,4	100(4041 firms)
Chemicals	55,9	2,1	9,1	13,8	100(1064 firms)
Plastics	71,4	18,3	4,5	5,8	100(1501 firms)
Non-metallicminerals	77,9	14,8	3,0	4,3	100(1315 firms)
Metallurgy	86,05	10,1	2,1	1,3	100(7340 firms)

Mechanical prod.	76,3	16,7	4,7	2,3	100(2616 firms)
Office machinery	84,7	11,1	1,9	2,3	100(791 firms)
Transport material	65,1	16,4	5,1	13,3	100(670 firms)
Electronics	75,0	14,9	4,7	5,5	100(1150 firms)
Others	90,2	7,1	1,5	1,1	100(2818 firms)
Total	82,1	11,8	3,0	3,0	100(34436 firms)

Source: Institut d'Estadística de Catalunya (2003), *Estadística, producció i comptes de la indústria*, 2003 (Barcelona, Generalitat de Catalunya/IEC, 2003, p.119, table 4.1.10).

4. Industrial Firms in the City of Barcelona, 2000 and 2002

Year	Total number of firms	Industrial firms	Metal Transformation Firms
2000	165.498	11.580	3.436
2002	168.863	11.140	3.291

Source: IDESCAT, www.idescat.net/territ/BasicTerr "Establiments d'empreses i professionals per grans sectors d'activitat (IAE). Web information obtained in 16 November 2005.

5. Metal-mechanic "enterprises" in Spain, 1916 (productive centers with more than 10 workers)

Andalucía	106
Aragón	23
Asturias	49
Baleares	7
Canarias	8
Cantabria	17
Castilla-León	21
Castilla-La Mancha	9
Cataluña	302
Euskadi	175
Extremadura	11
Galicia	32
Madrid	45
Murcia	31
Navarra	11
Rioja	7
Valencia	60
TOTAL SPAIN	904

Source: Own elaboration, from Archivo Militar de Segovia, "Comisión Movilización Industrial. Ministerio de Guerra, 1916-1921" and José Marvá (1917) "Ligero bosquejo de las industrias en España en su relación con las necesidades militares en general, y en particular con las del material de ingenieros" in Memorial de Ingenieros del Ejército, 1917. Enterprises/productive centres are not equal to firms.

6. Metal-mechanic firms in the Barcelona province. Employment, Power, Specialties, and Localization, 1916

Workers	HP power	Name	Referen ce in source	Product Specialties	Location (factory and/or offices)	Main branch of activity
5		Pedro Deucausé	1061i	Fundicion	BCN Pueblo Seco, Cabanas 31	S
5	2	Antonio Poch	987		BCN entre FFCC ZM y San Martín	FM
5	10	Isidoro Tribó	1050(d)	Engranajes	BCN, Calabria 197	CM
5	10	Isidro Tribo	1050d	Engranajes	BCN Calabria 197, Mallorca	CM
6	11	Jaime Guardia	994	Fabricacion soldadura amarilla y fusion metales	BCN junto Pueblo Seco	SYCM
6	14	Juan Mercé	967	Hierro		S
7	1	Ramón Puigjaner	922	Bombas hidráulicas	BCN, por Gracia	FM
7	3	S. Ramón	812			CM
7	5	Miguel Sala	964			FYRM
8		Jose Prat	2531	Fundicion	Igualada	S
8	3	José Bachs	859			FYRM
8	5	Francisco Nonell	820			FYRM
8	10	Delfin Bonshoms	1000(d)	Fundicion	BCN San Martín Vehils 2	S
8	10	Delfin Bonshoms	1000d	Fundicion		S
9	2	Federico Escuder	915	Maquinaria para estampacion	BCN entre	FM

				de chapa	Universidad Industrial y Paseo Gracia	
9	5	Viuda de Joaquín Lleal	814			RM
9	5	Emilio Judas	839	Bronce	BCN entre U	S
9	5	Miró Cortés y Ventosa	875		BCN junto Paseo sn Juan	FM
10	1	Andrés Costa	953			RM
10	2	José Roset	823			FYRM
10	2	P. Guisasola	867		BCN San Martin	RM
10	2	Sebastián Fuster	923		BCN entre Pueblo Seco y Estacion Norte	RM
10	3	Francisco Gasch	840		BCN junto Gran Via	S
10	3	Ignacio Guadall	930	Reparaciones mecanicas y sobre todo automoviles	BCN entre Universidad Industrial y Paseo Gracia	RM
10	4	J. Vilà Renom	958			FYRM
10	5	Balart y Saus	826	Maq y material electrico		FM
10	15	José Planell	965	Reparacion		RM
11	2	Sucesores de Camilo Guitart	811			FYRM
11	8	Juan Salvatella	947		BCN junto Pueblo Seco	FYRM
12	2	Domingo Butifoll	976			FYRM
12	2	Bofarull Hnos.	983	Herramientas	BCN entre Pueblo Seco Y Gran Via	CM
12	6	Parera	974			FYRM
13	2	Miguel Granés	957			FYRM
13	4	C. Turquí	916		BCN junto Gran Via	FYRM
13	4	Auto Taller Condal	1061g	Construcciones mecanicas	BCN Aribau 49 esq Aragon	FM
13	5	Duch y Argemí	961			FM
14	2	Joaquin Roura	831		BCN junto Paseo sn Juan	S
14	2	Domenech y Reig	841		BCN entre Universidad Industrial y Paseo Gracia	S
14	2	Juan Esquiú	975			FYRM
14	3	Camellas y Bonells	952	Hierro		S
14	5	Ignacio Boada	902		BCN entre Tranvia Badalona y Pueblo Nuevo	FYRM
14	5	José Roig Chovar	913	Bombas hidráulicas	BCN entre Universidad Industrial y Paseo Gracia	FM
14	12	Sans Hermanos	912	Barras cilindricas de acero Siemens	BCN entre Universidad Industrial y Paseo Gracia	CM
14	20	Maurer y Compañía	1060	Carpinteria mecanica	BCN Mallorca 12	CM
15	3	C.H. Pascals	833	Tornos y máquinas de limar		FM
15	5	Raimundo Colominas	985		BCN entre Universidad industrial y Sants	RM
15	1.5	Herederos de la Viuda de Moliné	821			S
15	7	Herederos de Francisco Selma	1061	Fundicion	BCN Aragon 116 Borrell	S
15	8	Steenhausen Otto y Compañía	986	Maquinaria imprenta	BCN, por Gracia	FM
15	10	Manuel Falguera	835			FYRM
16	3	F. Rius y Ferrer	946		BCN junto Pueblo Seco	FYRM

16	11	Herederos de José Guardiola	866		BCN entre Universidad Industrial y Sants	FYRM
16	7.5	Francisco Prats	807	Humidificadores y bombas		FM
16	14	Baciano Sanahuija y Margarit	824	Cardado y apresto lanas		FM
17	4	Heredera de Francisco Usich	847	BCN, entre Gracia y Sagrera		S
18	2	Sucesores de Duran Cañameras	960			FM
18	3	Juan Puigjaner	925		BCN entre Pueblo Seco y Estacion Norte	CM y S
18	2.5	Salvador y Ros	845	Bronce y otros metales		S
18	8	Sucesores de Bas	956			FM
18	20	Juan Lermi	828	Fundicion	BCN Pueblo Nuevo	S
19	27	Antonia Oluella de Moreno	1082	Alambre y clavos	BCN Pueblo Seco, Parlamento 30	CM
20	3	Rigoberto Jambrina	829		BCN entre FFCC ZM y San Martin	S
20	3	A.E.G. Thomson Houston Iberica S.A.	920	Reparacion motores electricos		RM
20	6	Juan Padrlo	1050a	Fundicion	Hostafranchs, Cortes 310	S
21	3	Juan Turú	834	Maquinaria textil		FYRM
21	5	Andres Guillamot	924	Material electrico	BCN entre Pueblo Seco y Estacion Norte	CM
21	10	Magín Desveus	959			FYRM
21	16	J.Vidal Hermanos	927	Maquinaria	BCN junto Pueblo Seco	FM
23	33	Juan Torres	979	Camas de hierro y somiers	BCN, por Gracia	CM
24		Bousams y Teruel	990	Fundicion hierro	BCN junto Sagrera	S
24	15	Viuda e Hijo d Miralles Brugada	1050e	Maquinaria	BCN Calabria 195 Mallorca	FM
25		Establecimiento Mecanico Bacás	815	Maq para curtidos		FM
25	8	José y Jacinto Trullás	822			FYRM
25	8	Mariné, Mauri y Deval	982		BCN entre San Martin y FFCC ZM	FM
25	25	Felix Gallent	813	Fundicion		S
26	10	Laboratorio Vellino	910	Motores explosion, grupos electrogenos y bombas elevacion agua	BCN, entre Gracia y Sagrera	FM Y CM
27	6	Arturo Santamaría	929	Puertas de acero ondulado y fundicion hierro y metales	BCN junto Paseo sn Juan	CM y S
27	7	José Jover	872	Amasadoras	BCN junto Gran Via	FM
27	10	Comte, Josá, Cabré y Compañía	914	Maquinaria para estampacion de chapa	BCN entre Universidad Industrial y Paseo Gracia	FM
28	6	Coll y Carreras	901	Caldereria en general	BCN San Martin	CM
28	7	Udo Steinberg, S.C.	917			FYRM
28	10	Anglas y Serra	1000e	Fundicion		S
28	10	Anglas y Serra	1000(e)	Fundicion	BCN Pujadas 97, Dos de Mayo	S
28	12	Herrera Hnos.	830	Fundicion		S
29	12.5	Baqué Lloret	978	Remates, platinas, calderas	BCN junto Pueblo Seco	CM
30	5	H. Peter	984			FM
30	6	Aniceto Negre	865		BCN entre Universidad Industrial y Paseo Gracia	FM
30	10	Wenceslao Llorens	1069	Objetos aluminio	BCN Gracia,	CM

					Granada 40	
30	13	Baxarias y Codina	993	Griferia		CM
30	15	Pedro Cardús	1058	Camas	BCN entre mallorca y provenza	CM
31	20	Roura y Bombardó	932	Fundicion y taller mecanico		FYRM
32	5	Foirá y Guixé	2454	Fundicion	BCN frente Pl. España	S
33	6	Giralt y Ribas	838	Latones y bronce	BCN entre Pueblo Seco y Estacion Norte	S
33	12	Pujol Comabella y Compa	2518	Aeroplanos	BCN Independ 130yAlmogavars167	FMYCM
33	85	Juan Estela Clará	1089	Trefileria	BCN San Martin, Pedro IV 268	CM
34	5	Isidro Forn Ruiz	864		BCN entre Universidad Industrial y Paseo Gracia	FM
35	12	Alejandro Riera, S.C.	874	Telares y amasadoras para panificación	BCN junto Paseo sn Juan	FM
36	6	Valls Hermanos	854	Prensas	BCN entre Pueblo Seco Y Gran Via	FM
36	8	Talleres Roca	954	Radiadores calefacción		CM
36	15	Juan Abelló	837	Maquinaria industrial textil		FYRM
37	6	Mortori Guell Canet y Ca	2519		BCN San Martin Pedro IV 108	FM
37	8	Hijos de Jose O. De Sentmenat	1050k	Cajas de hojas de lata	BCN Pueblo Seco	CM
37	10	Agustin Mas	862		BCN Pueblo Nuevo	FM
37	10	José Sagarra y Cia	869		BCN junto Sagrera	FYRM
38		Soujol y Compañía	991	Tuberia para conduccion de agua		CM
38	5	Francisco Espí	898	Hierro	BCN entre FCC ZM ySan Martin	S
38	8	Antonio Gras	1062	Cajas de hojas de lata	BCN Calabria 140, Aragon	CM
38	45	Font y Campabadal	861	Engranajes	BCN junto Gran Via	CM
38	63	Sucesores de E. Coral	906	Caldereria gruesa y gruas	BCN junto Pueblo Seco	CM
39	12	Salvador Font Verdaguer	817			FYRM
39	13	Joaquin Prats	951	Construccmaquinaria general y fundicion hierro		S YFM
39	25	Francisco Blanch	938	Maquinaria		FM
40	17.5	Hijo y Yemo de Andrés Oliva	871	Fundicion y taller mecanico	BCN entre Tranvia Badalona y Pueblo Nuevo	FYRM
40	70	Trefileria y Punteria Catalana	1081	Alambre y clavos	BCN Pueblo Seco, Ricart 1 a 7	CM
41	6	Hijos de Brisó	1059	Basculas y arcas	BCN Muntadas 10	CM
42	7	Viuda e Hijos de Gustavo Guanch	936	Máquinas para generos de punto		FM
45	6	Nicolas Agustín	863	Maquinaria para géneros de punto	BCN junto Gran Via	FM
47	15	Balzach y Compañía	827			FYRM
47	47	José Ma. La Coma	1055	Fundicion y taller mecanico	BCN San Martin en AliBey	S
48	10	Menna Claramunt	962	Maquinaria para trabajar madera		FM
49	30	Pedro Pujol	992	Embuticion y estampado de laton y metales blandos	BCN entre Pueblo Seco Y Gran Via	CM

50	15	José Castells	921	Caldereria gruesa y construcc.mecanicas	BCN junto Pueblo Seco	CM
52	32	J. Fernando Sanz	1084	Fundicion	BCN Calabria esq Tamarit	S
54	32	Sindicato Nacional de maquinaria agrícola	905	Maquinaria agricola	BCN entre Tranvia Badalona y Pueblo Nuevo	FM
56	26	Enrique Tarrida	948	Faros, faroles, aparatos calefaccion agua	BCN junto Pueblo Seco	CM
56	65	Juan Cots	858	Resortes, tornillería, lanzaderas para máquinas de tejidos	BCN entre Pueblo Seco Y Gran Via	CM
63	5	Enrique Cardellach y Hno. S.C. Ingenieros	870	Ascensores y montacargas	BCN junto Gran Via	FM
72	15	Vallet y Fiol y Ca	919	Reparacion automoviles y construccion motores explosion	BCN entre Universidad INdustrial y Paseo Gracia	FYRM
75	15	E. Schilling y P. Paguaga	943	Escopetas caza	BCN Pueblo Nuevo	CM
76	54	Deo Canals y Cia	856	Caldereria de hierro	BCN San Martin	CM
78	27	Juan Llopart	1052	Fundicion	BCN San Martin en Pedro IV 333	S
78	100	Industrias Mecánicas S.A.	908	Fundicion y fabricac hierro, embragues a friccion	BCN junto a Gran Via en salida dir. Sur	CM y S
80	10	Hijos de Federico Ciervo	886	Contadores de gas	BCN, Barceloneta	CM
80	77	Vivó Torras y Cia	852	Material eléctrico	BCN entre Pueblo Seco Y Gran Via	CM
80	100	Hugo Heusch y Ca.	1061f	Alfileres	BCN Diputacio 112 a 116, Borrell	CM
82	35	A.Casajuana Pfeiffer	890	Maquinaria agricola	BCN San Martin	FM
85	30	Pedro Tuñó	1051	Carpinteria mecanica	BCN Tarragona 111, despacho Lafont 24	CM
90	9	Hijos de Luciano Llechós	1090	Basculas y arcas	BCN Dos de Mayo Mallorca	CM
90	42	Rosell y Vilalta	893	Maquinaria para la industria textil	BCN entre Tranvia Badalona y Pueblo Nuevo	FM
90	94.5	Ballarín, S.A.	977	Cerrajería y metalistería	BCN, por Gracia	CM
94	125	Compañía de Cables Electricos	988	Cables eléctricos		CM
96	43	José Pané	857	Maquinaria molineria y tuberias hidraulicas	BCN San Martin	FM
98	6	Marcelino Vilarrasau	868		BCN San Martin	FM
100	25	Torres y Bordas S. Limitada	903	Maquinaria para trabajar metales en plancha	BCN Pueblo Nuevo	FM
100	26	Ferrero y Compa.	1064	Cubas de chapa de hierro	BCN Calabria 123, Diputacion	CM
100	42	S.A. Serra	955	Maquinaria		FM
100	90	Ribas y Pradell	1077	Serreria mecanica y puntas de paris (Las Franquesas)	Franquesas, Las	FyCM
101	68	Vivé y Casals	873	Fundicion	BCN junto Paseo sn Juan	S yRM
105	500	Hijos de José Canela	892	Maquinaria para tejidos	BCN San Martin	FM
110	43	Tintoré y Oller, S.C.	1000(1)	Objetos hoja de lata	BCN Gracia Granada 40	CM
110	43	Tintoré y Oller, S.C.	1000(1)	Objetos hoja de lata		CM
111	21	Augusto Klein e Hijo	934	Maquinas para generos de punto	BCN entre Pueblo Seco Y Gran Via	FM
111	25	Mateo Grau	900	Bronces y sus aleaciones	BCN junto Gran	S

					Via	
124	53	Hijos de Jaime Planas	911	Prensas para embutir proyectiles	BCN entre Universidad Industrial y Paseo Gracia	FM Y CM
125	193	Hijos de Francisco Lacambra	2539	Fundicion y laminacion de cobre (fabrica San Hipolito Voltregá, Torello)	Torello fabrica Sn Hipolit Voltrega; Desp.BCN Alibey 21	S YCM
134	33	S.A. Girbau	926	Articulos ferreteria y fundicion hierro		CM y S
140	115	A. Elizalde	860	Construcciones automoviles y motores aviacion	BCN, entre Gracia y Sagrera	FM
147	147	Aceros San Martín	931	Fundicion acero		S
150	80	Antonio Marqués	909	Fabricación de cuchillos y tijeras	BCN entre Gracia i St. Gervasi	CM
152	190	Francisco Rivière e Hijos	998 (pero en plano 894)	Fabricación de alambres (Casa Antunez)	BCN junto Castillo Montjuic -casa Antunez-	CM
153	140	Talleres Hereter	945	Fabricacion pequeños automóviles		FM
160	160	Hijo de I. Damians	895		BCN entre Universidad Industrial y Paseo Gracia	FM
163	24	Hijos de José Preckler	1057	Articulos d chapa de hierro	BCN Consejo Ciento 243, Casanovas	CM
163	72	Juan Mas Bagá	1079	Fundicion, ferreteria, fumisteria	BCN Valencia 344 a 356	SYCM
174	70	Herederos de Alexander Hermanos	888	Máquinas de vapor, calderas para las mismas y turbinas hidráulicas	BCN, Barceloneta	FM Y CM
190	50	Aceros Hispania S.A.	941	Fundicion aceros moldeados		S
200	269	Hijos de Emilio Detouche	1065	Trefileria	BCN Gracia, Matadero 28	CM
208	208	Industrias Marnel S.A.	1047	Trefileria	BCN Dos de Mayo 195 Consejo Ciento	CM
208	250	Altos Hornos de Cataluña	969	Laminacion hierro y acero		S YCM
219	243	Chamon y Triana	949	Contadores gas y electricidad		CM
245	185	Hijos de Dionisio Escorza	944	Fundicion aceros y construccmecanicas	BCN entre Pueblo Seco Y Gran Via	S Y FM
250	490	Société et Établissement Junquier	894	Maquinaria para municiones		FM
294	70	Francisco Rivière e Hijos	997	Tejidos metalicos (D. Trafaltar, F. Cataluña 57, S.M.)	BCN San Martín (despacho en Trafalgar)	CM
300	507	La Unión Metalúrgica S.A.	904	Tornillería y fragua	BCN San Martín	CM y S
348	180	Ribas y Pradell	928	ver carnet 1077	BCN junto Estacion Norte - y carnet 1077 en Franqueses ver-	FM Y CM
350	400	Hijos de Ramon Boris S.en C.	1075	Trefileria	Badalona fabrica y desp BCN	CM
365	120	S.deNavegación e Industria	897	Maquinas y calderas marinas	BCN, Barceloneta	FM Y CM
411	300	Siemens Schuckert Industria Eléctrica S.A.	989	Material eléctrico		CM
483	1650	Juan Torras	971	Herreria y construccion Mecanicas	BCN San Martín	S YCM
560	150	G. De Andreis	1073	Envases metalicos	Badalona fabrica y desp BCN	CM
604	510	La Hispano-Suiza	884	Automóviles y motores para aviones	BCN junto Sagrera	FM

685	650	La Maquinista Terrestre y Marítima	882			FM Y CM
714	600	Pirelli y Compañía	825	Conductores electricos y articulos de goma		FM
1200	2020	S. Material para Ferrocarriles y Construcciones	942	Hierros y aceros laminados,construccMetalicas, material ffcc	BCN Pueblo Nuevo	CM y S

Fuente: Own elaboration from “*Provincia de Barcelona. Memoria de la Comisión de Estadística, 1916. Memoria redactada por la Comisión constituida por el Comandante de Artillería don Fernando de la Torre y Capitán del mismo Cuerpo don Mariano de Salas, para investigar el auxilio que la industria civil puede proporcionar a la militar en la provincia de Barcelona*” Archivo General Militar de Segovia. Legajo 3s-1d-I30 de la Comisión de Movilización Industrial. I acknowledge Elena San Román for her generous help in locating this source.

Notes:

- F and RM mean “production and repair of machinery”, CM “metallic constructions”, S metal production and RM “repair of machinery”.
- The source seems reliable. The responsible military officer in charge of gathering the data from entrepreneurs and local institutions was Comandante Fernando de la Torre, who worked ten years in civil industry and knew very well the particular problems of these industries, in open contrasts with military officers responsible of doing the same job of gathering information from the rest of Spain. The source indicates that there was a very high interests and participation of interviewed people and institutions in Catalonia (Delegación de Hacienda, Cámara Oficial de Industria y Comercio, Asociación de Industriales Mecánicos y metalarios de Barcelona, and around 80% of all estimated centers specialized in manufacturing and repair of machinery and metal products). F. de la Torre wrote in page 44 of the “Memoria de Barcelona” that approximately 20% of the small repair workshops with one or more “tornos y algunas máquinas de taladrar y limar” could not be included in his statistics.

These military data are much more complete than the often quoted J.Playà’s statistics for Barcelona province of 1913 in which only mechanic and electric manufactures were estimated, thus excluding all other specialties of the metal and mechanic (José Playá, *Estado y Estadística de las Industrias Mecánicas y Eléctricas en la provincia de Barcelona, en el año 1913*, Barcelona, Imprenta de Pedro Ortega, 1913, páginas 47-48).

7. Number of Metal-Mechanic S.A. Firms in Spain and Barcelona Province, 1922-1978 (Number of S.A.)*

	1922	1929	1935	1940	1958	1978
*Machinery&Metal Construct.						
Spain	251	322	328	289	1.272	1.958
Barcelona Prov.	114	138	136	111	482	808
*Cars/Airplanes						
Spain	69	80	76	68	289	467
Barcelona Prov.	25	27	27	27	122	140
*Ship-Building						
Spain	19	7	7	8	32	48
Barcelona Prov.	6	1	0	5	8	8
*Siderurgy						
Spain	19	20	24	24	73	119
Barcelona Prov.	3	3	5	21	35	35
*Engine-Building						
Spain	---	---	---	---	---	43
Barcelona Prov.	---	---	---	---	---	21
TOTAL Spain	358	429	435	389	1.666	2.635
TOTAL Barcelona Prov.	148	169	168	143	630	1.012

Source: *Anuario Financiero y de Sociedades Anónimas de España*. Madrid, Editorial SOPEC. For years 1922, 1929, 1935, 1940, 1959-1960 and 1979-1980. A critical appraisal of this source in Albert Carreras y Xavier Tafunell (1993) “La gran empresa en España(1917-1974).Una primera aproximación”, *Revista de Historia Industrial*, 3, 127-145.

* Note: The table only includes those S.A. firms for which the source provided data on capital nominal. The sources, and the table, include firms specialized in production, repair, and commercial businesses.

8. Most Important Metal-Mechanic S.A. Firms in Spain in 1922

Ranking	Name	Year registration as S.A.	Capital Nominal(M.Pts)	Prov.	Specialty
1.	Altos Hornos Vizcaya	1902	125	Vizcaya	Siderurgy
2.	Sociedad Metalúrgica Duro-Felguera	1900	78	Madrid	Siderurgy
3.	Cía Siderúrgica del Mediterráneo	1917	50	Vizcaya	Siderurgy
4.	Sociedad Española de Construcc.Navali	1909	50	Madrid	Ship-Building

5.Sociedad Minero-Siderúrgica de Ponferrada	1918	30	Madrid	Siderurgy
6.Industrial Asturiana Santa Bárbara	1895	20	Oviedo	Siderurgy
7.La Maquinista Terrestre y Marítima	1855	20	Barcelona	Mach./MetalConstr.
8.Española de Construcciones Babcock&Wilcox	1918	20	Vizcaya	Mach/MetalConstr.
9.Española de Construcciones Metálicas	1901	18,5	Vizcaya	Mach/MetalConstr.
10.La Hispano-Suiza	1904	10	Barcelona	Cars&Airplanes
11.La Hispano	1917	11	Guadalajara	Cars&Airplanes
12.Cia.Metalúrgica Sn.Juan de Alcaraz	1886	10	Madrid	Mach/MetalConstr.
13.Echevarría	1920	10	Vizcaya	Mach/MetalConstr.
14.Nueva Montaña	1899	10	Santander	Siderurgy
15.Astilleros de Tarragona	1918	10	Barcelona	Ship-Building
16.Basconia Cía. Anónima	1892	9,5	Vizcaya	Siderurgy
17.Cía.Euskalduna de Constr.y Repar.deBuques	1900	8	Vizcaya	Ship-Building
18.Material para Ferrocarriles y Construcciones	1881	7,7	Barcelona	Mach/MetalConstr.
19.Astilleros Minguell	1916	7,5	Barcelona	Ship-Building
20. G.deAndreis Metalgraf Española	1916	7	Barcelona	Mach/MetalConstr.
21.Unión Cerrajera	1906	6	Guipúzcoa	Mach/MetalConstr.
22.Altos Hornos de Andalucía	1912	6	Málaga	Siderurgy
23.Talleres de Miravalles	1920	5	Vizcaya	Mach/MetalConstr.
24.Talleres Hereter	1912	4	Barcelona	Cars&Airplanes
25.Torras Herrería y Construcciones	1918	4	Barcelona	Mach/MetalConstr.
26.Soc.Electro-Metalúrgica Ibérica	1918	4	Madrid	Siderurgy
27.Ajuria y Aranzabal	1914	3	Alava	Mach/MetalConstr.
28.Talleres de Deusto	1892	3	Vizcaya	Mach/MetalConstr.
29.Talleres Ibaizabal	1918	3	Vizcaya	Mach/MetalConstr.
30.Maquinaria y Metalurgia Aragonesa	1902	3	Zaragoza	Mach/MetalConstr.
31.San Pedro Elgoibar	1918	3	Guipúzcoa	Siderurgy
32.Astilleros de Pasajes de Sn Juan	1918	3	Guipúzcoa	Ship-Building
33. Astilleros Eraso	1918	3	Guipúzcoa	Ship-Building
34.Construcciones Prekler	1920	3	Barcelona	Mach/MetalConstr.
35. United Shoe Machinery Co.	1917	2,5	Barcelona	Mach/MetalConstr.

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

Note: The words "sociedad anónima", which are in most of the firms, have been eliminated. Capital is "capital nominal" in million pesetas of that year; the province is that where the legal residence of the firm is located though often factories are in other provinces as it was the case of S.M. Duro-Felguera (Oviedo), Cía Metalúrgica de Sn Juan de Alcaraz (Riopar,Albacete), Astilleros de Tarragona (Tarragona), o S.E.C.N. The specialty is the one indicated in the source, though particularly in the biggest firms integration existed and the firms combined different specialties. Mach/Metal Constr. Means Machinery and Metal Construction. The sources includes firms that either produced, repaired, and bought/sold products and services from other firms. In Cars&Airplanes the source and the table include production and/or distribution of pneumatics, bikes, motorcycles and accessories. This note must be taken into account in the following 10 and 11 Tables of the Appendix.

9. Most Important Metal-Mechanic S.A. Firms in Spain, 1929

Ranking/Name	Year RegistrationS.A.	Knominal(Mpts)	Province	Specialty
1. Altos Hornos de Vizcaya	1902	125	Vizcaya	Siderurgy
2.S.M. Duro-Felguera	1900	77,5	Madrid	Siderurgy
3.Sociedad Española de Construcción Naval	1908	60	Madrid	Ship-Building
4.Cía.Siderúrgica del Mediterráneo	1917	50	Vizcaya	Siderurgy
5.Fábrica de Mieres	1879	25	Oviedo	Siderurgy
6.Cía Auxiliar de Ferrocarriles	1917	23	Guipúzcoa	Mach/MetalConstr.
7.La Maquinista Terrestre y Marítima	1855	20	Barcelona	Mach/MetalConstr.
8.Industrial Asturiana Santa Barbara	1895	20	Oviedo	Siderurgy
9.Unión Naval de Levante	1924	17,2	Madrid	Ship-Building
10.Ford Motor Ibérica	1921	15	Barcelona	Cars&Airplanes
11. Unión Cerrajera	1906	15	Guipúzcoa	Mach/MetalConstr.
12. Basconia	1892	14	Vizcaya	Siderurgy
13. Sociedad Española de Motores y Materiales	1928	12,5	Barcelona	Mach/MetalConstr.
14. Sociedad Española de Constr.Metálicas	1901	12,5	Vizcaya	Mach/MetalConstr.
14. Nueva Montaña	1899	10	Santander	Siderurgy
15.Sociedad Electro-Metalúrgica	1918	10	Madrid	Siderurgy
16. La Hispano-Suiza	1904	10	Barcelona	Cars&Airplanes
17.La Hispano	1917	10	Guadalajara	Cars&Airplanes
18. Ajuria	1914	10	Alava	Mach/MetalConstr.
19.Echeverría	1920	10	Vizcaya	Mach/MetalConstr.
20.Cía Euskalduna de Constr.yReparac.Buques	1900	8	Vizcaya	Ship-Building
21.Material para Ferrocarriles y Construcciones	1881	7,7	Barcelona	Mach/MetalConstr.
22.Elizalde	1927	4,5	Barcelona	Cars&Airplanes
23. General Motors Peninsular	1925	4	Madrid	Cars&Airplanes
24.Fábrica Nacional de Bicicletas	1929	3	Guipúzcoa	Cars&Airplanes
25.Morris España	1927	3	Madrid	Cars&Airplanes
26. San Pedro Elgoibar	1918	3	Guipúzcoa	Siderurgy
27.Talleres Aco	1923	2,5	Guipúzcoa	Cars&Airplanes
28. Talleres del Astillero	1913	2,5	Santander	Ship-Building
28.Nacional Pirelli	1924	2	Barcelona	Cars&Airplanes
29.David	1914	2	Barcelona	Cars&Airplanes
30. Altos Hornos de Cataluña	1916	2	Barcelona	Siderurgy

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

10. Most Important Metal-Mechanic S.A. Firms in Spain, 1935

Ranking/Name	Year registration S.A.	Knominal(Mpts)	Province	Specialty
1. Altos Hornos Vizcaya	1902	125	Vizcaya	Siderurgy
2. S.M. Duro-Felguera	1900	77,5	Madrid	Siderurgy
3. Cía. Sid. Mediterráneo	1917	75	Vizcaya	Siderurgy
4. S.E. Construcción Naval	1908	60	Madrid	Ship-Building
5. Echevarría	1920	30	Vizcaya	Mach/Metal Constr.
6. Fábrica Mieres	1879	25	Oviedo	Siderurgy
7. Cía. Auxiliar Ferrocarriles	1917	23	Guipúzcoa	Mach/Metal Constr
8. Babcock & Wilcox	1918	20	Vizcaya	Mach/Metal Constr
9. La Maquinista T. y M.	1855	20	Barcelona	Mach/Metal Constr
10. Ind. Ast. Sta Barbara	1895	20	Oviedo	Siderurgy
11. Unión Naval Levante	1924	17,2	Madrid	Ship-Building
12. Ajuria	1914	15	Alava	Mach/Metal Constr
13. Unión Cerrajera	1906	15	Guipúzcoa	Mach/Metal Constr
14. Basconia	1892	14	Vizcaya	Siderurgy
15. S.E. Constr. Metálicas	1901	12,5	Vizcaya	Mach/Metal Constr
16. La Hispano-Suiza	1904	10	Barcelona	Cars/Airplanes
17. La Hispano	1917	10	Guadalajara	Cars/Airplanes
18. Firestone Hispania	1932	10	Vizcaya	Cars/Airplanes
19. Nueva Montaña	1899	10	Santander	Siderurgy
21. Ford Motor Ibérica	1921	9	Barcelona	Cars/Airplanes
22. Euskalduna	1900	8	Vizcaya	Ship-Building
23. Laviada	1919	7	Oviedo	Mach/Metal Constr
24. Talleres Miravalles, Palencia e Ibaizabal	1925	6,7	Vizcaya	Mach/Metal Constr
25. Fábrica Sn Fco. Desierto	1892	6,5	Vizcaya	Siderurgy
26. Aceros Lasarte	1928	6	Guipúzcoa	Mach/Metal Constr
27. Aluminio Español	1925	6	Madrid	Mach/Metal Constr
28. Elizalde	1927	4,5	Barcelona	Cars/Airplanes
29. General Motors Peninsular	1925	4	Barcelona	Cars/Airplanes
30. Nacional Pirelli	1924	4	Barcelona	Cars/Airplanes
31. Sn Pedro Elgoibar	1918	3	Guipúzcoa	Siderurgy
32. Fundiciones Alsasua	1920	3	Navarra	Siderurgy
33. Fundiciones de Vera	1919	3	Navarra	Siderurgy
34. Talleres del Astillero	1913	2,5	Santander	Ship-Building
35. David	1914	2	Barcelona	Cars/Airplanes

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

11. Most Important Metal-Mechanic S.A. Firms in Spain, 1940

Ranking/Name	Year Registration S.A.	Knominal(Mpts)	Province	Specialty
1. Altos Hornos Vizcaya	1902	250	Vizcaya	Siderurgy
2. S.M. Duro-Felguera	1900	77,5	Madrid	Siderurgy
3. C.S. Mediterráneo	1917	75	Vizcaya	Siderurgy
4. S.E. Construcción Naval	1908	60	Madrid	Ship-Building
5. Cía. Auxiliar Ferrocarriles	1917	50	Guipúzcoa	Mach/Metal Constr
6. Babcock & Wilcox	1918	40	Vizcaya	Mach/Metal Constr
7. Echevarría	1920	30	Vizcaya	Mach/Metal Constr
8. Unión Naval Levante	1924	30	Madrid	Ship-Building
9. Fábrica de Mieres	1879	25	Oviedo	Siderurgy
10. José María Quijano	1914	22,5	Santander	Mach/Metal Constr
11. Basconia	1894	21,5	Vizcaya	Siderurgy
12. Ind. Astur. Sta Barbara	1895	20	Oviedo	Siderurgy
13. Unión Cerrajera	1906	20	Guipúzcoa	Mach/Metal Constr
14. Ajuria	1914	20	Alava	Mach/Metal Constr
15. La Maquinista T. y M.	1855	20	Barcelona	Mach/Metal Constr.
16. Firestone Hispania	1932	20	Vizcaya	Cars/Airplanes
17. Construcc. Aeronáuticas	1936	17,5	Madrid	Mach/Metal Constr
18. Rivière	1935	16,5	Barcelona	Mach/Metal Constr
19. Nueva Montaña	1899	15,2	Santander	Siderurgy
20. Patricio Echeverría	1938	15	Guipúzcoa	Mach/Metal Constr
21. La Hispano-Suiza	1904	15	Barcelona	Cars/Airplanes
22. Ford Motor Ibérica	1920	9	Barcelona	Cars/Airplanes
23. Pradera Hermanos	1938	8	Vizcaya	Siderurgy
24. Euskalduna	1900	8	Vizcaya	Ship-Building
25. Fábrica Sn Fco. Desierto		6,5	Vizcaya	Siderurgy
26. S.A. para fabricar Neumáticos Michelin	1933	5	Guipúzcoa	Cars/Airplanes
27. Elizalde	1927	4,5	Barcelona	Cars/Airplanes
28. General Motors Pen.	1925	4	Barcelona	Cars/Airplanes
29. Nacional Pirelli	1924	4	Barcelona	Cars/Airplanes
30. Fundiciones Alsasua	1920	3	Navarra	Siderurgy

31. Continental, F.E. Caucho	1935	2,75	Madrid	Cars/Airplanes
32. I.N. Taxímetros y aparatos precisión	1930	2,5	Barcelona	Cars/Airplanes
33. Talleres del Astillero	1913	2,5	Santander	Ship-Building
34. Neumáticos Continental	1935	2,01	Madrid	Cars/Airplanes
35. La Constructora Guipuzcoana	1918	1	Guipúzcoa	Ship-Building

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

12. Most Important Metal-Mechanic S.A. Firms in Spain, 1958

Ranking/Name	Year Registration S.A.	Nominal (Mpts)	Province	Specialty
1. Altos Hornos de Vizcaya	1902	2.119,3	Vizcaya	Siderurgy
2. E.N.A.S.A.	1946	2.100	Madrid	Cars/Airplanes
3. Manufacturas Metálicas Madrileñas (former Manufact. Aluminio)	1924	1.047,25	Madrid	Mach/Metal Constr
4. S.E.A.T.	1950	900	Madrid	Cars/Airplanes
5. S.M. Duro-Felguera	1900	756	Madrid	Siderurgy
6. S.E.C. Babcock & Wilcox	1918	770,4	Vizcaya	Mach/Metal Constr
7. S.E.C.N.	1908	634	Madrid	Ship-Building
8. Fábrica Mieres	1879	600	Oviedo	Siderurgy
9. Basconia	1892	529,7	Vizcaya	Siderurgy
10. Cia Auxiliar Ferroc.	1917	474,7	Guipúzcoa	Mach/Metal Constr
11. Materialy Constr. (former Girona-Devis)	1881	450	Madrid	Mach/Metal Constr
12. La Maquinista T. y M.	1855	400	Barcelona	Mach/Metal Constr
13. ENDASA	1943	440	Madrid	Mach/Metal Constr
14. Astilleros y Talleres NO	1944	371,2	Coruña	Ship-Building
15. Euskalduna	1900	357,5	Vizcaya	Ship-Building
16. Bazan	1947	350	Madrid	Ship-Building
17. S.E. Constr. Electromecán.	1917	332,8	Madrid	Mach/Metal Constr
18. Nueva Montaña Quijano	1899	312	Santander	Mach/Metal Constr
19. Aluminio Ibérico	1951	300	Madrid	Mach/Metal Constr
20. ZINSA	1956	300	Madrid	Mach/Metal Constr
21. Firestone Hispania	1932	300	Vizcaya	Cars/Airplanes
22. Motor Ibérica	1929	262,5	Barcelona	Cars/Airplanes
23. Metalúrgica Sta. Ana	1955	253,5	Madrid	Mach/Metal Constr
24. Astilleros de Cádiz	1952	230	Madrid	Ship-Building
25. E.N. Motores Aviación (former Elizalde)	1927	200	Madrid	Cars/Airplanes
26. Asturiana del Zinc	1957	200	Oviedo	Mach/Metal Constr
27. FADISA	1956	160	Avila	Cars/Airplanes
28. Máquinas Coser ALFA	1940	150	Madrid	Mach/Metal Constr
29. Unión Cerrajera	1906	151,5	Guipúzcoa	Mach/Metal Constr
30. I.N.A.S.A.	1956	150	Navarra	Mach/Metal Constr
31. Patricio Echeverría	1938	150	Guipúzcoa	Mach/Metal Constr
32. I.N.A.S.A.	1956	150	Navarra	Mach/Metal Constr
33. Patricio Echeverría	1938	150	Guipúzcoa	Mach/Metal Constr
34. Construcc. Aeronáuticas	1923	123	Madrid	Cars/Airplanes
35. SIASA	1942	120	Madrid	Siderurgy
36. F.Y.E.S.A.	1950	104	Madrid	Mach/Metal Constr
37. Echevarría	1920	100	Vizcaya	Siderurgy
38. Lanz Iberica	1953	100	Madrid	Cars/Airplanes
39. Victorio Luzuriaga	1898	100	Madrid	Mach/Metal Constr
40. Ac. y Forjas de Azcoitia	1939	100	Madrid	Mach/Metal Constr

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

Note: The words "sociedad anónima", which are in most of the firms, have been eliminated. Capital is "capital nominal" in million pesetas of that year; the province is that where the legal residence of the firm is located though often factories are in other provinces as it was the case of S.M. Duro-Felguera (Oviedo), Cia Metalúrgica de Sn Juan de Alcaraz (Riopar, Albacete), Astilleros de Tarragona (Tarragona), o S.E.C.N. The specialty is the one indicated in the source, though particularly in the biggest firms integration existed and the firms combined different specialties. Mach/Metal Constr. Means Machinery and Metal Construction. The sources includes firms that either produced, repaired, and bought/sold products and services from other firms. In Cars&Airplanes the source and the table include production and/or distribution of pneumatics, bikes, motorcycles and accessories.

13. Most Important Metal-Mechanic S.A. Firms in Barcelona Province, 1922

Ranking/Name	Year Registration S.A.	Nominal (Mpts)	Specialty
1. La Maquinista Terrestre y Marítima	1855	20	Mach./Metal Constr.
2. La Hispano-Suiza	1904	10	Cars&Airplanes
3. Astilleros de Tarragona	1918	10	Ship-Building
4. Material para Ferrocarriles y Construccs.	1881	7	Mach/Metal Constr
5. Astilleros Minguell	1916	7,5	Ship-Building
6. G.de Andreis Metalgraf Española	1916	7	Mach/Metal Constr.
7. Torras Herrería y Construcciones	1918	4,5	Mach/Metal Constr
8. Neumáticos Nacionales	1916	4	Cars&Airplanes

9. Talleres Hereter	1912	4	Cars&Airplanes
10. Construcciones Prekler	1920	3	Mach/MetalConstr.
11. United Shoe Machinery Co.	1917	2,5	Mach/MetalConstr.
12. Aceros Sn Martín	1914	2,5	Siderurgy
13. Astilleros del Mediterráneo	1915	2	Ship-Building
14. Altos Hornos de Cataluña	1916	2	Siderurgy
15. La Metalúrgica Española	1917	2	Mach/MetalConstr.
16. La Unión Metalúrgica	1902	2	Mach/MetalConstr.
17. Astilleros y Buques B.B.G.	1918	1,5	Ship-Building
18. Construcciones Metálicas del Llobregat	1919	1,5	Mach/MetalConstr.
19. David	1914	1,5	Cars&Airplanes
20. Aceros Hispania	1919	1,5	Siderurgy
21. América Autos	1917	1,2	Cars&Airplanes
22. Nuevas Industrias Metalúrgicas	1921	1	Mach/MetalConstr.
23. Garage Renault	1916	1	Cars&Airplanes
24. Astilleros Burell y Pesquerias de Cataluña	1920	1	Ship-Building
25. Empresas y Construcciones Navales	1918	1	Ship-Building
26. Comerma	1919	0,55	Cars&Airplanes
27. Auto-Integral	1918	0,51	Cars&Airplanes
28. Garage y Talleres Galeotti	1919	0,50	Cars&Airplanes
29. Automóviles Eléctricos	1919	0,50	Cars&Airplanes
30. Automóviles y Maquinaria	1919	0,50	Cars&Airplanes
31. Autowagon	1915	0,50	Cars&Airplanes
32. Barcelona-Auto	1914	0,50	Cars&Airplanes
33. España	--	0,50	Cars&Airplanes
34. General Automóviles	1911	0,50	Cars&Airplanes
35. Anónima de Locomoción Automóvil	1917	0,50	Cars&Airplanes

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

14. Most Important Metal-Mechanic S.A. Firms in Barcelona Province, 1929

Ranking/Name	Year Registration as S.A.	Knominal(Mpts)	Specialty
1. La Maquinista Terrestre y Marítima	1855	20	Mach/MetalConstr
2. Ford Motor Ibérica	1921	15	Cars/Airplanes
3. Sociedad Española Motores y Materiales	1928	12,5	Mach/MetalConstr
4. La Hispano-Suiza	1904	10	Cars/Airplanes
5. Material Ferrocarriles y Construcciones	1881	7,7	Mach/MetalConstr
6. Elizalde	1927	4,5	Cars/Airplanes
7. Nacional Pirelli	1924	2	Cars/Airplanes
8. David	1914	2	Cars/Airplanes
9. Altos Hornos Cataluña	1916	2	Siderurgy
10. Empresas de Construcciones Navales	1918	1	Ship-Building

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

15. Most Important Metal-Mechanic S.A. Firms in Barcelona Province, 1935

Ranking/Name	Year Registration as S.A.	Knominal(Mpts)	Specialty
1. La Maquinista Terrestre y Marítima	1855	20	Mach/MetalConstr
2. La Hispano Suiza	1904	10	Cars/Airplanes
3. Ford Motor Ibérica	1921	9	Cars/Airplanes
4. Material Ferrocarriles y Construcciones	1881	5,7	Mach/MetalConstr
5. Elizalde	1927	4,5	Cars/Airplanes
6. General Motors Peninsula	1925	4	Cars/Airplanes
7. Nacional Pirelli	1924	4	Cars/Airplanes
8. David	1914	2	Cars/Airplanes
9. Altos Hornos Cataluña	1916	2	Siderurgy
10. Llopart	1931	2	Siderurgy

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

16. Most Important Metal-Mechanic S.A. Firms in Barcelona Province, 1940

Ranking/Name	Year Registration as S.A.	Knominal(Mpts)	Specialty
1. La Maquinista Terrestre y Marítima	1855	20	Mach/MetalConstr
2. Rivière	1935(foundd1854/60)	16,5	Mach/MetalConstr
3. La Hispano-Suiza	1904	15	Cars/Airplanes
4. Ford Motor Ibérica	1920	9	Cars/Airplanes
5. Elizalde	1927	4,5	Cars/Airplanes
6. General Motors Peninsula	1925	4	Cars/Airplanes
7. Nacional Pirelli	1924	4	Cars/Airplanes
8. Ind.Nac.deTaxímetros y Aparatos Precisión	1930	2,5	Cars/Airplanes

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

17.. Most Important Metal-Mechanic S.A. Firms in Barcelona Province, 1958

Ranking/Name	Year Registration as S.A.	Knominal(Mpts)	Specialty
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1.Motor Ibérica(antesFordMotor Ibérica)	1929(foundd 1920)	262,5	Cars/Airplanes
2.La Maquinista Terrestre y Marítima	1855	400	Mach/MetalConstr
3Electrolisis del Cobre ECSA	1941	48	Mach/MetalConstr
4.Rivière	1935(founded1854/60)	50	Mach/MetalConstr
5.Hispano-Olivetti	1929	48	Mach/MetalConstr
6.Serra	--	45	Mach/MetalConstr
7.Nacional Pirelli	1924	45	Mach/MetalConstr
8.Permanyer de Industrias Mecánicas	1947	45	Mach/MetalConstr
9.Trenzas y Cables Acero	1951	40	Mach/MetalConstr
10.Faros Españoles FAESSA	1953	37,5	Mach/MetalConstr
11.C.Soler Almirall CSB	1942(founded1917)	36	Mach/MetalConstr
12.Instalac.Cerámicas y Aplicaciones Mecánicas ICAM	1941	35	Mach/MetalConstr
13.Maquinaria y elementos transporte MAQUITRANS	1941	30	Mach/MetalConstr
14.Hierros y Aceros Industriales	1949	30	Mach/MetalConstr
15.Torras Herrería y Construcciones	1918	25	Siderurgy
16.Cía Electro-Siderúrgica	1948	15	Siderurgy
17.Ciriza Huarte	1953	12,5	Ship-Building
18.Catalana Marítima	1928	12	Ship-Building
19.Perfiles Laminados	1940	10,5	Siderurgy
20.Naviera Vasco-Catalana	1954	9,6	Ship-Building

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

18. Most Important Metal-Mechanic S.A. Firms in Barcelona Province, 1978

Ranking/Name	Year Registration	S.A. Knominal(Mpts)	Specialty
1.Motor IBérica	1923	3.602	Cars and Airplanes
2.La Maquinista Terrestre y Marítima	1855	1.983	Mach/MetalConstr
3.Torras Herrería y Construcciones	1918	1.599	Siderurgy
4.FAESSA Internacional	1953	819	Cars and Airplanes
5.Trenzas y Cables Acero TYCSA	1951	750	Mach/MetalConstr
6.Bendibérica	1965	742	Mach/MetalConstr.
7.Unidad Hermética U.H.	1962	738	Mach/MetalConstr
8.Rivière	1935(founded1854/60)	555	Mach/MetalConstr
9.Altos Hornos Cataluña	1916	457	Siderurgy
10.C.Soler Almirall CSB	1942(founded 1917)	450	Mach/MetalConstr
11.Condiesel	1953	425	Engine-Building
12.Fábricas Lucia Bere SAFALUBRE	1953	370	Mach/MetalConstr
13.Humet Hidráulica	1965	304	Mach/MetalConstr
14.Lemmerz Española	1929	300	Mach/MetalConstr
15.Plat Saco-Lowell	1913	280	Mach/MetalConstr
16.Fundiciones Industriales	1946	264	Mach/MetalConstr
17.ares Hnos.	1952	230	Mach/MetalConstr
18.uinaria y elementos de transporte MONOTRANS	1954	216	Mach/MetalConstr
19.RPIC Española	1942	205	Mach/MetalConstr
20.rias Mediterráneo IMSA	1958	200	Mach/MetalConstr
21.Clausor	1956	185	Cars and Airplanes
22.RockwellCerdans	1949	180	Mach/MetalConstr
23.SMI Española	1965	159	Mach/MetalConstr
24.Hispanomotor	1951	116	Engine-Building
25.Permanyer S.A. de Industrias Mecánicas	---	90	Cars and Airplanes
26.Oxymetal Industrias Españolas	1941	80	Siderurgy
27.Cía. Española de Motores CEMOTO	1958	75	Cars and Airplanes
28.Aracre	1965	70	Siderurgy
29.FERGAT Española	1957	60	Cars and Airplanes
30.MATACAS	1964	55	Cars and Airplanes
31.Cribex	1971	30	Cars and Airplanes
32.Industrias Filtro del Automóvil SAIFA	1952	25,2	Cars and Airplanes

Source: Own elaboration from *Anuario Financiero y de Sociedades Anónimas de España*.

19. Metal-mechanic “enterprises” in Spain and Barcelona province in 1958 and 1978

	Productive centers		S.A. Firms	
	Spain	Barcelona Province	Spain	Barcelona Province
1958	70.717	8.802	1.666	630
1978	39.973	7.688	2.635	1.012

Sources: *Anuario Financiero y de Sociedades Anónimas de España* (Madrid, SOPEC, 1959-1960 and 1979-1980); INE, Censo industrial de España, años 1958 y 1978.

Notes: For 1958 metal-mechanic industries include “industrias metálicas básicas”, “fabricación y reparación de productos metálicos”, “construcción y reparación de maquinaria no eléctrica”, “construcción y reparación de material de transporte”. For 1978 metal-mechanic industries include “industrias transformadoras de los metales y mecánica de precisión” and gathers same branches approx. as for 1958.

20. Legal nature of the firms which own industrial establishments in Spain, 1978

	All Industrial Estab.	Only Metal-Mechanic Estab.
* Personal	141.885	30.095
* Societies	33.178	9.458
"Anónima"	24.277	7.211
"Limitada"	7.988	2.153
Others ("colectiva/comanditaria")	913	94
* Cooperative	5.106	235
* Others (public,etc..)	15.023	185
* Total number establishments	195.192	39.973

Source: Instituto Nacional de Estadística. Censo Industrial de España-1978. Establecimientos industriales. Resumen Nacional
 Note: The information of the Census is very relevant and suggests that other sources currently used to study "Sociedades Anónimas" in Spain greatly underestimate the total number of establishments and firms existing in the country. Thus, according to the Anuario Financiero y de Sociedades Anónimas de España, in 1978 there were only 2.635 metal-mechanic S.A.s in Spain (Anuario ..., Madrid, SOPEC, 1979-80), when the table above with census data indicates 7.211 establishments belonging to S.A.s of this industrial branch.

21. Number of workers of metal-mechanic industries in Spain/Barcelona Province (1958 and 1978)

	SP	BCN
1958	606868	105540
1978	915809	220921

Source: Own elaboration from INE, Censo Industrial de España, years 1958 and 1978.

22. Number of "enterprises"(productive centers) of metal-mechanic industries in Spain/Barcelona Province, by dimension (1958 and 1978)

	Total prod.centers		Centers-5workers		5-19workers		20-99workers		100-499 workers		500 and more workers	
	SP	BCN	SP	BCN	SP	BCN	SP	BCN	SP	BCN	SP	BCN
1958	70717	8802	57694	5983	9258	1959	3012	719	631	123	122	18
1978	39973	7688	21472	--	11575	---	5.264	---	1.087	---	221	---

Source: Own elaboration from INE, Censo Industrial de España, years 1958 and 1978.

23. Number of "enterprises" and workers in Spanish industry/Spanish metal-mechanic industries (1958 and 1978)

	IndCenters	MetMechCenters	IndWorkers	MetMechWorkers	Centers -20workers		Centers+100workers	
					Tot.Industry	MetMech	Tot. Industry	MetMech
1958	536.323	70.717	3.140.876	606.868	517.103	66.952	3.651	753
1978	195.192	39.973	2.811.160	915.809	158.466	33.047	4.493	1.308

Sources: Own elaboration from INE, Censo Industrial de España, years 1959 and 1978 (Madrid, 1962 and 1978).

Notes: The source indicates productive centers, which are not at all equal to firms. Data on the table aggregate information for "industrias metálicas básicas, fabricación y reparación de productos metálicos, construcción y reparación de maquinaria no eléctrica, construcción y reparación de material de transporte". The source is useful to observe the dominance of personal capitalism in this capital intensive industry in Spain, when comparison is made with sources about incorporated firms in metal-mechanic industries in Spain: in 1958 there were 2.635 metal-mechanic S.A. firms listed in the Anuario Financiero y de Sociedades Anónimas de España (Madrid, SOPEC, 1959-1960), and in 1978 1.666 S.A. firms listed in the Anuario Financiero y de Sociedades Anónimas de España (Madrid, SOPEC, 1979-1980).

24. Number of "enterprises" and workers in the industry of Barcelona province/metal-mechanic industries of Barcelona province (1958 and 1978)

	IndCenters	MetMechCenters	IndWorkers	MetMechWorkers	Centers -20workers		Centers+100workers	
					Tot.Industry	MetMech	Tot. Industry	MetMech
1958	51.240	8.802	570.044	105.540	47.047	7.942	964	141
1978	26.429	7.688	597.480	220.921	20.850	--	1.110	--

Sources: Own elaboration from INE, Censo Industrial de España, years 1959 and 1978 (Madrid, 1962 and 1978).

Notes: The source indicates productive centers, which are not at all equal to firms. Data on the table aggregate information for "industrias metálicas básicas, fabricación y reparación de productos metálicos, construcción y reparación de maquinaria no eléctrica, construcción y reparación de material de transporte". The source is useful to observe the coexistence of personal capitalism and big incorporated firms in this capital intensive industry in the province of Barcelona, when comparison is made with sources about incorporated firms in metal-mechanic industries in the province: in 1958 there were 630 metal-mechanic S.A. firms listed in the Anuario Financiero y de Sociedades Anónimas de España (Madrid, SOPEC, 1959-1960), and in 1978 1.012 metal-mechanic S.A. firms listed in the Anuario Financiero y de Sociedades Anónimas de España (Madrid, SOPEC, 1979-1980).

25. Labour Force in Metal-Mechanic Firms in Barcelona Province, 1900-1978

Year	Productive Centers	Workers
1900	1578	--
1913	156	5.900
1916	247	13.573
1923	--	27.800
1958	8.802	105.540

1978 7.688 220.921

Sources: Own elaboration from

- For 1900: Dirección General de Contribuciones (1901) Estadística Administrativa de la Contribución Industrial y de Comercio. 1900 (Madrid, Establecimiento Tipográfico Hijos de J.A. García, 1901). *This source includes 341 “contribuyentes industriales” that produced metal or metal constructions (the total figure in Spain was 933, and the second province in importance –Basque Country and Navarre not included in the source- was Madrid with 236 and Oviedo with 121), and 1.237 “contribuyentes artesanos” (14.938 for total category in the country, and again Barcelona was first in ranking of the source followed by 683 artisans in Madrid).
- For 1913 it only considers workshops of mechanic constructions, excluding metal producers and metal constructions, and the source is José Playà (1913) Estado y Estadística de las Industrias Mecánicas y Eléctricas en la provincia de Barcelona en el año 1913 (Barcelona, Imprenta de Pedro Ortega). It underestimates the whole sector clearly. According to the Censo Obrero of 1905 only in Barcelona city there were 11.149 workers in the metal industries (see note below).
- For 1916 Archivo Militar de Segovia. Legajos Comisión Movilización Industrial 1916-1921. Región Militar de Cataluña. This source only considered centres that fitted military interests, and centres with more than 10 employees.
- For 1923 the figure comes from Arxiu Cambó, Servicio de Estudios, “Memoria sobre la situación de las industrias de transformación metalúrgica en España, 23 de octubre de 1923”. Their data came from entrepreneurial institutions and associations and included all metal-mechanic branches. According to Censo Nacional de Población the city of Barcelona had in 1920 27.131 metal workers, and therefore it seems the 1923 figure should correspond not to the province but to the city of Barcelona. See note below.
- For 1958 and 1978 INE, Censo Industrial de España, years 1958 and 1978. This source considers all kinds of productive centers regardless size, and thus is the most comprehensive of all the sources of the table.

Note: In 1849 the city of Barcelona had 52 “fábricas” (21 “cerrajeros” and 11 “mecánicos de fundición” with 1.048 “oficiales, aprendices y peones” (158 in workshops owned by “cerrajeros mecánicos”, and most of the others fundiciones, construcciones and calderería), according to Laureano Figuerola, Estadística de Barcelona en 1849 (Barcelona, Imprenta y Librería Politécnica de Tomás Gorchs, 1849, reprinted in Madrid, Instituto de Estudios Fiscales, 1968; figures in pp. 298-299). Metal workers in the city of Barcelona in 1856 were 2.060 (Ildefons Cerdà, *Monografía estadística de la clase obrera*, 1856), in 1905 11.149 (*Censo Obrero de 1905*), in 1920 27131 and in 1930 40.386 (*Censos Nacionales de Población*, 1920 and 1930). Data from Cerdà, Censo Obrero and Censos Nacionales de Población for 1920 and 1930 have been elaborated by Conchi Villar (unpublished work “Estrategias sindicales y trabajo de la mujer en el sector del metal en Barcelona:1930-1936”)