

The Catalan Calico-Printing Industry Compared Internationally(*)

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The purpose of this paper is to relate the Catalan calico-printing industry to its counterparts in other parts of Europe. The industry has already been thoroughly studied but no attempts, to my knowledge, have been made to compare it in this way and it barely receives mention in SD Chapman's and S Chassagne's recent study on European textile printers (1): I hope, therefore, to be contributing to filling one of the few gaps which exists in its historiography.

I shall be associating the Catalan experience with two different types of historical approach to the industry. The first is that of M Lévy-Leboyer whose 1964 thesis, *Les banques européennes et l'industrialisation internationale dans la première moitié du XIXe siècle*, argued for the contrasting histories of the French and British calico-printing industries lying at the roots of two diverging patterns of national industrialization, one which had its source in the basic manufacturing processes ("downstream" or "aval") –the British– and the other which started from the finishing processes ("upstream" or "amont") (2). The second is that of Chapman and Chassagne whose approach could be categorized as having its source in the more empirical tradition of British economic history – they believe that Lévy-Leboyer's contrasts are overdrawn and adopt in their study a form of growth accounting analysis, assessing the different national industries in terms of entrepreneurship, capital formation, labour, management, markets and technological change.

The structure of the paper takes the following form. In a first section I describe the process whereby the calico-printing industry was diffused around Europe and place its establishment in Barcelona within this process. In a second I make what might be termed "macro-economic" comparisons, about the size of the Barcelona industry compared to those elsewhere, with respect to number of manufactures, production and cotton consumption. In a third I deal with the "micro-economic", comparing internationally the size of firms, sums invested in the industry, enterprise and organization of production. Finally, in my conclusion, I summarize and attempt to explain what the comparisons reveal to have been the particularities of the Barcelona experience of the industry.

It should be noted that the comparison will by no means be a complete one. Firstly it will not cover other important aspects of the industry, such as technical advance and design, and secondly it is only based on a limited range of reading in Catalan, Spanish, French and English –neither full international coverage will thus be achieved nor will any of the issues be compared as exhaustively as would be desirable.

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As should soon emerge, however, the national contrasts in the industry were most marked and so hopefully the limited literature on which this paper is based will be sufficient to highlight some of these differences and to contribute to defining the place of Catalonia within the European industry.

The Introduction of the Industry

The first of the tables has on it some details concerning the diffusion of calico-printing in Europe between 1648–1778. Reading from the left, the second column has the date of the establishment of the industry, the third the name of the centre, the fourth the source for the calico-printing skills and the fifth details state assistance. In this diffusion I have identified five principal “stages”. These are represented by the numbers placed in the first column. A word of caution is necessary about the limitations of the table. It is confined to the period before mechanization; it is not a complete list of calico-printing centres founded during these years; as can be observed not all its columns have been filled. In addition the classification of the diffusion process into stages, whose characteristics will not be summarized, is an approximate one only, involving some simplification. The aim as has just been emphasized, is to identify the major contrasts in the European industry and for this, it is to be hoped, it will serve.

Stage one represents the introduction of the industry to Europe. This took place via the continent’s major ports – Marseilles, Amsterdam and London, the priority of Marseilles being explained by its dominance of the Levant trade at this stage, still Europe’s principal route to India, the source of both printed calicoes and the printing calico techniques (3).

A second stage is dominated by French economic and religious policy. In truth, as will be seen, much of the history of the industry is dominated in this way. France, in addition to having introduced the industry to Europe, was the first country in which its significant diffusion away from ports to inland areas took place – the Comtat-Venaissin, Dauphiné, Vivarais, Languedoc, Saintonge, Poitou, Normandy and Paris all contained calico-printing concerns in the second half of the seventeenth century. As it was Protestants and Protestant areas which played the leading rôle in this diffusion, the Revocation of the Edict of Nantes, which was followed shortly by the radical 1686 ban on the import, manufacture and wearing of printed calicoes, occasioned a Europe-wide emigration of the industry – as can be seen from the table, Huguenot refugees introduced calico-printing to Bremen, Canstadt (near Stuttgart), Frankfurt, Berlin, Geneva and Lausanne as well as reinforcing the growing industries of London and Amsterdam (4).

A third stage, situated between the 1680’s and 1720’s, is characterized by a very slow diffusion from the ports and from those areas introduced to the industry by Huguenot refugees. The economic depression and warfare of these years may have contributed to this slowness but these were not the only influences. Jean Rhyiner, author of the first history of the industry, and whose family was its introducer to Bâle, reveals that there were both technical and psychological factors behind the delay: “comme le Hollandais est caché dans ses opérations”, he wrote – and it was Amsterdam, it should be noted, which exercised a near complete dominance of the European trade in calicoes during these years (5) – “on a cru pendant très longtemps que cet art était plus difficile et que d’autres que ceux qui étaient initiés dans ces mystères ne réussiraient pas”. During the first half of the eighteenth century the technical skills necessary for calico-printing were in short supply. (6)

The details of this limited and sluggish industrial diffusion are as follows. The Augsburg printer Neuhofer learned the new production techniques in Holland and London – in this case the prior existence of a European cloth-printing tradition, which had been centred in Germany, is relevant to explaining the pattern of diffusion (7); Neuchâtel owed its trade to one Jean Labram, who had been apprenticed to a calico-printing firm in Geneva, and to Jacques Deluze who had been involved in the Amsterdam calico trade; the industries of Bâle and Aarau were founded by merchants, including the Rhyiner family mentioned in the previous paragraph, who, like Deluze, had been involved in the Amsterdam trade. (8)

This third stage of diffusion has in fact a lot in common with the second, its principal dynamic being a secondary repercussion of the French calico restrictions of 1686. If the initial consequence of these had been a diffusion of skilled printers throughout Europe, a secondary one was the growth of a large illegal trade in calicoes which tended to be channelled through Alsace and Lorraine. The merchants who began printing during this stage were involved in this trade, their movement into printing representing an attempt to increase their profit margins by by-passing the services of the Amsterdam printers. (9)

Table 1. Some details of the diffusion of calico-printing in Europe 1648–1778

Stage	Year	Place	Source of skills	State's Role	Stage	Year	Place	Source of skills	State's Role
1	1648	Marsailles			5	1750	Ghent		
1	1676	London			5	1752	Angers		MLY.
1		Amsterdam			4	1753	Antwerp		MLY. LOAN
3	c. 1680	Augsburg	Amsterdam, London		4		St. Petersburg	England	
3	1680's	Hamburg	Amsterdam		5		Amiens		
2		Bremen	Amsterdam/Huguenot		4	1754	Loerach, Baden	Berne	
2		Camstadt	Huguenot		4		Planen, Saxony	Nuremberg	
2		Near Stuttgart	Huguenot		5		Paris	Geneva/Neuchâtel	
2		Frankfurt	Huguenot		5		Le Puy	Geneva	
2	1686	Berlin	Huguenot		5	1755	Rouen	Geneva/Neuchâtel	
2	1687-91	Geneva	Huguenot		5	1756	Bourges		
2	1698	Lausanne	Huguenot		5	1757	Orange	Switzerland	
3	1715	Neuchâtel	Geneva/Amsterdam		5	1758	Nantes	Neuchâtel/Bâle/Aarau	
3	1716	Bâle	Amsterdam		5		Melun	Bâle	
3	1716-7	Scharisheim, near aarau	Amsterdam		5		Jouy	Switzerland	
4	1715-20	Dublin	London		5	1760	Montpellier	Switzerland	
4	1722	Stockholm	Amsterdam		5	1761	Carlisle	London	
4	1723	Edinburgh	London	RM	5		Lyons	Geneva	
4	1724	Vienna			5	1762	Essonnes		
5	1726	Zürich	Geneva		4	1763	Bohemia		
4	1736-8	Barcelona	Marsailles/Switzerland/Hamburg	PRIV.	5	1766	Belfast		
5	1738-42	Glasgow	London		5		Troyes	Switzerland/France	
4	1744	Erlangen,		RM	5	c.1767	Mantresa	Barcelona	
		Franconia			5	1770	Wesserting	Geneva/Neuchâtel	
5	1745-6	Avignon	Switzerland		5	1772	Villefranche	Mulhouse	
5	1746	Mulhouse	Bâle	LOAN	5		Colmar	Neuchâtel/Augsburg	
5		Mataró	Sweden	PRIV.	5	1775	Vizille	Geneva	
4	1747	Munich		RM	5	1777	Olot	Barcelona	
5	1749	Le Havre	London		5	1778	Manlieu	Barcelona	
4	1750	Copenhagen	London		5				
5	1750-4	Lancashire	London						

Key to column on state's role: RM= foundation of royal manufacture; PRIV= grating of royal privilege; LOAN= grating of loan; MLY= grant of monopoly; NOBLE= founded by noble
 Sources: those not included in notes 3-11 on text are as follows: for French towns: E Bonnet, "L'industrie des toiles peintes à Montpellier", *Bulletin de la Société Lanquedocienne de Géographie* 46 (1923), pp 10, 16; SD Chapman & Chassagne, *European Textile Printers*, (London, 1981), pp 106-9, 115-16; E Depire, *La toile peinte en France au XVIIIe et au XVIIIe siècle* (Paris, 1912), pp 154, 169, 172, 205; L. Dermigny, *Cargaisons indiennes, Solier et Cie, 1781-1793* (Paris, 1960), pp 208-10, 217 n5, 221 n60, 244; P Leuillot, "Une industrie malhousienne: l'impression sur étoffes", *Annales* 2 (1947), p 489; M Lévy-Leboeuf, *Les banques européennes et l'industrialisation internationale dans la première moitié du XIXe siècle*, (Paris, 1964), pp 52 n15, 53; H Lüthy, *La banque protestante en France de la Révocation de l'Édit de Nantes à la Révolution*, Paris (1961), II, 665-6; for Baden, Erlangen, Planen: Chapman & Chassagne, *European Textile Printers*, pp 7, 114; for Ghent: J Dhondt, "The Cotton Industry at Ghent during the French Régime" in F Crouzet (et al) eds, *Essays in European Economic History*, (London, 1969), p 16.

A fourth phase saw the industry spread principally to capital cities – Dublin, Stockholm, Edinburgh, Vienna, Barcelona, Munich, Copenhagen, Antwerp, St. Petersburg, Prague. Behind this stage were two linked factors: the importance of such centres in the demand for the product which caused them, in the lack of other important technical influences on location, to be a preferred site for calico printing concerns, and an increasing preparedness of governments to support the establishment of an industry which would give rise to import–substitution and thus favour the balance of trade – incomplete details concerning royal support are included in the fifth column of the table (10).

Finally a fifth period can be identified which saw an acceleration in the industry’s diffusion which can be linked to three developments – the removal of restraint, and the actual encouragement given to the spread of the industry, in France from 1759; the general expansion of the European economy from the late–1720s, and the consequently favourable conditions with respect to consumer demand and the availability of capital, and a great increase in the supply of technical expertise in printing methods as well as, possibly, in cotton cloth production which permitted a geographical diffusion of the industry away from those generally urban centres in which it was first introduced –the movement to Glasgow, Belfast, Lancashire, Carlisle in Britain, one eastwards in Switzerland, via Zürich and Berne, to St. Gall and Glaris, in Spain the shift from an industry concentrated almost entirely in Barcelona to one extending to the towns of Mataró, Olot, Vic, Manresa, Manlleu, Igualada and Reus (11). As can be seen there is considerable overlap between this and the previous stage as a consequence of the late date at which the industry was introduced in more backward parts of Europe.

If one were to attempt to categorize the introduction of the industry to Barcelona with greater precision, it could be argued that it had characteristics of both the third and fourth stages of the diffusion process which has just been described. Essential to it was a 1728 ban on the import of calicoes and government encouragement given to import substitution (12) but the industry was not introduced by royal manufactures or by counts, the experience of eastern Europe, but, as in Neuchâtel, Bâle or Berne, by merchants, predominantly, some of whom would have had commercial links with the centres of the trade (13). The signs are that there was both an overland, continental route and an Atlantic one for the introduction. The first of these is revealed both by the presence of a Swiss worker, Pedro Genus, in the manufacture of Esteve Canals, founder of the industry, as well as by various details of the links of the new industry with Marseilles which, with its strong colony of Swiss merchants, and a printing industry which had been revitalized from this source during the 1720’s and 1730’s, acted, in Herbert Lüthy’s words, as the “aboutissement de la voie d’eau de Genève à la mer” (14). The second is demonstrated, by the employment of a Hamburger by Bernat Glòria, founder of the second significant manufacture and later, in the mid–1740’s, by that of the Swede, Jacob Lund, by Jaume Campins, founder of the royal manufacture of Mataró and by Campins’s additional use of Amsterdam as a source for printing moulds, dyestuffs, designs and other technical requirements (15). The years of the establishment of the trade, as is now well established, coincided with a shift in the emphasis in Catalonia’s trading patterns from the Mediterranean to the Atlantic economy and so this varied origin of the new industry was to have been expected (16).

The growth of the industry: “macro-economic” comparisons

Before embarking on comparisons at the macroeconomic level, concerning number of manufactures, production and cotton consumption, a few points need to be made about the accuracy of the data which will be used.

It hardly needs to be emphasized that all pre–industrial data of a statistical kind tends to be at the best only of an approximate nature. Those for the cotton and calico–printing industries are more than usually incomplete. The very factor which was to contribute to the industry’s success, lack of either guild or state control, has also occasioned a sparsity of administrative records. In addition, when attempts were made to record production, the smallness of the production units (particularly for printing which could be carried out in a single room) and the dynamic nature of the industry, which progressed very rapidly, made their satisfactory execution difficult.

Barcelona’s case reflects these factors. Figures are incomplete, and particularly so for production and cotton imports. The official monitoring of the industry was erratic. Up to 1760 it was the responsibility of an “oidor” of the Real Audiencia who had been appointed sub–delegate of the Junta General de Comercio,

Francesc de Montero, who appears to have limited inspections to those required in connection with requests for privilege. With the creation of a Junta Particular de Comercio in Barcelona in 1760, and the drawing up in 1767 of regulations for the industry which were to be administered by this body, the possibility of greater control was created, but this never materialized as the regulations were at no stage properly enforced (17). In addition, on the few occasions that industrial surveys were ordered, all sorts of difficulties were encountered in their execution. In 1784, for example, it was admitted that the results submitted were not complete and that those encharged with carrying out the survey had had to omit “otras muchas (fábricas) que por su poco volumen, y por haberse situado en parages poco conocidos” had been difficult to trace. In 1778, orders to carry out a count of manufactures were initially not obeyed as they were judged impracticable in view of the “multitud de dichas fábricas” and “el casi continua establecimiento de ellas, y el suprimirse otras” (18). From approximately the 1780’s two new types of source become available – reports of travellers who visited Barcelona and lists of manufacturers and production contained in the *Almanak Mercantil*, a publication intended for the use of merchants. Both are of some assistance but have to be used with caution. The information contained in the former was based principally on hearsay and thus at best is only approximate. For example the figure of 150 manufacturers in the city in 1788 and 1789 (table 2) is that of the Abbé Ponz and the French diplomat, Jean François de Bourgoing, and the former admits it to be only an approximate one – “el número de estas fábricas se acerca a ciento y cincuenta, como me han dicho”, he writes. The latter confuse insofar that they were not kept up to date. Their authors seem to have assumed commercial and industrial activity to have been unchanging, for virtually the same lists of manufacturers are printed year after year. There is some difficulty in establishing for which year the information was originally compiled and which would be the only one for which it can legitimately be used (19).

Even in the ideal conditions of relatively complete data for the European industry, and the decade of the 1780’s comes closest to these, there is a danger when making international comparisons that like is not being compared to like. Among the factors which need to be taken into consideration are the following. Numbers of manufactures are clearly only a very approximate guide for charting growth patterns and

Table 2. Number of calico-printing manufactures in Barcelona

1750	8	1785(R)	62
1754	11	1786	+100
1768(February)	29	1788–9	c.150
1770	41	1793	+112
1772(R)	26	1797–1806	c.91–2
1775(R)	25	1804	+104
1779(R)	41	1822	72
(U)	36	1829	56
1784(R)	54		
(U)	+20		

Key: (R)= regulated, (U)= unregulated (see note 32 about this distinction), C= approximate, +=minimum.

Sources: 1750: R Grau & P López, “Empresari i capitalista a la manufactura catalana del segle XVIII. Introducció a l’estudi de les fàbriques d’indianes”, *Recerques* 4 (1974), 25; 1754: A Duran Sanpere, *Barcelona i la seva història*, (Barcelona, 1973), II, 300; Feb. 1768, 1770: Biblioteca de Catalunya, Junta de Comercio (BC, JC), leg 53, no 40, ff 3–13, survey of the industry since the publication of its regulations in February 1768, undertaken in December 1770; 1772: J Carrera Pujal, *Historia política y económica de Cataluña*, (Barcelona, 1947), IV, 151; 1775: BC, JC, leg 51, no 8, report of directors of Sociedad de Hilados; 1779: for regulated manufactures report of Duran and Forn of 11 June 1779 (BC, JC, leg 53, No 24, ff 8–12); for unregulated: analysis of all data generated by Junta de Comercio’s attempt to apply regulations between 1778–80 (BC, JC, leg 53, no 22, f 9, no 23, ff 2, 35, 38–9, 45, 49, 50–52, no 24, ff 2–7, 18–29, 43–100, no 25, ff 2–10); 1784: BC, JC, leg 53, no 29, ff 2–21, report on industry by directors of Sociedad de Hilados; 1785: BC, JC, leg 51, no 13, f 2, Relación de las fábricas de Indianas, by directors of Sociedad de Hilados; 1785; 1786: “Estados de las 100 fábricas de indianas y casas de particulares... que por las listas de los Reverendos Parrocos de esta ciudad se ha podido averiguar hallase establecidos” a copy of which is held by the Museo de Estampación Textil of Premià de Mar; 1788–9: A Ponz, *Viaje de España*, XIV, 45; 1793: Carrera Pujal, *Historia política*, IV, 164–5; 1796–1806: *Almanak Mercantil o Guía de Comerciantes*, (Madrid, 1796–1806), whose figures are at best only approximate; 1804: F Torrella Niubó, *El moderno resurgir textil de Barcelona (siglos XVIII y XIX)*, (Barcelona, 1961), pp 184–8; 1822 & 1829: M Izard, *La revolución industrial en España. Expansión de la industria algodonera catalana, 1832–1861*, (Mérida, 1969), pp 32, 35.

establishing the relative importance of national industries. Production and cotton import figures provide a better basis for macroeconomic comparisons but they too are not uniform in what they represent. To give various examples, the significance to be attached to the size of the French industry is diminished by the fact that most printing, 80% in 1785, was done on imported cloth (in other words a great deal of the value added was achieved in other countries) (20); the growth pattern of British cotton imports, very gradual and then a precipitate acceleration, is distorted by its calico legislation which forbade the printing on pure cottons between 1721 and 1774 (Wadsworth and Mann state that if printing on pure cottons had been allowed during these years cotton imports would have been doubled and of course the extent of the break in trend after 1774 commensurately reduced) (21); Swiss production, which was of a quantity which made it the area of Europe with the highest concentration of calico-printing, was achieved with a relatively small labour force, the high productivity having its explanation in the fact that the majority of manufacturers worked on a commission basis for international commercial companies, confining themselves purely to the printing processes: like France the significance of the industry for the local economy has to be adjusted downwards in view of these international links and the dependent nature of the trade (22); finally the Barcelona industry: this, too, as historians have emphasized, printed on significant quantities of imported textiles, though the percentages were not as high as in either Switzerland or France because of the restrictions imposed by the 1728 legislation – the import of cotton cloth “in the white” was banned (23). More significant was the lateness of the Catalan movement into spinning. This factor is illustrated by the extent of dependence on the import of spun yarn and the contrast with Britain is striking. There, as early as the years 1711–20, only just over 5% of imported cotton took the form of spun yarn whereas in Barcelona as late as 1793 over 48% of imports were in this category. As spinning was the most labour intensive of the cotton production processes, the servicing of one loom giving work to between 7 and 10 spinners, it can be seen that the part of the industry most likely to have a significant impact on local labour markets was introduced at a comparatively late stage (24).

These problems are not so great, however, as to invalidate all international comparisons. There is consistency between the different tables and what they reveal conforms to data of a non-quantitative kind. What do they show about the position of Barcelona within the European industry?

Table 2 reveals that by the 1780's Barcelona contained a great concentration of calico-printing manufactures. In discriminating between the different estimates for the decade, it has already been noted that Ponz's 1788 figure is an approximate one only. That for 1784 excludes “unregulated” manufactures, or those whose dimensions did not conform to minimums set by the 1767 regulations. The most complete survey carried out during the decade was probably that of 1786 which was undertaken by the Church to ensure that all children working in calico-printing manufactures should receive religious instruction. It revealed the existence of 100 manufactures, employing between them 2151 children (25) and in view firstly of the probable omission from this list of micro-manufactures and the evidence which exists for continued growth in the industry after this date it seems probable that Ponz's figure of 150 manufactures was near to being attained at the end of the decade. Vilar writes of the first three years of the French Revolution as “l'apogée véritable de l'activité commerciale catalane” (26) and the table suggests that this was the case too for the city's calico-printing industry.

Table 3 compares the numbers of manufactures in Barcelona with those for other centres of the calico-printing industry. It serves to demonstrate that the extent of the concentration of manufactures

Table 3. Number of calico-printing manufactures in Barcelona compared to elsewhere, 1780–1800

1780 – 1790	Barcelona	74–150
1785	France	+114
1785	Britain	111
1790 – 1800	Switzerland	59
1790 – 1800	Belgium	55
1790 – 1800	Saxony	56
1790 – 1800	Austria	18
1790 – 1800	Bohemia-Moravia	31
1790 – 1800	Hamburg	21
1790 – 1800	Prussia	14

Sources: table II and Chapman & Chassagne, *European Textile Printers*, pp 9, 11.

in the city was exceptional. Barcelona, a single city, grouped as many concerns as were contained within Europe's leading national economies.

One qualification must be made immediately. It is possible that the figures for Barcelona are more complete than those for elsewhere. This is probably the case. For instance, Wadsworth and Mann, in their calculations concerning the size of the English industry in the 1710's, mention some 80 so-called "job-printers" 'who took customers' goods to print, but who had no regular place of business". These they do not include in their assessment of the number of printing concerns in London for the early eighteenth century (27). There are signs of similar under-counting for the Swiss and French industries, but, though the correction of this factor would require some adjusting of figures, it would by no means disqualify the impression that Barcelona contained a quite exceptional calico concentration by the 1780's. As noted the 1786 figure of 100 is composed uniquely of concerns giving employment to children – all of the manufactures included on it were of a substantial size – and so it is clearly not the case that the Barcelona figures are distorted excessively by the inclusion of small businesses – the majority were large concerns. It is the case, besides, that these high figures for numbers of manufactures find support in those for production and cotton imports which will now be discussed.

As is clear from table 4, production details are less complete than those for the number of manufactures. The most thorough calculations are for the year 1797. As is noted below the table, the relative lowness of the 1802 figure is partly to be explained by its non-inclusion of either printed linens or prints on imported cloth. In view of what has just been said about the probable peaking in the number of manufactures during the first years of the French Revolution, it is clear that the 1784 figure would not represent the maximum for the industry's output during the century, but, despite this, table 5, which uses the 1784 figure and calculations made for the same period in other parts of Europe, reveals that the Catalan industry occupied a relatively favourable position in international rankings. Barcelona's industry was slightly less than half

Table 4. Production of printed calicoes and linens in Barcelona, 1760–1797 (in metres)

1760	+620,000
1768	1,103,723*
1775(R)	1,240,000–1,395,000
1784	6,769,693
1797	3,560,955

Note: *= figures for stocks, not production, R= regulated manufactures. += minimal figure. Figures for 1797 are for printing on Barcelona manufactured cotton cloth only.

1760: Archivo General de Simancas, Superintendencia de Hacienda (AGS, SH), Remesa 22, leg 1103, petition of Barcelona printers, 1760; 1768: R Fernández, "La burguesía barcelonesa en el siglo XVIII: la familia Glòria" in P Tedde (ed), *La economía española al final del Antiguo Régimen*, (Barcelona, 1982), II, 67; 1784: as for table II; 1804: *Almanach mercantil para 1798*, pp 332-3.

Table 5. Production of printed calicoes in Barcelona compared to elsewhere (in metres)

Barcelona	1784	6,769,693
Britain	1784–7	12,400,000
France	1785	+16,000,000
Switzerland	1790	c.10,998,363-12,373,158

+= minimum

c= approximate figure

Note: The conversion rates of pieces of calicoes (the usual measurement) to metres used are as follows: Spain, 15 canas or 15.55 metres; France, 20 metres; Britain, 25.6– 27.4 metres, Switzerland 15 aunes or 16.8 metres, taking the Swiss aune at 1.12 metres. On cloth sizes see P Caspard, *La Fabrique-Neuve de Cortaillod*, (Paris, 1979), pp 101–2.

Sources: Barcelona in 1784: as for table II; Britain and France: Chapman & Chassagne, *European Textiles Printers*, p 8; Switzerland: Lévy-Leboyer (*Les banques européennes*, p51) estimates the production of Bâle, Geneva and Neuchâtel at 400–500,000 pieces of 15 aunes in 1790. These three towns are estimated to have contained 61.1% of the Swiss calico-printing labour force at this date (B Veyrassat, *Négociants et fabricants dans l'industrie cotonnière Suisse, 1760–1840*, (Lausanne, 1982), 24n) and I have made my estimate on the assumption that they had a similar % of total Swiss production. I have preferred this way of estimating the total than the approximation of one million pieces given (Lévy Leboyer, p 51 n; Veyrassat, pp 23–4) which would make Swiss production greater than that of either Britain or France.

as large as the French one and slightly more than half as large as those of Britain and Switzerland. It is clear that the omission from Chapman's and Chassagne's international comparisons of calico-printing of any information concerning the Catalan industry for the period after 1775 results in a serious underestimation (by a multiple of five approximately) of its relative importance (28).

The conventional method used for relating the size of the Catalan industry to those of its competitors has been by comparing rates of cotton consumption (29). Table 6 shows that the Catalan/British ratio with respect to these was probably at its highest in the late 1770's or early 1780's, before the British industry had begun its great acceleration consequent upon its early mechanization of spinning. The table also shows, though this fact is well known, the rapidity with which the relatively favourable ratio with respect to the British industry was eroded after 1800.

Table 6. Spanish and British cotton imports compared (figures in lbs)

Year	1.Barcelona	2.Catalonia	3.Spain	4.Britain	1,2,3 % 4
1754	c.350,208			3,036,039	1/4=11.5%
1776		(1,523,477)		5,844,736	2/4=26%
1783		(1,724,323)		9,558,000	2/4=18%
1784	(2,152,240)			11,280,000	1/4=19%
1792			4,465,304	33,427,000	3/4=13.4%
1793		3,211,228		17,869,000	2/4=18%
1808		(2,535,769-3,042,923)		41,961,000	2/4=6-7.25%
1816		1,910,868		86,815,000	2/4=2.2%
1817		2,444,236		116,758,000	2/4=2.1%
1818		2,505,948		162,123,000	2/4=1.5%
1819		4,399,184		133,117,000	2/4=3.3%

Note= the figure for 1754 is a calculation based on a contemporary estimate of the annual cotton consumption of the city's cotton looms; those in parentheses are estimates only, made by contemporaries.

Column 1= cotton used purely for the calico-printing industry; column 2= cotton imported via Barcelona for regional consumption or estimates of consumption in the Catalan area.

British imports are taken from BR Mitchell & P Deane, *Abstract of British Historical Statistics*, (Cambridge, 1962), pp 177-81. Spanish figures are calculated as follows: 1754: based on the contemporary calculation that the city's 456 cotton looms used an average of 768 lbs of cotton each year (Duran Sanpere, *Barcelona II*, 299); 1776 & 1783: these are estimates of the Junta de Comercio (BC, JC, leg 51, no 12, ff 7-14: informe of Guàrdia & Duran, 13 March 1783); 1784: BC, JC, leg 53, no 29, ff 2-21, informe of directors of the Compania de Hilados, 15 Dec. 1784; 1792-3: from Balanzas de Comercio for these years which are cited by J Nadal & E Ribas, "Una empresa cotonera catalana: la fàbrica de la Rambla", *Recerques 3* (1974), p 50; 1808: Estimate of Junta de Comercio contained in letter of 9 April 1808 (Torrella Niubó, *El moderno resurgir textil*, p 195; 1816-20: Nadal & Ribas, "Una empresa", p 50, whose figures I have converted on the basis of 2204 lbs to the metric ton. Note: Both the 1783 and 1784 sources contain estimates of total Spanish consumption - 2,738,620 and 4,706,933 lbs respectively - which I have not included as they seem to be no more than guesses.

The tables are not sufficiently complete to provide a very sensitive record of the rhythm of the Catalan growth and of its relationship to that of the growth of the European economy as a whole. They do, at least, however provide further proof for Pierre Vilar's two generalizations about the Catalan experience: its general conformity with trends in the international economy and the originality represented by its exceptional speed (30). An acceleration of growth rates in cotton production was the common experience in Europe from the 1760's, but the rate of the Catalan expansion, to a great extent because the starting-point was low, was especially rapid. Production which possibly multiplied by ten between the 1760's and 1780's, cotton imports which doubled between 1776 and 1793, the closeness with which the first introduction of spinning was followed by its mechanization all these details conform with Vilar's other evidence demonstrating the exceptional abruptness of the Catalan expansion.

If speed is one peculiarity of the Catalan experience, the other is its overwhelming concentration in one city. The international comparisons, as noted, reveal Switzerland to have had the largest national concentration of calico printing within eighteenth century Europe in terms of production per capita. But the comparison with respect to Barcelona, as noted, is between a city and national economies. Switzerland's production was provided by three cities and their hinterlands, Neuchâtel, Bâle and Geneva and a number

of more rural centres, to the east, grouped around Zürich, Glaris and Berne. As table 7 reveals there was no individual city in Europe of the late eighteenth century which grouped as much calico-printing activity as Barcelona. The often quoted reaction of travellers and contemporaries to the extent of industrial activity in the city during these years (and calico-printing was not the only such activity, though it was the most extensive) is understandable – it was unusual (31).

Table 7. Barcelona's calico-printing compared to that of other European cities

<i>Centre</i>	<i>Year</i>	<i>No. of manufs.</i>	<i>Prod. in metres</i>
Barcelona	1784	74+	6,769,693
Rouen	1785	38	c3,040,000
	1806	46	c5,824,000
Paris	1785	13	c2,600,000
	1806	12	c5,376,000
Nantes	1785	8	2,240,000
Mulhouse	1785	27	
	1776/86		*2,000,000
Manchester	1785	45	
Neuchâtel	1797	6	2,290,400
Geneva	1785	12	

c= approximately, *= average. For Paris & Rouen in 1806 I have calculated on the basis of pieces of 20 aunes. Barcelona: as for table II; Rouen, Paris, Nantes, Mulhouse, Manchester, Geneva: Chapman & Chassagne, *European Textile Printers*, p 8; Lévy Leboyer, *Les banques*, pp51-5; Neuchâtel: Caspard, *La Fabrique-Neuve*, p 114.

The Catalan Industry: micro-economic comparisons

Size of firms

Table 8 reveals that the structure of the Catalan calico-printing industry took the form of a large number of substantially sized firms. One qualification to this impression needs to be made. The expansion in the number of small printing concerns after 1768 – one related to the exceptionally rapid growth of the industry referred to in the previous section of this paper – would, were the sizes of the labour forces of these small concerns fully recorded, contribute to lowering this average figure. The existence of fairly complete figures for “regulated manufactures” (32) after this date, however, at least serves to demonstrate the continued existence of a large number of substantial manufacturing concerns, and that the dominance of the industry by these was not being seriously eroded by the foundation of small concerns is demonstrated by the failure of the inclusion of 20 “unregulated manufactures” in the figures for 1784 to decrease the average significantly as well as by the details of the 1786 survey by Barcelona’s parishes to which reference has just been made.

Table 9 permits comparisons to be made between the size of manufactures in Barcelona and that of those in other European printing centres. An average figure for the size of Barcelona’s manufactures for the entire 1750–84 period has been given. A first glance at the table might suggest that the city’s

Table 8. Approximate average sizes of labour forces in Barcelona's manufactures

<i>Year</i>	<i>No. of manufs</i>	<i>Total labour</i>	<i>Average labour</i>
1750	8	900	113
1754	11	1368	124
1772	25(R)	2625	105
1775	25(R)	2850–3000	114–20
1779	41(R)	3897	95
1784	80	8638	108

Note: R= regulated manufacture. Except for 1784 these are approximate figures only, calculated on the basis of 3 workers to the loom.

As for table II. N.B. the figures for 1784 include 6 manufactures and their labour forces from outside Barcelona.

Table 9. Average size (in terms of labour forces) of calico-printing concerns in various centres at various dates

<i>Centre</i>	<i>Year</i>	<i>No. of manufs.</i>	<i>Total labour</i>	<i>Average labour</i>
Augsburg	1790–1800	9	3,200	356
Neuchâtel	1797	6	1,604	267
Mulhouse	1806	14	c3,290	235
Geneva	1785	11	2,470	225
Geneva	1806	4	c880	220
Alsace–Lorraine	1790–1800	37	7,000	189
Hamburg	1790–1800	21	3,200	152
Barcelona*	1750–84	8–80		107
Franconia	1790–1800	7	700	100
Neuchâtel	1766	17	1,603	94
France	1806	186	c14,694	79
Prague	1787	12	936	78
Seine–Inférieure	1806	46	c3,542	77
Switzerland	1790–1800	59	4,300	73
Ghent	1793	12	881	73
Austria	1790–1800	18	1,300	72
Saxony	1790–1800	56	3,800	68
Bohemia–Moravia	1790–1800	31	2,100	68
Belgium	1806	55	c3,355	61
Prussia	1790–1800	14	700	50
Neuchâtel	1760	16	758	47
London	1719	23	635	28
Silesia	1790–1800	8	100	13

Note: c= approximate figure. * I have averaged the size of Barcelona's manufactures over these years.

Chapman & Chassagne, *European Textile Printers*, pp 11, 175, 213; Caspard, *La Fabrique–Neuve*, pp 109, 114–15, 127, 185; FW Carter, "The Cotton Industry in Prague, 1766–1873", *Textile History* 6 (1975), 133; AP Wadsworth & JL Mann, *The Cotton Trade and Industrial Lancashire, 1600–1780*, (Manchester, 1931), pp 136–7; S Chassagne, "L'Enquête, dite de Champagny, sur la situation de l'industrie cotonnière française au début de l'Empire (1805–1806)", *Revue d'Histoire Economique et Sociale* 54 (1976), 366.

industrial structure was an average one as it stands only slightly above the centre of the list. Such a conclusion would not be completely accurate, though, for two extra factors have to be taken into consideration before conclusions are drawn from the table. The first is that the figures of a number of centres are for the years 1790–1800, when the mechanization of the spinning processes was underway. These developments led to an increase in economies of scale and so some of the high averages near the top of the list are for industries which are not strictly comparable with the pre-mechanization figures. The possibilities of growth for these reasons is demonstrated by the estimate that Robert Peel of Lancashire was employing a labour force of 6,800 and printing 1.37 million metres of cloth out of a national total of 11.8 million metres by 1784 and that Richard–Lenoir controlled 1/10 of all French spinning machinery, employing 12,820 workers by 1812 (33). The second factor, and this time the point relates to pre-mechanization concerns, is that the figures for a number of centres are distorted by the existence of one or several industrial giants – those for both Geneva (with the Fazy enterprise employing 1200) and Neuchâtel (La Fabrique Neuve de Cortaillon employing 476 in 1766) are affected in this way (34). With the giants removed the averages fall significantly. There were larger than average manufactures concern in Barcelona's industry – the Canals concern employed 300 in 1746 and Canaleta 600, if spinners are included, in 1765 (35) – but these were not sufficiently large nor numerous (given the size of the industry) to cause the average figures which have been calculated to be distorted seriously. It thus can be affirmed that the largeness of the number of substantial manufactures in the Barcelona industry, from an early stages in its development, is revealed by international comparison to be unusual.

Capital Formation

Again it is what is different in the Catalan case which is of special interest and so the aspects of the Catalan experience in this area which concord with the general experiences of capital formation will be dealt with briefly but an attempt will be made to go into greater depth about local idiosyncracies.

Much of the former, of what was to have been expected in view of what is known about the characteristics of capital formation in the pre-industrial period, and what is known about the character of the calico-printing industry, is revealed by tables 10 and 11. In both cases the size of investments ranges extremely widely and this accords with the different types of production unit which could be used for

TABLE 10: Investment in calico-printing in Barcelona (in libras catalanas)

<i>Firm</i>	<i>Date</i>	<i>First inv.</i>	<i>Accum. cap.</i>	<i>Firm</i>	<i>Date</i>	<i>First inv.</i>	<i>Accum. cap.</i>
UNDER 6000 LIBRAS				12000 – 24000			
B. Rovira	1788	300		J. Aymar	1762	12000	
A. Pagés	1773	1150		A. Carrera	1763	12000	
J. Gatell	1784	1200		G. Mayolas	1764	12000	
G. Feu	1785	1300		A. Carrera	1781		12791
M. Pérez	1777	1500		G. French	1745	14000	
G. Bausà	1785	2184			1749		21326
E. Bosch	1772	2806			1752		29692
F. Ribas	1766	4000		J. Pongem	1747	15000	
	1768		10150	J. Roig	1783	16000	
G. Sala	1783		4000	J. Canaleta	1753	16000	
	1785		11,100		1766		46915
Ausicj	1792	4500			1770		33401
J. Ayguasanosa	1754	4500		M. Formentí	1779	20000	
	1760		7070	J. Gallissá	1775		23511
F. Olaguer	1783		5000		1779		42141
				A. Tombá	1784		24000
					1785		33000
6000–12000				24000 – 48000			
J. & P. Alabau	1795	6000		J. Rull	1784		24000
O. Artigas	1789		6065		1797		51500
M. Casas	1785	6400			1802		297590
F. Olsina	1784	6500		J. Espalter	1779		25000
J. Buch	1763	7000		I. Cathalá	1762	26000	
	1767		24000	Armet	1781	26000	
	1769		42400	J. Arenys	1785		30000
	1773		59200	M. Ribas	1795		30000
G. Illes	1778	8000		J. Martí	1805		30000
J. Pedra	1781	8000		I. Mayner	1802	32000	
B. Glòria	1738	8000		J. Igual	1770		36100
	1742		12000	L. Clarós	1789		39047
	1743		14400				
	1744		22000				
	1756		48000				
M. Alegre	1761	9000		Proposal for Malaga	1778	56000	
J. Mató	1798	9000		Mataró	1747	58800	
F. Rigalt	1781		10000	J. Amat	1797	68000	
					1802		59207
				V. Demeste	1790		60000
				M. Ortells	1777		80000
				M. Formentí	1771		94005
				J. Tresserras	1804		128450
				P. Ramon	1791		154971
				E. Canals	1758		156449

The principal source is Grau & López, "Empresari i capitalista", pp 28–9, 38, 48–57. For Glòria: Archivo Histórico de Protocolos de Barcelona (AHPB), Duran Quatrecases, act of 13 Aug. 1744, ff 323–27 & Fernández, "La burguesía barcelonesa", II, 74; for French: AHPB, Severo Pujol, act of 18 Jan. 1745, ff 45–6, Creus Llobateras, 8 Aug. 1749, ff 54–7, S Prats, 3rd book of contracts and agreements, act of 9 June 1752, f 51; for Rull: A Sánchez Suárez, "Los fabricantes de indianas de Barcelona a finales del siglo XVIII y principios del XIX: la familia Rull" (Tesis de licenciatura inédita, Barcelona 1981), pp 112, 115, 200; Ribas and Canaleta's 1766 figure: A Sánchez Suárez, "La era de la manufactura algodonera en Barcelona, 1736–1839" (unpublished paper kindly communicated by the author), p 12; Mataró: AHPB, JB Fontana, Libro de concordias, nos 90 & 91, 27 Nov. 1749; Canals/Canet: AHPB, Duran Quatrecases, 1 Sept. 1759, ff 147–86, division of manufacture.

Table II. Investment in calico-printing elsewhere in Europe (in libras catalanas)

	<i>Firm</i>	<i>Place</i>	<i>Date</i>	<i>First investment</i>	<i>Accum. capital</i>	
UNDER 6000	Printer & engraver	Paris	1805	1104		
	Rhyiner	Bâle	1717	2400		
	Average	London	1747	1860–18600		
	Cressier	Neuchâtel	1742		2727	
			1761		3409	
6000–12000	Average	Lancashire	1760's	8333		
	Petit Cortaillod	Neuchâtel	1774		9545	
12000–24000	Josserand	Lyon	1788		13426	
	Marin	Neuchâtel	1781		14773	
	Zetter, Schwarz	Mulhouse	1762		16013	
	Schwarz, Koechlin, Dollfuss	Mulhouse	1746	22000		
			1758		70795	
			1776		174544	
	Keittinger	Montpellier	1788		22228	
24000–48000	Truton, Marin	Paris	c1797	28400		
	Dejean	Bievres	c1780's	36000		
	Dubois	Paris	1799		36000	
	Danton, Moreau	Angers	1759	39557		
			1769		275308	
48000–96000	Seimandy, Liquier	Montpellier	1778		51230	
	Brenier	St. Denis	1803		53200	
	Lesourd de Liste	Angers	1787		61882	
	Baron	Essonnes	1768		63672	
	Dollfuss	Bievres	1804		64800	
	Imhoff	Montpellier	1778		66596	
	Paris, Chaland	Vernaison	1787		70564	
	Jarry	Cachan	1798		80000	
	Gillet & Montaut	Angers	1771		84784	
	Schmalzer	Mulhouse	1789		86228	
	Stevens & Parker	London	1751–5		86490	
	OVER 96000	Duftoy	Bievres	1813		96800
		Cornetz	Mulhouse	1789		136015
		La Fabrique Neuve	Neuchâtel	1816		153409
Wilson		Lancashire	1774		184140	
Perrenod & Cie		Melun	1786		218826	
Peel, Church		Lancashire	1787		143778	
Peel, Bolton		Lancashire	1790/5		c421290	
Peel, Bury		Lancashire	1795		863598	
Oberkampf		Jouy	1769		588888	
			1781		2273114	
			1815		2508410	
Gurnier, Danse		Beauvais	1781		1013910	

Note: The rates of exchange used against the libra catalana are as follows: £ sterling = 9.3; French libra = .4; Swiss libra = 0.57 on the authority of J Townsend, *A Journey through Spain in the Years 1786 and 1787*, (London, 1791), II, 155–8; JF de Bourgoing, *Nouveau voyage en Espagne, ou tableau de l'état actuel de cette monarchie*, (2nd ed Paris, 1803), I, ii; Caspard, *La Fabrique-Neuve*, p 206.

Sources: L Bergeron, *Banquiers, négociants et manufacturiers parisiens. Du directoire à l'Empire*, (Paris, 1975), II 588–91; Caspard, *La Fabrique-Neuve*, (Paris, 1979), 93–4, 97; SD Chapman & Chassagne, *European Textile Printers*, (London, 1981), pp 16–19, 27, 51, 53, 59, 134–5; S Chassagne, *La manufacture de toiles imprimées de Tournemine-lès-Angers (1752–1820). Etude d'une entreprise et d'une industrie au XVIIIe siècle*, (Paris, 1971), p 194; Leuillot, "Une industrie mulhousienne", p 489; R Oberle, "La fortune de Samuel Koechlin, fondateur de l'industrie mulhousienne", *Revue d'Histoire Economique et Sociale*, 47 (1969), 111–13; J Rhyiner, "Traité sur la fabrication et le commerce des toiles peintes", in D Dollfuss–Ausset, *Matériaux pour la coloration des étoffes*, (Paris, 1885), II, 74.

Table 12. Enterprise and industrial organization in the Catalan industry to February 1768

Date	Names	Professions	Links with previous manufactures	Organization	Date	Names	Professions	Links with previous manufactures	Organization
I	1. Esteve 2. Sala 3. Aranyó	Esparter/Fabricant Vidrier de Llum Vidrier de Llum	Via Marselles	Compartida 1 + 2	XI 1749	1. Sala	Vidrier	1 from I, III, IV	Concentrada 1
II	1. Serra	Barreter d'agulla/ Comerciant.	Via Marselles and Switzerland	Polaritzada 1 + 2	XII 1749	1. Planxaart			
1737	2. Canals 3. Canet	Botiguer de Tall Corredor d'orella			XIII	1. Canaleta 2. Canaleta 3. Videllias 4. Grau	Veler/Fabricant Vidrier Veler Taverner	1 from II	Concentrada 1
III	1. Gibría 2. Gescell 3. Guipert 4. Sala 5. Aranyó 6. Vidal	Comerciant Comerciant Comerciant Vidrier Vidrier Comerciant	5 + 6 from I + Via Hamburg	Compartida 1,2,3,4,5	1753	1. Ferra	Comerciant/Veler		Concentrada 1
1738	1. French 2. Sala 3. Brunés 4. Formenti	Comerciant Vidrier Apotecari Veler/Fabricant	2 from I + III 4 from III	Compartida 1,2,3,4	XIV 1753	1. Seguí	Comerciant		Polaritzada 1 + fabricant
IV	1. Campins 2. Vilalonga 3. Llauder 4. Feliu 5. Janer 6. Corominas	Comerciant Cavaller Ciutadan honorat Ciutadan honorat Comerciant Comerciant	Via Sweden	Compartida 1,3,5,6	XV 1753	1. Aygua-sanosa 2. Recolons 3. Arolas 4. Subirana 5. Llorens 6. Torras 7. Llobet	Teixidor de Lli	5 from II	Compartida 1,2,3,5,6
V	1. Guàrdia	Botiguer de Tall		Polaritzada 1 + two fabricants	XVI c.1754	1. Roca 2. Serrall			
VI	1. Clota	Comerciant		1 employs administrador	XVII	1. Salomó 2. Salomó	Comerciant/Botiguer Veler/Comerciant	Employs Gravador from II + XVII	
1746	1. Pongem 2. Formenti 3. Sabater 4. Just	Comerciant Veler/Fabricant Barreter d'Agulla Paraire	2 from III + IV	Compartida 1,2,3,4	XVIII c.1754	1. Magarola 2. Magarola 3. Llorens	Comerciant Comerciant Tintorer de seda		Polaritzada 1 + 2 + fabricant
VII	1. Canals	Veler			XIX	1. Las Casas 2. Comas	Sastre/Comerciant Sastre		
1747	1. Canals	Veler			1755	1. Cantarell 2. Pujol	Tintorer de Panyos Veler/Comerciant		Polaritzada 1 + fabricant
VIII	1. Peramàs	Comerciant			XX 1755	1. Burges 2. Aldrich	Corredor d'Orella Droguer		Concentrada 2
1747					XXI 1756				
IX					XXII 1756				
X									

Date	Names	Professions	Links with Previous manufactures	Organization	Date	Names	Professions	Links with Previous manufactures	Organization
XXIII 1758	1. Canet	Comerciant	1 from II	Polaritzada 1 + two fabricants	XXXIV 1766	1. Ribas 2. Roca	Fabricant Comerciant	1 from XII	Concentrada 1
XXIV 1759	1. Fomenat 2. Sabater 3. Just	Veler/Fabricant Bareire d'Agulla Pareyre	1 from III, IV, VIII 2 from VIII 3 from VIII	Concentrada 1	XXXV 1766	1. Alabau	Veler		Concentrada 1
XXV 1760	1. Llorens	Tintorer de seda	1 from XIX		XXXVI 1767	1. Iglesias 2. Iglesias	Fabricant Fabricant	1 from XXVII	Concentrada 1
XXVI c.1761	1. Capelino 2. Tomás	Veler Galenero		Concentrada 1	XXXVII c1767	1. Illa	Fabricant	1 from V, XXVIII	Concentrada 1
XXVII 1761	1. Alegre 2. Gibert	Comerciant Comerciant	1 Buys VI	Polaritzada 1 + two fabricants	XXXVIII c1767	1. Pallarés	Fabricant		Concentrada 1
XXVIII 1762	1. Cathala 2. Sevilla 3. Llorens 4. Gispert 5. Aran 6. Illa	Veler/Pintor de seda Veler Vídua de Llorens (XXV) Botiguer de Teles Comerciant Fabricant	Absorbs XXV 6 from V	Compartida 1,2,5,6	XXXIX c1767	1. Rigalt	Fabricant		Concentrada 1
XXXIX 1762	1. Aymar 2. Ribas	Tintorer de panyos Mestre de Casas		Polaritzada 2+1 (?)	XL c1767	1. Pagès	Fabricant		Concentrada 1
XXX 1763	1. Carrera 2. Bicarfit 3. Roca 4. Pelliser	Fabricant Comerciant Mestre de Casas Espader		Concentrada 1	XLI c1767	1. Crous	Fabricant		Concentrada 1
XXXI 1763	1. Buch 2. Armengol 3. Olsinà 4. ?	Comerciant Veler Fabricant		Polaritzada 1+3	XLII c1768	1. Igual 2. Busquets	Fabricant Fabricant		Polaritzada 1 + 2
XXXIII 1760-8	1. Soler, R.	Velluer	XXXII 1764	1. Llagostera	XLIII c1768	1. Soler	Cerer	1 buys XXVIII and employs Aymar (XXIX)	Polaritzada 1 + Fabricant

Note: "Fabricant" denotes person trained in some or all of technical side of calico-printing; C. = approximate; manufactures omitted from the list because of lack of information include BF Fontanelles (mentioned 1754); J. Font (has privilege 1763); A. Riera, J. Mombianch, F. Parera, O. Arquimbau (founded and ceased between 1760 and 1768).
I, XVI: Duran Sanpere, Barcelona, II, 292-4, 299; XVII, XXVII-XXXI: Grau & López, "Empresari i capitalista", 19-57; V-VIII, X, XII, XIII, XVII, XIX; C Martínez Shaw, "Los orígenes de la industria algodonera catalana y el comercio colonial" in J Nadal & G Tortella eds, Agricultura, comercio colonial y crecimiento económico en la España contemporánea, (Barcelona, 1974), pp 249-50; II, XXII; P Molas Ribalta, Los gremios barceloneses del siglo XVIII, (Madrid, 1970), pp 520, 528; XXXIV: V Vázquez de Prada, "Un modelo de empresa catalana de estampados en el siglo XVIII: la firma Francisco Ribas", Primer Congrés d'Història Moderna de Catalunya, (1984), I, 635; XV, XXV: Archivo de la Corona de Aragón (ACA), Batllia General, Índice del llevador general de concesiones, 23 June 1753, f59, 11 Dec. 1755, ff 158-9, 11 Sept. 1760, f 269; IX: AGS, Consejo Supremo de Hacienda, reg. 248, f 180; IV, XI, XIV, XVIII: AHPB, Duran Quatrecaes, act of 13 Aug. 1744, ff 323-27; Severo Pujol, act of 18 Jan. 1745, ff 45-6; Creus Llobateras, 8 Aug. 1749, ff 54-7 & 4 March 1753, ff 90-1; XXI, XXIII, XXXIII, XXXV-XLV; BC, JC, XXI = leg 53, no 1, XXIII = leg 5, no 8, ff 8-11, others = leg 53, no 40, f 2-13; XX: Archivo de Santa Maria del Mar, papers of Isidro Cathala, copy of a notarial act of Creus Llobateras, 6 May 1756.
N.B. I have found no evidence of a manufacture founded by Anglè & Sabater though this commercial company was involved in marketing calicoes and later took over the running of Canet's manufacture for some years.

calico-printing. Both tables show that the principal form of investment in the industry was by the accumulation of profits – the figures for accumulated capital are far larger than those for initial investments and capital accumulation on an impressive scale can be plotted in the case of some enterprises (Ribas, Sala, Buch, Glòria, French, Canaleta, Gallissa and Rull on table 10, Schwarz, Koechlin and Dollfuss, Danton, Moreau and Oberkampf on table 11). In both cases there was a substantial increase in the size of investment once the process of mechanization began. There are few examples of mechanized concerns on the Catalan list, though the capitalization of Rull in 1802 and Tresserras in 1804 gives an idea of the shifts involved. In the case of table 11, the notable examples of the Peel family's factories in Lancashire and Oberkampf's manufacture at Jouy are included in the Over 96000 libras section. Finally evidence concerning some of the first manufactures (Glòria's, Campins's Royal Manufacture of Mataró and the Canals/Canet concern in the Catalan case and a number of the highly capitalized French concerns in the Over 48000 Libras category) shows that the investments required in the initial establishment of the industry tended to be large.

The two tables, though, also reveal some contrasts between the Catalan industry and those elsewhere. The principal one is the relative smallness of the sums invested given the large size – this has just been established – of the industry's manufactures. The anomaly is partly to be explained by the nature of the sample of Catalan manufactures on which table 10 is based. Most of the cases are extracted from the Grau and López article which covers capital formation for the post 1780 period principally, when there was a proliferation of small manufactures. The table is thus not necessarily a completely accurate reflection of capital formation in the industry as a whole. Nor, though, is it completely unrepresentative as included within it are a number of large concerns and these, too, were founded on the basis of comparatively small investments – to take two examples: the Canaleta concern with its 16,000 libras investment in 1753 was operating 32 looms with a labour force that would have been approaching 100 a year later and Pongem's manufacture, with its 40 looms and labour force of 122 in 1751, was founded with an initial investment of 15,000 libras in 1747 (36). The relative smallness of the investments in the industry compared to those in trade is commented on by Grau and López – “Comparat amb les inversions en negocis contemporanis d'altra mena – fins i tot botiques de teles – el capital d'una 'fàbrica' es petit”, they write (37).

Enterprise and industrial organization

In order to provide something of a solid basis for making international comparisons concerning these two most complex aspects of calico-printing, tables 12 and 13 have been drawn up. These relate to the Catalan and Swiss industries, using the experiences of Neuchâtel and Glaris to represent the latter, with the justification that these two areas illustrate between them the two stages of Swiss development – a monopolist one, when it benefited from the banning of calico-printing in France and the initial inability of the French industry, once this ban had been removed in 1759, to meet demand and a competitive one, during which the Swiss industry survived by moving to low wage areas in the east (38). The tables record the names of the founders or principal partners in the manufactures, the professions of the founders and their associates, the links of manufactures with previous concerns and the types of industrial organization adopted. The connection of this method of analysis with previous historical work is as follows: the use of tables of this kind is a technique of which Béatrice Veyrassat has made pioneering use (and her work has been used as the principal source for the Glaris industry) (39) and Grau and López are responsible for a systematization of the different types of managerial structure pertaining in the Catalan industry (40) – and, as with Veyrassat's, their work has been drawn from for some of the factual material used in compiling the Catalan table.

A few points need to be made about the limitations of these tables. They are not complete – a number of calico-printing concerns, both in Switzerland and Catalonia, about which there is no accurate information, are not included; the amount of data about the concerns which are included varies considerably and the Catalan list has been limited to the period up to 1768. To have extended it, and the discussion of its content, would have had the consequence of making this section of the chapter too lengthy, for the industry experienced a rapid expansion from this year, some fifteen new concerns being founded by 1770, but it could be argued anyway that the Catalan industry had already developed sufficiently by this point to demonstrate some of its principal characteristics. An advantage of concentrating on the pre-1768 period is that it is that about which the Grau/López article informs least, only 11 of the 93 contracts concerning calico-printing companies which they analyse relating to these years.

The comparison of the first column of the two tables, that detailing the professions of the founders of manufactures, reveals firstly the importance of merchants in the establishment of both industries. One contrast emerges, however, concerning the type of merchant involved. In the case of the Swiss industry it was specialized cloth merchants who played the predominant role. Deluze, Sandoz, Brandt, Chaillet,

Table 13. Enterprise & industrial organization in the Swiss industry to 1830

<i>Manufacture date</i>	<i>Names</i>	<i>Professions</i>	<i>Links with previous manufactures</i>	<i>Organization</i>	<i>Commission Merchants (1) names (2) year independent from</i>
I Prê-Royer (Neuchâtel) 1715-20	1. Labram 2. Deluze	Fabricant Mercader de Panyos	1 From Geneva 2 Links with Amsterdam	Polaritzada 1+2	
II La Poissine (Neuchâtel) 1727-c1734	1. Labram (brothers) 2. Deluze	Fabricant Mercader de Panyos	1 From Geneva + I 2 Links with Amsterdam + II	Polaritzada 1 + 2	(1) Sandoz, Barbier
III Les Isles (Neuchâtel) 1727	1. Sandoz	Mercader de Panyos			
IV Port de Cressier (Neuchâtel) 1732	1. Brandt 2. Feitknecht 3. Brandt	Mercader de Panyos/"Bourgeois" Mercader de Panyos/"Bourgeois" Mercader de Panyos/"Bourgeois"	Fabricant from Languedoc	Polaritzada + two fabricants	
V Le Bied (Neuchâtel) 1734	1. Deluze 2. Labram (brothers)	Mercader de Panyos Fabricant	Successor to I + II Employs Augsburg trained fabricant	(1) polaritzada 1 + 2 (2) Polaritzada 1 + Dupasquier	
VI Vauvilliers (Neuchâtel) 1741	1. Clerc 2. Clerc		1. From Geneva 2 = Huguenot refugee		
VII Petit Cortailod (Neuchâtel) 1741	1. Jéquier 2. Chaillet				
VIII Grandchamp (Neuchâtel) 1750	1. Chaillet	Conseiller d'Etat Directeur des sels, mercader de Panyos	1. From VII		
IX St. Blaise et Marin (Neuchâtel) c.1750	1. Desplands	Fabricant	1. From III via Mulhouse	Concentrada	(1) a) Brandt, Feitknecht, Brandt b) Brandt, Montmolin, Jean Renaud
X Fabrique, Neuve (Neuchâtel) 1751	1. Du-pasquier 2. Bovel (from 1754)	Fabricant	1. From (a) Augsburg (b) V 2 from V	Concentrada	(1) a) Bovel, Dupasquier (1752) (2) 1818 b) Pourtalès (1753-)
XI Mollie (Glaris) 1760	1. Streiff	Fabricant	1. Professionally trained in trade via travelling	Concentrada	(1) B. Jenny Cia
XII La Borcaderie (Neuchâtel) 1766	1. Montmolin	Mercader de Panyos	1. Commission merchant for IX		
XIII Glaris 1790	1. Staub 2. Staub			Concentrada	(1) B. Jenny & Cia
XIV Glaris 1796	1. Glarner 2. Glarner	Fabricant	1. Professionally trained in trade	Concentrada	(1) B. Jenny & Cia
XV Glaris 1797	1. Trümpp	Fabricant	1. Professionally trained in trade by father at Lisbon	Concentrada	(1) B. Jenny & Cia (2) 1830
XVI Ennelbühl (Glaris) 1806	1. Freuler	Tintorer	1. Professionally trained in trade	Concentrada	
XVII Glaris 1812	1. Brunner	Fabricant	1. Professionally trained in trade via travelling	Concentrada	(1) B. Jenny & Cia (2) 1830/40
XVIII Glaris 1817	1. Trümpp	Mercader de Panyos	1. Professionally trained in trade and associate of XV	Concentrada	(1) B. Jenny & Cia
XIX Glaris 1820	1. Glarner	Fabricant	1. Professionally trained in trade	Concentrada	
XX Schwanden (Glaris) c.1820	1. Bühler	Blanquejador		Concentrada	
XXI Glaris c.1820	1. Glarner 2. Glarner	Tintorer Tintorer		Concentrada	(1) B. Jenny & Cia
XXII Glaris 1823	1. Streiff	Mercader de Panyos		Concentrada	(1) Luchsinger, Streiff (2) 1836
XXIII Ennenda (Glaris) 1825	1. Trümpp 2. Trümpp	Fabricant Fabricant	Professionally trained in trade via travelling	Concentrada	(1) B. Jenny & Cia (2) 1830
XXIV Glaris 1825	1. Blumer	Tintorer	1. Professionally trained in trade	Concentrada	(1) B. Jenny & Cia
XXV Niederunden (Glaris) Late 1820's	1. Steinmann 2. Steinmann			Concentrada	(2) 1833
XXVI Schwanden (Glaris) 1827	1. Blumer 2. Jenny	Caja de Comerç de Panyos i de teixits i filats		Concentrada	(1) P. Blumer & Jenny
XXVII Mollie (Glaris) 1828	1. Karrer		Fabricant		Concentrada
XXVIII Netstal (Glaris) 1830	1. Leuzinger	Tintorer	1. Professionally trained in trade	Concentrada	(2) 1839-41

Manufactures omitted because of lack of information: Neuchâtel – Petit Cortailud

(1732-8), Les Brenets (1742), Couvet (1750-71).

Locle (1751-5), Bevaix, Neuchâtel, Le Landeron, Travers, La Côte, Rochefort, Valangin (1760-6); Glaris – J.H. Streiff (1740); C.J. Müller (1760); J. Tshudi (1783); F. Streiff (1791); J.B. Streiff (1791).

Caspar, *La Fabrique-Neuve*, pp 29-33, 36-41, 109; Veyrassat, *Négociants et fabricants*, pp 187-8, 258, 260n, 270, 344-5.

Montmollin, Trümphy and Streiff, who were involved in the foundation of manufactures I, II, III, IV, V, VII, VIII, XII and XVIII and XXII, and the companies of Brandt, Feitknecht and Brandt, Pourtalès (who took over from Dupasquier and Bovet), B. Jenny, Luchsinger & Streiff and Blumer & Jenny, who account for the majority of other concerns about which there is information, were all specialized in the textile trade. There were specialized cloth merchants involved in the Catalan industry too – Canals, Guàrdia, Salomó and Gispert in manufactures II, VI, XVIII, and XXVIII – but their contribution was outweighed by that of general wholesale merchants (“comerciant”) – Glòria and three of his associates in manufacture III, French in manufacture IV, Campins and two of his partners in manufacture V, Clota in VII, Pongem in VIII, Peramas in X, Seguí in XV, the Magarola brothers in XIX. What is more, most of those described as drapers who were involved in the establishment of the Barcelona industry owed their place not so much to their textile activities but to the fact that the size of their resources effectively placed them in the wholesaler category even if they still retained membership of their draping guilds. The example of Guàrdia, who is described as a cloth merchant, illustrates the point well: in 1736 a dossier prepared on him in connection with the consideration of his suitability to occupy the position of consul in the guild of “corredors d’orella” (commercial brokers) described him as “uno de los comerciantes de mayor caudal, crédito, e inteligencia que hay en esta capital, habiendo corrido distintas Provincias para instruirse en las Reglas de Comercio” (41). As for draping at the retail level, the lack of any link between this and later manufacturing is illustrated by the fact that of the 26 stockists of calicoes and other cotton goods in Barcelona in 1732 one only, Guàrdia, later set up a manufacture (42).

A second contrast which emerges from the comparison of the first column of the two lists is that whereas the Swiss industry was founded by individuals from a narrow range of professions which were virtually all of direct relevance to calico-printing – as can be seen printers and dyers in addition to merchants played the predominant role – in the case of Barcelona an eclectic range of trades was involved – glass-makers, an apothecary, a confectioner, several stocking knitters, dyers, silk- and linen-weavers, an inn-keeper, a builder etc.

A growing role played by “fabricants” in the founding of manufactures is observable in both cases (as is noted at the bottom of table 12 all those involved in technical aspects of calico-printing, whatever their specialization, have been described in this way (43). In the case of Switzerland virtually every concern founded after 1750 came from this source and in the Catalan case printers were involved in manufactures IV, VIII, XIII, XVII, XXIV, XXVIII, XXX, XXXI, XXXIV and the majority of those founded in 1767 and 1768. The emergence of such workers from positions of dependence to running their own concerns was explained by the power which their possession of the essential and complex printing skills gave them. It is one of the most notable examples of social mobility via industrial activity which exists for eighteenth century Europe (44).

The progress of some individual printers can be plotted from the tables. At Neuchâtel the first manufacture was formed on the basis of a merchant/engraver-colourist association and this combination was behind two successors to this manufacture (II & V) and it was in the third of these concerns that the printer Claude Abram Dupasquier gained employment, following a training in Augsburg’s industry, before setting up what was to be Neuchâtel’s most successful concern, La Fabrique Neuve de Cortaillod, in 1751 (manufacture X of table 13). The colourist/designer Desplands, who founded the manufacture of St. Blaise at Neuchâtel shortly after 1750 (manufacture IX), had a similar background as Dupasquier – he was of Languedocian origin, first served in the manufacture of Cressier, established in 1732 (manufacture IV), and spent some years working in the industry at Mulhouse before setting up on his own. The earliest examples of such success among Barcelona’s printers are provided by the cases of Formentí and Canaleta. Both began as silk-weavers. The former learned the printing skills in manufacture III, was a partner in manufactures IV and VIII and eventually founded his own concern, number XXIV, in 1759. The latter gained his skills in the Canals manufacture and set up his own concern in 1753.

But though in both industries such social mobility on the part of printers has been observed it is clear that it was less pronounced in the case of Barcelona. None of the foreign workers employed in the earliest concerns managed to found their own manufactures, though there are signs that Jacob Lund, the Swede employed at Mataró, attempted to do so – there were no Oberkamps in the Catalan industry – and Formentí’s and Canaleta’s are really the only examples of exceptional social mobility for the period covered by table 12, for of the concerns founded by printers in 1767 and 1768 only those of Iglesias, Rigalt and Igual lasted long. This point would need to be modified slightly were the period of analysis extended. For example, of the founders of the concerns established during the rapid expansion of the

industry between 1768 and 1770 which was mentioned, fourteen were individuals with printing skills and seven of them continued to produce for some years principally, though, within the “unapproved” section of the trade (45). Social mobility within the industry would appear to have been relatively limited in the industry until the 1780’s. With the end of the American War of Independence, in contrast, the rapidity of the growth of the export trade to America and the movement into spinning opened new avenues and widened old ones for social advancement (46).

The second column, links with previous manufactures, shows, as was to have been expected, that after an initial stage when techniques for the industry were principally drawn from abroad, skills were diffused locally from one manufacture to another. In the case of the Catalan industry manufactures III, IV, VIII, XI, XIII, XVIII and others can be shown to have this source and in the case of the Swiss manufactures II, V, VIII, IX, X, XII, XVIII. One significant contrast also emerges, however, and that is that whereas in the case of the Catalan industry the contact with foreign centres, at least for the period covered by this table, was of a once and for all nature, that of the Swiss industry became a structural feature. It was a standard practice for printers there to spend part of their lives travelling to gain skills and the profession had some of the characteristics of artisanal “compagnonnages” (47). A period of such travelling is documented for manufactures V, IX, XI, XVII and XXIII.

The argument of Grau and López, whose systematization of types of organizational structures has been borrowed for these comparisons it was noted above, is that there was a progressive development in such structures, shared management (between all or most partners) giving way to polarized patterns, with a division between a commercial director (known as an administrator) and a production one (fabricant), and culminating with the emergence of concentrated direction, with the fabricant exercising both commercial and production management. “A mesura que avança el segle,” they write, “a mesura que l’experiència de la manufactura augmenta, a mesura que les operacions guanyen envergadura, l’èxit de la direcció unificada es fa més evident”. There are slight difficulties in drawing comparisons between the two industries insofar that the Swiss pattern of development was distinct. There too, as is revealed on table 13, the phenomenon of shared or polarized management existed in the early manufactures but it gave place not to a unification of commercial and production management but generally to a commission system in which manufactures worked to the orders of commercial companies – a type of polarized management thus effectively continued to exist but with the two parties in separate companies. The arrangement, in which the printer was described as “travaillant à façon”, was, as Caspard notes, virtually universal in Switzerland and “reposait... sur une séparation absolue entre la fabrication proprement dite et toute la partie commerciale” (48). Despite these difficulties, it is clear that there were similarities between the general trends in managerial developments. The movement towards simpler managerial structures was shared. The dynamic behind this simplification was the same. Shared management was a consequence of the unprecedented nature of the manufactures and the consequent lack of entrepreneurs with an adequate range of skills to assume overall responsibility. This lack was resolved by the very existence of the calico–printing manufactures whose skilled printers received training in both spheres of management – this is demonstrated by the first examples of concentrated management, Canaleta in the Catalan case and Desplands and Dupasquier in that of Neuchâtel. If there is a contrast between the two cases it is that the movement towards concentrated direction had not proceeded very far in the Catalan case for the period covered by table 12. Polarized direction was the predominant form in 1768 showing the continued direct involvement of commercial capital in the running of enterprises whereas in Switzerland a form of concentrated direction had become universal even if it was purely on the basis of commission work.

Conclusion

The comparing of the Catalan calico–printing and cotton industries with those of some other parts of Europe has revealed a number of originalities – the rapidity of the expansion of the industry, the extent of its concentration within Barcelona, the large average size of manufactures, the relatively low figures for investment, the predominance of wholesale merchants in the industry’s conception, the breadth of the range of other professions which became involved in the trade, the apparently low rates of social

mobility to which it gave rise, the relative isolation from other centres of the industry and the slowness of the movement towards concentrated direction. These issues will be dealt with in turn.

The large size and the rapidity of growth would seem to have a first explanation in the relative liberality of government policy towards the industry. The tendency has sometimes been to interpret this policy as having been only marginally favourable insofar that there was no direct investment by the Crown in manufacturing to compare with that which took place in the wool industry in other parts of Spain (49). This contrast is certainly a valid one within a national context, but, seen from an international perspective, Spanish legislation appears to have been uniquely favourable to the industry's development. In no other of Europe's major powers was the industry at so early a stage not merely given freedom to develop but actually supported by an import ban and the granting of privileges. Elsewhere the industry was forced to emigrate to those rare parts of the European economy practising liberal economic policies (50). Herbert Lüthy writes eloquently of this aspect of the industry's controversial early history – "Bannie par les grandes puissances maritimes, à l'exception de la Hollande qui jouit de ce fait d'un quasi-monopole au début du siècle, l'industrie des indiennes s'est successivement repandue dans la frange de petits territoires indépendants qui s'étend des villes hanséatiques aux Etats de Suisse et à Genève" (51). The relatively favourable legislative treatment of the industry, when added to the now well-established fact of Spain's enjoyment of a period of rising population growth and prosperity in the second half of the eighteenth century (52), the opportunities provided by the opening of the American market and evidence of a shift in consumer taste away from light woollens to cottons (53), contribute to an adequate explanation for the speed of the growth and size of the industry.

These factors do not though account satisfactorily for the second originality, the extent of the industry's concentration in Barcelona. The city was well placed to be the entry-point for the first manufactures. Its port-situation was of clear advantage to an industry which had to import nearly all its raw materials and its proximity to Marseilles provided it with a nearby source for the calico printing techniques. These considerations contribute to a partial explanation for the concentration but they would also, it might have been thought, have favoured the growth of the industry in other coastal areas of the peninsula but this, despite some attempts, barely occurred. At a broad level of explanation the originality would seem to have its source in the phenomenon whose explanation formed the principal inspiration of Capmany's *Memorias historicas sobre la marina, comercio y artes de la antigua ciudad de Barcelona* – the uniqueness of Barcelona's commercial and industrial capacity within Spain at this stage. That one of Capmany's principal explanations for the phenomenon, in the year 1779, should lie in Barcelona's guild system, and its contribution to "la conservación de las artes como para la estimación de los mismos artesanos" (54), is a further reminder of the differences between comparing Catalonia with other parts of Spain and internationally.

Once the calico-printing industry was established on a large scale, a further factor contributing to the extent of the concentration in the industry would have been the development of externalities. One example of this is the existence of drawing and engraving skills, both crucial to the industry's success. Barcelona's *Escuela de Bellas Artes*, founded by its Junta de Comercio in 1775 to provide instruction in these subjects, had 500 pupils four years later, and 11,304 students had passed through its halls by 1808 (55).

The favourableness of government policy towards the industry, the prosperity of the second half of the eighteenth century before the disruptions of the French Revolution period, the supply restrictions in other parts of the peninsula – these factors explain the size of the industry, the speed of its growth and its concentration but they do not account for the large average size of the Barcelona manufactures. The industry was liable to considerable economies of scale, but it is not these types of influences which are relevant to explaining the Barcelona particularity as they applied to calico-printing throughout Europe. A second contribution to size was the important role played by commercial capital, accustomed to large scale investment, in the establishment of the industry – though this factor too was common to most areas of calico-printing within Europe. Common too to other areas were the exemptions from guild regulations which were clearly an essential enabling factor for concentrated production (56). What needs elucidating is why within a European industry in which there was a tendency to large scale of production, Barcelona, without possessing giant, individual concerns, came to contain so large a concentration of substantial manufactures. Two aspects of state intervention would appear to bear primary responsibility. The first was the character of the 1728 legislation to which the industry owed its foundation. This, by disallowing the import of calicoes and other cloths in the white for printing, forced manufactures, in the absence

of a local cotton industry, to incorporate the weaving processes – as noted earlier in this paper Barcelona's industry was unusual in its early involvement in the pre-printing, manufacturing stages of production and this clearly increased the average size of manufactures. A second influence was the process whereby manufacturers negotiated privileges from the Crown. The reports of the government agents who inspected manufactures in connection with these requests give the impression that large size and centralization of the production process were virtually essential for them to obtain a favourable response. It is certainly the case that renewal of privileges was dependent on expanding production or at least maintaining a constant number of looms in activity (57). Involvement of manufacturers with the State, as in other countries practising mercantilist policies, placed a premium on size (58). Such initial stimuli to large scale were then consolidated by regulations which were adopted for the industry in 1767 and which prescribed minimal scales of production for qualification for the status of approved manufacture (59).

Grau and López provide a part of the explanation for the relatively low rates of investment in the Catalan industry. They make two principal points. Firstly they emphasize that the contracts by which calico-printing companies were founded, and on the analysis of which their article is based, contained clauses, which they call "d'urgències", to cater for any temporary credit difficulties, which contributed to reducing the capital specified. This fact, they note, demonstrates "fins a quin punt les xifres de capital social pactat són relatives". Secondly they emphasize the capital savings resulting from the Catalan industry's avoidance until a late stage of involvement in the labour-intensive spinning processes and the additional economies provided by the possibility which existed for manufacturers to purchase their spun cotton supplies on credits of between 12 and 18 months – a small investment could thereby be used most fully (60). Even greater capital savings of course resulted from the practice of printing on cotton cloth imported in the white (61).

Such explanations go part of the way to accounting for the divergences between national investment rates which are detectable from the analysis of tables 10 and 11. They serve, for example, to account for the similarly low rates of investment in the Swiss industry observable on table 11. As Caspard has emphasized the commission basis on which this industry worked reduced its capital requirements (62). They clearly do not, though, serve as a complete explanation – if they did then the French industry, which, as noted earlier, confined itself principally to printing on imported calicoes, should have had low rates of capital formation and yet it is the high rates of investment in this industry which represent the principal contrast to the Catalan case. The explanation is more simple and takes us back to what was said in the first section of the paper about the different stages of the diffusion of the industry in Europe. It was only after 1759 that the French industry was allowed to develop freely and its high investment figures reflect the large cost involved in the initial establishment of the industry as well as the extra cost involved in setting up manufactures in rural or small town areas (63). So in this case the contrast is to be explained by historically induced peculiarities in the structure of the French industry rather than in any atypicality on the part of the Catalan trade.

The impact of the two factors occasioning high investment levels in the French industry can be observed too from some of the Catalan evidence – the large investment in the Mataró manufacture was clearly consequent upon its being the first concern in this town and the similarly large cost which was quoted for establishing a manufacture near Malaga in 1778 must be explicable in similar terms. Table 11 also provides other examples of low urban investments in London and Paris. The latter are commented on by Louis Bergeron: "Hors de Paris," he writes, "la structure du capital est très différente. L'investissement initial se trouve fortement alourdi par les dépenses immobilières" (64).

So the comparison of tables 10 and 11 serves some purpose. It is a useful reminder that though the types of capital-saving measures which existed at Barcelona would potentially apply to all industrial areas with reasonably developed capital markets, interference with the development in calico printing in other parts of Europe had had the consequence that such areas were probably in a minority. Catalonia was unusual in Europe of the 1760's in its possession of a well-established industry in an urban setting. The maturity of the industry and the urban location both contributed to externalities which explain relatively low rates of capital formation and contribute to our understanding of the reasons for the rapidity of the industry's growth.

The predominance of wholesale merchants in the introduction of the industry perhaps requires least explanation. Barcelona was an importing port, par excellence, and, as Pierre Vilar and others have noted, there was a long tradition of importing merchants switching from depending on foreign merchandise to producing in their own right or in collaboration with guild-workers. Wholesale merchants were the leading

investors in the city with the resources, in terms of finance and international contacts, to introduce a new industry.

The breadth of the range of other trades which became involved in the industry is to be explained in part by the factor which it has been argued was the principal cause for the extensive involvement of rich drapers in the industry. At the summit of the majority of artisanal trades, there were individuals with large resources who, side by side with wholesale merchants, were investing in a wide range of activities outside their own trade. This phenomenon has been thoroughly documented by historians (65). It should be added, though, that professional as well as financial considerations were of importance for the extent of involvement of some of these trades in the industry: that of dyers was to be explained by the importance of the dyeing processes in calico manufacture (66), that of so many textile artisans by the inclusion of the weaving processes in the Catalan manufactures (67). This factor, which as noted did not apply elsewhere, provided the possibility of entry into, and success in, the industry from the manufacturing rather than the printing end. It was a route which was taken by two of Catalonia's most successful eighteenth century manufacturers – Canaleta and Capelino (68). Other trades would of course have provided a formation in at least the commercial requirements for running an enterprise.

The relating of the Catalan case to that of Switzerland in the discussion of enterprise and organization of production gives rise to exceptionally sharp contrasts, it should be noted, as they were such dissimilar centres. Both Neuchâtel and Glaris were primarily agricultural areas before they became involved in calico-printing, and were characterized neither by widespread capital ownership and investment habits, nor extensive artisanal industry. There would have been more in common had the comparison been made with an urban calico centre such as London, Rouen or Paris. The differences provide though a good illustration of a point made by Bergeron in the context of Paris and Grau in that of Barcelona – such cities' possession of accumulated capital, merchants and large luxury industries with skilled labour forces made them the ideal points for the introduction of an industrialization of which an important part consisted in the importing of technologies developed elsewhere (69).

The apparently relatively low rates of social mobility in the Catalan industry, suggested by the failure of its printers to achieve the same dominance as they seem to have achieved elsewhere, argues for there having been a price which was paid for the readiness with which local capital and enterprise turned to the new industry. This involvement, and the existence in other trades of skills relevant to calico-printing, had the consequence that the skilled printer without capital, whose successes were so resounding in other parts of Europe, lost some of the bargaining power which the scarcity of skills gave him elsewhere. Certainly in Barcelona's case a fairly rapid diffusion of the initially secret printing skills took place (70).

The predominance of polarized rather than concentrated direction in the Catalan industry, at least for the period covered by table 12, would seem to have a related explanation. The extensive involvement of commercial capital in the industry contributed to a tendency to impose on it relations of production on the model of those which characterized other productive activities in which such capital was involved – the polarized division between capitalist administrator and fabricant was a near exact replica of that which was customary between wholesale merchants and botiguers. Employment as "fabricant" provided, clearly, the possibility of capital accumulation and the gaining of economic independence – a movement to concentrated direction – but it would seem that it was at least as usual an experience for the managerial status to become a permanent one (71).

Two elements are necessary for a full explanation of the contrasts apparent in the extent of the international links of the two industries which were analysed for two extremes are involved – an analysis of the reasons for the extent of the isolation of the Catalan industry and one for the extent of the cosmopolitanism of the Swiss. The Catalan isolation finds part of its explanation in geographical factors: Barcelona's distance from what were to be the main foci of Europe's industrialization. This influence was reinforced, however, by the protection of the industry and the non-participation in any export markets other than similarly protected imperial ones (72). The Swiss industry, by contrast, was of necessity always an exporting one, unprotected by tariffs. It had been the liberalism of the economic policies of the Swiss states which had initially attracted the industry and it was similarly essential to its continued prosperity. This insured that contact was maintained with foreign markets and competitors. The exceptional cohesion between the calico-printers of France and central Europe, which lasted into the nineteenth century, had though also something to do with France's dominance and the consequent impact of French commercial and religious policy, which conditioned and gave a unity to the history of the industry in these areas. Calico-printing was confined to a minority group and to certain areas of the European economy – this,

in addition to any possible shared religious beliefs, gave participants in it a solidarity which was not totally lost when the French restrictions were removed and the “industry in exile” allowed to return to France (73).

Notes

- (1) *European Textile Printers in the Eighteenth Century*, (London, 1981).
- (2) Especially pp 32–49, 56–62; for his upstream/ downstream theory “Les processus d’industrialisation: le cas de l’Angleterre et de la France” *Revue Historique* 239 (1968), 281–98.
- (3) Chapman & Chassagne, p. 6.
- (4) E Depître, *La toile peinte en France au XVIIe et au XVIIIe siècle*, (Paris, 1912), pp 4–30; C Chassagne, *La manufacture de toiles imprimées de Tournemine-lès-Angers (1752–1820), étude d’une entreprise et d’une industrie au XVIIIe siècle*, (Paris, 1971), pp 38–50; L Dermigny, *Cargaisons indiennes, Solier et Cie, 1781–1793*, (Paris, 1960), I, 206; H Lüthy, *La banque protestante en France de la Révocation de l’Edit de Nantes à la Révolution*, (1961), II, 663–4; Lévy Leboyer, *Les banques*, pp. 49–55.
- (5) On this see D Ormrod, “English re-exports and the Dutch staplemarket in the eighteenth century” in DC Coleman & P Mathias (eds), *Enterprise and History: Essays in Honour of Charles Wilson*, (Cambridge, 1984), pp 96–103.
- (6) J Rhyiner, “Traité sur la fabrication et le commerce des toiles peintes” in D Dollfuss-Ausset, *Matériaux pour la coloration des étoffes*, (Paris, 1885), II, 73; on the continued shortage of skills in this area until approximately the 1760’s see Chassagne, *La manufacture de toiles imprimées*, p 51.
- (7) AP Wadsworth & JL Mann, *The Cotton Trade and Industrial Lancashire, 1600–1780*, (Manchester, 1931), p 129n.
- (8) P Caspard, *La Fabrique-Neuve de Cortaillod: Entreprise et profit pendant la Révolution industrielle, 1752–1854*, (Paris, 1979), pp 29–31; J Rhyiner, “Traité”, p 74; Dermigny, *Cargaisons*, I, 207.
- (9) On this see Rhyiner, whose family was involved in such a switch from a commercial to an industrial role: “Traité”, pp 74–6.
- (10) Chapman & Chassagne, *European Textile Printers*, pp 7, 25; AK Longfield, “History of the Irish Linen and Cotton Printing Industry in the 18th Century”, *Journal of Royal Society of Antiquaries of Ireland* 67 (1937), pp 32, 35–6; FW Carter, “The Cotton Printing Industry in Prague, 1766–1873”, *Textile History* 6 (1975), p 133.
- (11) Chapman & Chassagne, *European Textile Printers*, pp 10, 25–6; A & N Clow, *The Chemical Revolution*, (London, 1952) p 224; Dermigny, *Cargaisons indiennes*, I, 244; B Veyrassat, *Négociants et fabricants dans l’industrie cotonnière Suisse, 1760–1840*, (Lausanne, 1982), pp 186–7; C Martínez Shaw, “Los orígenes de la industrial algodonera catalana y el comercio colonial” in J Nadal & G Tortella (eds), *Agricultural, comercio colonial y crecimiento económico en la España contemporánea*, (Barcelona, 1974), p 246; JC Laforce, *The Development of the Spanish Textile Industry, 1750–1800*, (California, 1965), p 15; C Sala, *Dades històriques de l’Escola de Belles Arts d’Olot*, (Olot, 1974), p 101; R Grau & M López, “Empresari i capitalista a la manufactura catalana del segle XVIII. Introducció a l’estudi de les fàbriques d’indianes”, *Recerques* 4 (1974), p 51.
- (12) On this see J Carrera Pujal, *Historia política y económica de Cataluña. Siglos XVI al XVIII*, (Barcelona, 1947), IV, 133–5.
- (13) On this see Carrera Pujal, *Historia política*, IV, 135–41, A Duran Sanpere, *Barcelona i la seva historia*, (Barcelona, 1973), II, 293–7; Martínez Shaw, “Los orígenes”, pp 249–58.
- (14) Carrera Pujal, *Historia política*, IV, 136; Lüthy, *La banque*, II, 88–9.
- (15) R Fernández, “La burguesía barcelonesa en el siglo XVIII: la familia Glòria” in P Tedde (ed), *La economía española al final del Antiguo Régimen*, (Madrid, 1982), II, 68; M Monjonell Pardas, “La Real Fábrica de Indianas de Mataró de Jaime Campins y Compania” (tesis de licenciatura inédita, Barcelona, 1956), p 35.
- (16) On this see P Vilar, *La Catalogne dans l’Espagne moderne*, (Paris, 1962), III, 422–63.
- (17) On de Montero see P Molas Ribalta, “La junta de Comerç de Barcelona. Els seus precedents i la seva base social” in his *Comerç i estructura social a Catalunya i València als segles XVII i XVIII*, (Barcelona, 1977), pp 250–1.
- (18) See the letter of Intendant de Linde to the Junta de Comercio of late 1778 which cites from a letter of the Junta General of 21 Aug. 1778. Biblioteca de Catalunya, Junta de Comercio, (henceforth BC, JC), leg 53, no 23, f 45.
- (19) A Ponz, *Viaje de España*, (Madrid, 1782–94), XIV, 45; JF de Bourgoing, *Nouveau voyage en Espagne, ou tableau de l’état actuel de cette monarchie*, (1803 ed.), III, 274; *Almanak mercantil o guía de comerciantes para el año 1795*, (Madrid, 1794) etc. – editions were published annually between 1795 and 1799 and then for the years 1802, 1805 and 1806.
- (20) Lévy Leboyer, *Les Banques*, p 50.
- (21) Wadsworth & Mann, *The Cotton Trade*, p 170.
- (22) Caspard, *La Fabrique-Neuve*, p 39; L Bergeron, “Pourtalés et Cie, 1753–1801: Apogée et déclin d’un capitalisme”, *Annales: Economies, Sociétés, Civilisations* 25 (1970), 499.
- (23) The printing on imported textiles was particularly important for the export trade after the legislation of 1778 permitting free trade with America though printing for the domestic market was overwhelmingly on calicoes woven by the manufactures themselves. On this see JM Delgado Ribas, “La industria algodonera catalana (1776–1796) y el mercado americano. Una reconsideración”, *Manuscrits* 7 (1988), 103–16.
- (24) Wadsworth & Mann, *Cotton Trade*, p 170; J Nadal & E Ribas, “Una empresa cotonera catalana: la fàbrica ‘De La Rambla’, de Vilanova, 1841–1861”, *Recerques* 3 (1974), p 50.
- (25) Details in E d’Imbert, *Erasmo de Gónima, 1746–1821. Apuntes para una biografía y estudio de su época*, (Barcelona, 1952), pp 47–8.

- (26) *La Catalogne*, III, 66.
- (27) Wadsworth & Mann, *The Cotton Trade*, p 136.
- (28) Chapman & Chassagne, *European Textile Printers*, pp 8–9.
- (29) See for example P Vilar, “La Catalunya industrial: una arrencada i un destí”, *Recerques* 3 (1974), 8 & J Nadal, *El fracaso de la Revolución industrial en España*, (Barcelona, 4th ed. 1980), pp 207–8.
- (30) *La Catalogne*, III, 39–41.
- (31) For example J Townsend, *A Journey through Spain in the Years 1786 and 1787*, (London, 1791), I, 138: “The industry which everywhere appears in Catalonia seems to act with concentrated force in Barcelona”; A Young, “Tour in Catalonia”, *Annals of Agriculture* 8 (1787), 238: “There is every appearance as you walk the streets of great and active industry”; Bourgoing, *Nouveau voyage*, III, 274: “Il n’est pas de vie en Espagne où il règne plus d’activité apparente, ni plus d’industrie réelle”.
- (32) The regulations referred to in the second section of this chapter imposed certain size requirements for consideration as manufactures (“solo se reputaran por fábricas”) which included possession of 12 looms and a bleaching meadow. Manufactures conforming to these requirements were referred to as “regulated” and those which did not as “unregulated”. On this see Grau & López, “Empresari i capitalista”, pp 29–32.
- (33) Chapman & Chassagne, *European Textile Printers*, p 57; Lévy Leboyer, *Les banques*, p 60.
- (34) Caspard, *La Fabrique–Neuve*, pp 109, 115.
- (35) Canals: Duran Sanpere, *Barcelona*, II, 296; Canaleta: J Albareda & J Sancho, “Catalunya. 1.765: un informe econòmic i polític”, *Actes del Segon Congrés d’Història Moderna, Pedralbes: Revista d’Història Moderna* VIII, 1 (1988), 293. Erasmo de Goniima’s manufacture was said to have attained a labour force of between 800 and 1000 at the turn of the century (AB Gassó, *España con industria, fuerte y rica*, (Barcelona, 1816), p 76 though A. Sánchez Suárez throws doubt on this figure (“La era de la manufactura algodonera en Barcelona, 1736–1839” (unpublished typescript kindly communicated by its author), p90, n110).
- (36) Canaleta’s looms in 1754 are recorded by Duran Sanpere, *Barcelona*, II, 299 and Pongem’s labour force in his 1751 privilege (Arxiu de la Corona de Aragón, Real Audiencia, Diversorum – henceforth ACA, RA act of 22 Sept.– ff 273–82).
- (37) Grau i López, “Empresari i capitalista”, p 27.
- (38) Caspard, *La Fabrique–Neuve*, pp 28–9, 69, 71, 179–80; B Veyrassat, *Négociants et fabricants dans l’industrie cotonnière suisse, 1760–1840*, (Lausanne, 1982), pp 18–19, 30.
- (39) Veyrassat, *Négociants*, pp 185–93.
- (40) “Empresari i capitalista”, pp 42–4.
- (41) ACA, RA, Papeles de su excelencia, leg 249.
- (42) The details of stockists are contained in Archivo General de Simancas, Consejo de Hacienda (henceforth AGS, CSH), section 24, segunda remesa, leg 4907, expedientes sobre reconocimiento de tejidos de algodón, 1732.
- (43) Specializations in the Swiss industry included those of “dessinateur”, “graveur”, “imprimeur”, “coloriste” and “teinturier” (Rhyiner, “Traité”, pp 23–39).
- (44) For the most notable example of such mobility see S Chassagne, *Oberkampf, un entrepreneur au siècle des lumières*, (Paris, 1980) and chapter of his joint work with SD Chapman, *European Textile Printers*.
- (45) BC, JC, leg 53, no 40, ff 4–13: the fourteen printers who set up on their own between February 1768 and December 1770 were Sala, Brusosa, Sayol, Richelme, Casacuberta, Mari, Gatell, Pujol, Rafael, Daufi, Barruel, Lorenzo, Francisco and Andarion of whom the first seven were still producing in 1779.
- (46) Which took place from 1784 onwards principally. On the acceleration of growth in this period and the large number of manufactures founded: Sánchez, “La era de la manufactura algodonera”, pp 26–38.
- (47) On this see Veyrassat, *Négociants*, p 201, who quotes from the memoirs of a Glaris printer as follows: “Il y avait alors encore beaucoup d’imprimeurs qui se rendaient pour quelques années à l’étranger, à Mulhouse, Paris et Rouen ou dans le Vorarlberg et en Bohème, soit pour voir du pays, soit aussi pour gagner un peu mieux, puisque là-bas les indienneurs étrangers, ayant du métier, étaient la plupart du temps assez bien payés”.
- (48) *La Fabrique–Neuve*, p 39.
- (49) “Lo indudable es que en Cataluña se estableció la industria algodonera a base de una protección irrisoria si se compara con los privilegios y subvenciones cuantiosas que se dieron... en Castilla y Aragón...” (Carrera Pujal, *Historia política*, IV, 142).
- (50) I discuss both Spanish and the general European legislative reaction to printed calicoes in the chapter “State Intervention in the Catalan Calico–Printing Industry in the Eighteenth Century” which is to appear in M Berg ed *Markets and Manufactures in Early Industrial Europe*, to be published in early 1990.
- (51) *La banque protestante*, II, p 104 & see also 663–73.
- (52) E.g. R Herr, *The Eighteenth Century Revolution in Spain*, (Princeton, 1958), pp 86–8; G Anes, *El Antiguo Régimen: Los Borbones*, (Madrid, 1975), pp 27–9; Vilar, *La Catalogne*, II, 42–5. Vilar: “l’Espagne tout entière... tendit également, au XVIIIe siècle, à rattraper son retard”, though both Anes (pp 159–63) and Vilar (pp 99–114) emphasize that the economic response to the rising demand was patchy: “notons”, Vilar writes, “le caractère non nécessaire de la relation entre surplus démographique et industrialisation; celle-ci, qui réussit, en Catalogne... reste limitée, en Castille”.
- (53) J Vicens Vives, *Historia económica de España*, (9th ed., Barcelona), 1972, pp 527–8 presents the classic version. JM Delgado Ribas, “Política ilustrada, industria española y mercado americano, 1780–1820”, *Pedralbes* 3 (1983), 253–63 & “La industria algodonera catalana” pp 103–15, provides a more complex interpretation.
- (54) (Ed. E Giralt, Barcelona, 1972), I, 465.
- (55) J Iglésies, *L’obra cultural de la junta de comerç*, (Barcelona, 1969), p 42.
- (56) On the size of calico–printing manufactures J de Vries emphasizes the importance of the influence of merchant involvement resulting from the need to import raw materials (*The Economy of Europe in an Age of Crisis*, (Cambridge,

- 1976), p 104) and SD Chapman the primacy of technical and organizational factors (“The Textile Factory Before Arkwright: A Typology of Factory Development”, *Business History Review* 48 (1974), 451–73).
- (57) Thus the grant of a privilege to Serra, Canals and Canet in 1741 was conditional on their retaining 12 looms in action and grounds for the privilege’s renewal in 1747 included the fact that they had expanded their manufacture. (Archivo Histórico de Protocolos de Barcelona (henceforth, AHPB), Josep Cols, Registro de la Fábrica de Indianas).
- (58) On this see S Pollard, *The Genesis of Modern Management*, (London, 1969), p 64 and also JKJ Thomson, *Clermont-de-Lodève, 1633–1789: Fluctuations in the Prosperity of a Languedocian Cloth-Making Town*, (Cambridge, 1982), pp 178–9.
- (59) See note 32.
- (60) Grau & López, “Empresari i capitalista”, pp 26–7.
- (61) JM Delgado, “Política ilustrada”, pp 253–63 & “La industria algodonera catalana”, pp 103–15.
- (62) Caspard, *La Fabrique-Neuve*, p 99.
- (63) On this see Lüthy, *La banque*, II, 664–73; Lévy-Leboyer, *Les banques*, pp 52–3; Chassagne, *Tournemine*, p 102; Chapman & Chassagne, *European Textile Printers*, p 108; Dermigny, *Cargaisons indiennes*, I, 212.
- (64) L Bergeron, *Banquiers, négociants et manufacturiers parisiens. Du directoire à l’Empire*, (Paris, 1975), II, 588.
- (65) See especially P Molas Ribalta, *Los gremios barceloneses del siglo XVIII*, (Barcelona, 1970), pp 201–5.
- (66) PR Schwarz, “La coloration partielle des étoffes” in M Daumas (ed), *Histoire générale des techniques*, (1968), III, 75: “Ainsi ces toiles ‘peintes’ étaient en réalité ‘teintes’, d’où la solidité de leur coloris, cause de leur succès”.
- (67) The particular prominence of the silk industry both in providing founders of printing concerns and printers, in addition to having this technical explanation, is related too to its earlier development than calico-printing – capital had been accumulated in it and market networks established (Molas Ribalta, *Los gremios*, pp 454–5, 522–4 and on the importance of marketing networks see J. Torras, “The Old and the New: Textile Growth and Marketing Networks in Eighteenth Century Spain” to be published in Berg, *Markets and Manufactures* and “Early Manufacturing and Proto-Industry in Spain”, (Workshop on Proto-Industry in Mediterranean Economies, University of Warwick, April 1989)).
- (68) Introducers of cotton spinning and copper plate printing respectively (Carrera Pujal, *Historia política*, IV, 146, 214).
- (69) L Bergeron, *Banquiers, négociants*, II, 854: “le remodelage de l’espace économique français au XIXe siècle s’est il trouvé commandé, avant toute autre considération, par la concentration parisienne des capitaux et des entrepreneurs”. R Grau, “Cambio y continuidad en los orígenes de la Barcelona”, *Revista de la Universidad Complutense de Madrid*, 28 (1979), 578: “En Cataluña... la revolución industrial... se presenta como la consecuencia del impacto de las técnicas productivas desarrolladas en los países del noroeste de Europa y su difusión halla... un primer punto de apoyo en aquella parte de la colectividad mejor preparada para incorporar las novedades: la ciudad de Barcelona...”.
- (70) By the 1770’s colouring techniques seem to have achieved wide diffusion. Isidro Cathalà wrote in 1779 that “ya es muy sabido el secreto de los colores” – he was referring, to painting on silk but the remark would apply to all types of textile printing. (BC, JC, leg 54, no 17, f 41, letter of 28 July 1779).
- (71) The size of the managerial class in the Barcelona industry is striking – in 1785 35 manufactures were being operated by “fabricants” rather than their owners (only five of whom appear to have been minority share-owners in their companies). An example of permanent managerial employment is that of Mariano Ferrusola, “fabricant” for the Canals/Canet manufacture and then for Jaume Canet from at least 1756 to 1785). (BC, JC, leg 51, no 13, f 2, Relación de las fábricas de indianas, 30 Sept. 1785; for Ferrusola this relación for 1785 and he is mentioned in the 1757 inventory of the Canals/Canet manufacture drawn up on Canals’s death, AHPB, Duran Quatrecazes, Encants i Inventoris, act of 18 Nov. 1756 ff 246–265).
- (72) A González Enciso, *Estado e industria en el siglo XVIII. La Fábrica de Guadalajara*, (Madrid, 1980), pp 241–56.
- (73) This impression of the continued cosmopolitanism of the calico-printing industry into the 19th century is well portrayed by Serge Chassagne (chs 9–13 of his *European Textile Printers*) and PR Schwarz in his extensively footnoted “Contribution à l’histoire de l’application du bleu d’indigo (bleu anglais) dans l’indiennage européen”, *Bulletin de la Société Industrielle de Mulhouse*, 2 (1953), 63–79.