

# The rise, maturity and geographic diffusion of the cotton industry, 1760-1900

*Florence Molk*

**Abstract:** This article examines the trajectory of the cotton industry, including calico printing, over the period 1760-1900. From its beginnings in England as a leading industry of the capitalist world-economy, it spread geographically on a major scale to finally reach the United States and Japan. Over the long term, it is argued that as it expanded and competition increased, profit rates tended to fall, although unevenly.

**Keywords:** cotton, calico printing, leading industry, profit rates, capitalist world-economy

## Introduction

The cotton industry has captured the attention of many scholarly studies because of its assumed pivotal role in the industrial revolution in England. Our goal here is not to debate the relevance of these studies; instead we are interested in establishing the significance of cotton manufacture as a leading industry, tracing its geographical expansion, and examining the trend in its profit rates. From raw material transformed into yarn and cloth, cotton textiles, epitomized as consumer products, have been the emblem of a sector of long-term global influence on the world-economy.

Although cotton spinning is often perceived as the precursor of the cotton industry, calico printing was also a prosperous sector organized at the factory level. It began to flourish after 1760, once the ban on calico printing was abolished in France and later in Great Britain. Mechanized spinning was the second sector that eventually further developed the expansion of cotton manufacture in the 1780's. Finally, although weaving always played an integral

role in the production process, mechanized weaving began to supplant handloom production later on in the 1830's (the last process to fully mechanize).

Regarding cotton manufacture, it is known that Britain, in particular Lancashire, had been the first dominant center of production during the industry's expansion in the second half of the eighteenth century. Better suited and more adaptable than jute or linen "for clothing or for furnishing," cotton became the fiber of choice for many. Its adaptability to machine production offering cheaper products contributed as well to its popularity across the globe (Farnie 2004: 17). Why the expansion of manufacture? Technical innovations transformed the cotton industry. In spinning, the mechanization process, with the Arkwright's water system, had been established by the 1780's; then mule spinning, better suited for fine yarn, became widespread by the early 1800's.[1] Other innovative spinning mechanisms were introduced in the following decades, always improving productivity. Weaving, on the other hand, mechanized later and at a slower pace. Thus it was only in the mid-nineteenth century that the number of powerlooms surpassed those of handlooms.[2] The decrease in price of raw cotton from the southern United States, due in part to mechanical innovation in the 1790's, also permitted a reduction in the price of cotton yarn and fabrics (Crouzet 1982: 195, 197-98). Furthermore, rising import duties alleviated the burden of competition from "East Indian textiles" — tariffs against Indian imports were augmented several times between 1797 and 1819 (Farnie 1979: 8, 96; Singleton 1997: 166; 2004: 60-61). Because of mechanical innovations, cheaper finer cottons, and protection against foreign Indian competition, Britain was able to attain its supremacy in cotton manufacture. According to Deane,

By the time her rivals had followed her lead and were turning out comparable products, prices had fallen to more competitive levels and the boom profits had been won. ... [I]t meant that the country which was first in building up the capacity and the ancillary industries and the commercial contracts could go on getting higher-than average profits for a considerable time, simply because it was enjoying larger economies of scale and could go on supplying its products at keener prices (Deane 1965: 92).

For Britain, exports were central to cotton's industrial growth. In this context, the supremacy of the British navy in the late eighteenth century advantaged the sale of cotton goods to overseas markets (see Singleton 2004). If, prior to the 1790's, most production was certainly geared for home consumption, a large

share of its production value was exported afterwards: it reached about 75 percent in 1805/06, stabilized to about 50 percent until 1840, and increased again up to 67 percent between 1869/71 (Barr 2000: 139; Crouzet 1982: 194; Deane and Cole 1967: 187).<sup>[3]</sup> Europe and the United States were the first export destinations. Later on, Latin America, the Levant and Asia, particularly India after "the abolition of the East India Company's monopoly in 1813," increasingly acquired British cotton textiles (Crouzet 1982: 194; Farnie 1979: 90).

Whereas at the beginning of the nineteenth century the British cotton industry represented only 4 or 5 per cent of the total national income or 7 or 8 per cent by 1812; its productivity expansion, nonetheless, surpassed the results obtained by other manufacturing industries between 1780 and 1830 (Deane 1965: 88; Rose 2000: 22). Overall, British cotton manufacture, mostly concentrated in Lancashire, increased its production at a rate of 7.4 percent per annum until 1840 when continental competition as well as other home industries started eroding its established supremacy (Farnie 1979: 7-8; Boyson 1970: v, who dates mid-nineteenth century as the turning point; Lloyd Jones and Le Roux 1980).

A more meticulous observation shows an unprecedented growth between the Revolutionary and the Napoleonic Wars, "stimulated by expansion of foreign trade and price inflation. The boom wartime conditions promoted the supremacy of the British cotton industry, which in return recorded large profits" (Barr 2000: 140; see also Chapman 1979: 52). The period following 1815 witnessed deceleration as well as increased competition, a trend that continued until the 1840's.<sup>[4]</sup> The recovery and increase of exports in the 1850's due to an increase in demand from the United States, Australia, and Asia did not, however, bring back pre-1815 preeminence (Barr 2000: 140; Farnie 1979: 135). According to Crouzet, "after a slowing-down of growth during the 1840's, the cotton industry, which was called 'the greatest manufacturing industry that has ever existed', then enjoyed a halcyon decade, with a big increase in cotton consumption and massive investment, which dramatically enlarged its productive capacity while at the same time improving productivity" (Crouzet 1982: 206). However, the eve of the American Civil War marked a turning point for the British cotton industry and, despite cyclical recoveries, it never recaptured its early in the century prominence (Crouzet 1982: 108).

In the last quarter of the nineteenth century, the industry definitively lost its competitive edge. Farnie summarizes as follows the post-1873 period.

The decrease in the industry's rate of expansion was apparently the product less of any secular decline in the quality of the entrepreneurship or any shortage of capital than of the competition of low-cost competitors abroad, the long-term decline in profits expectations, and the secular shift towards more competitive spheres of production such as engineering (Farnie 1979: 187).

At first glance, the evolution of the British cotton industry roughly followed the cyclical trends of the capitalist world-economy, whereby the pre-1815 period corresponds to a period of growth and expansion, followed by contraction between 1816 and 1850, with a recovery from 1851 to 1870, and again a depression of prices after 1873. As we shall explore later in more detail, the British cotton industry experienced growth and expansion, with high profit returns, between 1780 and 1815, followed by a contraction until the 1840's, and recovery after the 1850's, but even with cyclical upturns the industry never recaptured its prominence.

## **Geographic expansion**

While Britain was the primary and dominant center of production, the cotton industry also expanded on the Continent (France, Germany, Belgium, Austro/Hungary, and Switzerland) as well as the United States in the late eighteenth and early nineteenth centuries. Before the Napoleonic wars,[5] the cotton industry was fairly well established and successful in France, Switzerland, Belgium, and the Ruhr-Saxony region (Germany) but was still dominated with hand spinning and calico printing.[6] Machine spinning developed after 1796 in France and other countries. This relatively slow but steady development was also accompanied with a stiff British competition able to produce yarn at cheaper and falling prices (Crouzet 1964: 575). But during the Continental blockade, after 1806, the picture of the cotton industry changed to some extent. During that period, British exports in general, and cotton yarns in particular were prohibited from entering potential markets on the continent, thus preparing an opportunity for some continental countries to further develop an indigenous market.[7] In France, despite succeeding in keeping afloat the cotton industry before the blockade, because of constant protection against British competition, the volume of output increased until the end of the Empire, except in 1808 and 1811 (Crouzet 1964: 577). In Saxony, after facing stiff competition prior to 1806, the industry was able to stabilize, however, without much increase in production. In Belgium, the industry flourished until 1810, but then stagnated

until 1815; picked up again after 1825, and finally faced serious difficulties in the 1840's (Voortman 1940: 122). Similarly, the continental blockade permitted the Austro/Hungarian cotton industry to further expand without facing direct British competition. It also faced a slump in the 1810's and picked up somewhat in the 1820's (Good 1984: 50).[8] The Swiss industry (cotton printing and muslin), accustomed to exporting its products had to send its production to Germany instead of France because of strong protectionist measures. However, other elements persisted to hamper the development of the continental cotton industry. Certainly, the price of raw cotton continued to be higher on the continent than in England. Crouzet estimates that the price of raw cotton after 1807 was between two to four times higher on the continent than in England (Crouzet 1964: 578).[9] Furthermore, after the end of hostilities in 1814-15, the British competition regained strength and destabilized production on the continent, followed by a few bankruptcies.[10] Protective measures were again installed and permitted the industry to continue its development.

The American cotton industry, unlike its counterpart in Europe, did not have a tradition of domestic production (putting-out or artisan production), but produced its main input, raw cotton. Since the quality of southern raw cotton improved dramatically in the 1790's, it became the major supplier of the nascent cotton industry (Tucker 1984: 53). Cotton manufacture slowly took form after the arrival from England of Samuel Slater in 1789. Equipped with know-how in machinery, he became the associate of Almy and Brown who were among the first cotton manufacturers in the United States (Ware 1931: 19; Tucker 1984). But the development of the American cotton industry was rather slow, since by 1806 a total of 15 mills were in operation, and half of them belonged to Slater and his associates. The industry only became significant in the 1820's (Rose 2000: 45). In the early period prior to 1808, most cotton textiles were imported from England (fine cotton) and India (coarse cotton),[11] but political events prompted the government to interfere in trade. Because of hostilities between England and the United States, the Jeffersonian embargo was imposed in 1807, and the war of 1812 further limited imports, which in turn facilitated the growth of a domestic industry, principally in New England (Rose 2000: 46; Irwin and Temin 2000: 19). At the end of hostilities between England and America in 1814, cheap products, especially Indian textiles, entered the American market, jeopardizing the existence of many cotton manufacturers already facing an economic slump, therefore another set of protectionist measures concretized with the introduction of the tariff of 1816 with a 35 percent ad valorem tax (Rose 2000: 47; Singleton 1997:

167). Finally in the 1820's, the domestic cotton industry produced more output than imported cotton goods (Irwin and Temin 2000: 21; Farnie 1979: 93). In the United States, New England became the principal center of production, and since then cotton manufacture continued to grow at a steady pace, supplying mainly its internal market with coarse quality products. But other protectionists' measures were introduced in the following decades.

The northeastern states continued to maintain supremacy in cotton production until the turn of the twentieth century. However, in the 1860's, southern states began operating cotton mills as well, but with limited impact. In 1900 while 41 percent of national spindleage remained in Massachusetts, southern spindleage represented 20.76 percent of the national total (Yonekawa 1998: 19; Rose 2000: 180).[12]

Lastly, in the final two decades of the nineteenth century, industrial cotton production spread to Asia. Cotton spinning manufacture reached Japan in the 1880's, and it is argued that it remained its principal industry until the 1930's (Chokki 1998: 1; Farnie and Nakaoka 2000: 11). A few attempts had been made at introducing mechanized spinning under the Meiji government, but most mills had not been very successful.[13] Cotton spinning was the first branch of the industry to introduce machinery followed by power loom weaving developing at a slower pace and not making significant inroads until the First World War (Koh 1966: 23).[14] However, by 1898 with the growth of cotton spinning, Japan's reliance upon Indian cotton yarn became minute and exports of yarn exceeded total imports.[15] In the 1890's Japan began exporting yarn to China as a result of a slump in the domestic market (Koh 1966: 24). The Sino-Japanese War (1894-95) followed by "two maritime laws" expanding "ocean going-shipping" as well as "the Russo-Japanese War of 1904-05" facilitated the access to Chinese and Korean markets (Farnie and Nakaoka 2000: 29; Koh 1966: 24; Seki, 1956:19). By 1900, one third of Japanese production was destined for export, and Japan surpassed the United States and India as a supplier of the Chinese market in the 1910's. Although still behind England, Japanese market share represented 20 percent of Chinese imports (Takamura 1982: 277, 278). Overall, by the early twentieth century the industry rivaled its competitors in the world-economy (Fletcher 1998: 63).

Indian cotton goods, as discussed previously, lost their competitive edge once the British introduced mechanized production along with tariff protection to defend their market. The "modern" Indian cotton industry emerged in the mid-1850s with the creation of the Bombay Spinning and Weaving Mill.[16] The industry

Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

continued to develop at a steady pace, and eventually totaled "193 mills with 4,945,783 spindles and 40,124 looms" by 1900. The peculiarity of the Indian cotton industry was the existence of "managing agency system" which provided both "the financing required by the industry, in respect to both fixed and working capital, and the day-to-day management of the industry." Exports to China absorbed a portion of the Indian cotton production; however, by 1914 Japan started to out-compete India in the Chinese market. By the mid-1920's, due to Japan's competition in the Chinese market, India turned to its national outlet with a supply of fabrics and medium and fine yarns, although by the end of the First World War, Japanese and British cotton goods still competed strongly for shares of the Indian national market (Koh 1966: 99, 125-6, 148, 126-27).

## **Production totals**

After this descriptive attempt at positioning cotton manufacture as a leading industry first located in Britain and its subsequent geographical expansion, let us now estimate worldwide total production over time. Amidst a lack of adequate output figures, and since raw cotton constitutes the main input of the cotton industry, we can obtain a fairly clear picture of its development by reporting cotton consumption over the long term.[17]

The British cotton industry expanded quickly between 1780 and 1800,[18] whereby fixed investments increased "by 165% to reach £ 4.9 m" (Mitchell 1988: 330; Rose 2000: 22). The United Kingdom consumed 3.0 thousand metric tons of raw cotton in 1780 and reached 24 by 1800. During that same period of time, France consumed an average of 4.0 thousand metric tons (Mitchell 1992: 427-28). While the consumption of raw cotton quadrupled in Britain between 1790 and 1810, in France it tripled (Crouzet 1990: 306). During the next period, 1800–1860, the United Kingdom continued to augment its annual consumption of raw cotton to reach a peak of 492 thousand metric tons, only to regain slow growth after 1870 (Mitchell 1992: 428).[19] In the meantime, France increased its average to arrive at 115 thousand metric tons in 1860. With reports beginning in the 1820's, Austria (Austria-Hungary) consumed 4.7 thousand metric tons, but steadily grew to 45 thousand metric tons by 1860. Germany averaged a consumption of 8.9 metric tons in the late 1830s and reported a total of 67 thousand metric tons by 1860 (Mitchell 1992: 428-29). Also, by 1860 the United States consumed an average of 184 thousand of metric tons. This brief outlook regarding the amount of cotton consumption between 1780 and 1860 demonstrates that the UK, France, Belgium,

Austria/Hungary, Germany and the United States participated in cotton manufacture, with England leading the group.[20] In 1870, continuing the trend, the UK persisted in the lead with raw cotton consumption equaling 489 thousand metric tons, followed by the United States with 174 thousand metric tons, Germany with 81 thousand metric tons, France with 59 thousand metric tons, and Austria/Hungary with 45 thousand metric tons. The following decade, in 1880, the tendency remained the same, recording bigger outputs for all of them. In 1890, for the first time Japan showed figures of 22 thousand metric tons of cotton consumption. Finally in 1900, the total amounted to 833 thousand metric tons in the United States (surpassing for the first time the UK), 788 thousand metric tons in the UK, 375 thousand metric tons in India,[21] 279 thousand metric tons in Germany, 221 thousand metric tons in Japan, 159 thousand metric tons in France, and 127 thousand metric tons in Austria/Hungary (Mitchell 1992). The post-1860's trend indicates the gradual growing importance of the United States, which eventually surpassed the UK, and the prominence of Japan and India at the turn of the twentieth century.

**Table 1 Cotton Consumption 1820 - 1900 (total in thousands of metric tons)**

	Austria/H	Belgium	France	Germany	Italy	Russia	Switz	UK	US	India	Japan	Total
1820			25.8%*			0.8%		73.3%	n/a			73.6
1830	4.25%		20.0%*			1.2%		74.5%	n/a			150.3
1840	4.0%	3.0%	17.8%	3.0%*		2.0%		70.0%	n/a			296.8
1850	7.0%	2.43%	14.3%	6.3%*		4.8%		64.0%	n/a			411
1865	3.7%	2.0%	10.2%	7.7%	0.5%	4.3%	4.0%	54.7%	12.5% [22]	n/a	n/a	598.8
1870	4.7%	1.7%	6.1%	8.4%	1.6%	4.8%	3.9%	50.8%	18.0%	n/a	n/a	963
1880	4.5%	1.6%	6.2%	9.6%	3.3%	6.6%	1.5%	43.4%	23%	n/a	n/a	1,420
1890	5.0%	1.5%	6.0%	11.0%	4.9%	6.5%	1.3%	36.3%	26.4%	n/a	1.0%	2,079
1900	4.4%	1.2%	5.6%	9.8%	4.3%	9.2%	0.8%	27.6%	28.1%	n/a	4.5%	2,850
1910	4.7%	1.7%	4.2%	10.3%	4.7%	9.7%	0.6%	19.9%	28.1%	9.2%	6.6%	3,712

\* average

Source: From Mitchell (1992, 1993); In Europe, Sweden and Finland (with a low percentage), Spain (whose records start in the mid-1830's) and the Netherlands (whose records start in the 1840's) are omitted; Latin America not included, as well.



Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

Another indicator of the relative importance of cotton manufacture can be established through the number of spindles used in the industry. Based on miscellaneous sources, we are able to establish factory spindleage from 1800. While the UK possessed 95.4 percent of the total number of spindles in 1800, its percentage decreased to 39.7 percent by 1910, indicating the geographic expansion of the industry during the nineteenth century. Unlike cotton consumption, total spindleage remained the largest in Great Britain over the decades, despite a decrease in percentage. This can be partially explained by the different technologies in use, mule spinning in Great Britain, and ring spinning producing bigger output in the United States.[23]

**Table 2 Factory Spindleage of the Cotton industry**

	Great Britain %	Continent %	America %	Asia %	Total Spindles (millions)
1800	95.4	4.6	0.05		3.46
1810	82.2	16.4	1.3		7.30
1820	73.9	24.1	2.0		11.45
1830	69.0	24.5	6.5		16.95
1840	63.2	26.8	10.0		24.20
1850	60.6	27.4	11.8		34.63
1860	61.0	27.6	11.0	0.7	49.78
1870	57.6	29.3	12.3	0.73	60.19
1880	54.1	27.5	15.3	2.0	73.46
1890	49.6	28.6	17.8	4.0	88.29
1900	42.84	30.7	20.2	6.3	106.43
1910	39.7	30.4	23.3	6.6	134.45

From Farnie (1979: 180; 2004: 23-24), Koh (1966: 23, 325 and 334), Rose (2000: 162), Takamura (1982: 279), Saxonhouse and Wright (1998: 276).[24]

Also particular to the cotton industry from its inception is a lack of monopolistic firms, except in Japan where a few companies dominated the market (see Chapman 1987: 26-35; Fitton and Wadsworth 1968: 192-196; Gattrell 1977; Loyd-Jones and Le Roux 1980; Rose 2000: 162, table 6.2; Koh 1966: 325-326 and tables 3-1: 365 and 3-3: 367). For example in Britain, with the introduction

Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

of the Arkwright-type mills in the late eighteenth century, the number of mills augmented in comparison to earlier periods. A rough estimate (not all of the UK was accounted for) recorded the existence of about 208 mills in 1788 (Chapman 1987: 27). In 1795, with the exception of a few large firms (owners among whom we find the Peels with 23 mills and the Douglasses and Robinsons) modest size with small resources characterized the industry. The next industry survey of 1812 recorded the importance of mule spinning in many factories. Despite technological innovations 70 percent of firms possessed less than 10,000 spindles. In contrast, owners such as the Horrocks of Preston (107,000 spindles), Marsland of Stokport, M'Connell and Kennedy and A&G Murray (all with 80,000 spindles) represented the other end of the industry. All four firms combined possessed 4.75 percent of worldwide spindleage based on the 1810 estimates.<sup>[25]</sup> Over the years, small manufactures continued to enter the industry, especially during the 1820's (Chapman 1987: 30).

Far behind Britain regarding cotton production, France, according to accounts, possessed one mechanized cotton manufacture in 1780, 8 in 1790, 48 in 1800 and 272 in 1814 (Chassagne 1991: Tableau 8, 259). But if we add non-mechanized spinning and weaving to the equation, we notice a far greater number of establishments. For example, the Champagny's survey of 1806 registered 1,037 spinning mills and 2,249 weaving mills (Chassagne 1991: Tableau 9, 269).

The estimated<sup>[26]</sup> spindleage of the Baker sample in the United States (see discussion below) represented 5.7 percent of the country's total and 0.6 percent of worldwide total in 1850 to eventually reach a decade later 7 and 0.8 percents respectively. In 1880, the former and latter amounted to 5.8 and 0.8 percents (McGouldrick 1968: 248-249; Farnie 2004: 23).

One major company, the Osaka Spinning Co., established in 1882, is emblematic of the expansion of cotton manufacture in Japan. With machines brought from England through the Platt Brothers, mechanized spinning began expanding steadily (Chokki 1998: 147). The Kanegafuchi spinning company was erected in 1887 with 29,000 spindles, and eventually became the leading company in 1903 with a total of 218,000 spindles (Koh 1966: 39). Overall, the Japanese cotton spinning industry saw the creation of 54 firms between 1894 and 1899. Then the number diminished through mergers, with only a few newcomers. Kuwahara reports that "At the end of 1898 thirteen companies had 50 percent of the operating spindleage nationwide, and twenty-eight had 75 percent; however, by

the end of 1907 the number of enterprises in each category had fallen to five and ten, respectively" (1998: 118). By 1907, six firms ("Big Six"),<sup>[27]</sup> with over 100,000 spindles each, possessed 61 percent of total Japanese spindleage, while the top ten represented 76 percent (Kuwahara 1998: 118-120).<sup>[28]</sup> The Big Six with a total of 911,939 spindles in contrast amounted to 0.7 percent of the world's spindleage capacity (Kuwahara 1998: 118; Farnie 2004: 23).

**Table 3 Number of Firms in the Cotton Industry**

	UK	US	Continent	Japan	India <sup>[29]</sup>
1860	n/a	n/a	n/a		
1880	1,874	56	n/a	5	62
1890	1,801	905	n/a	30	127 <sup>[30]</sup>
1900	1,787	973	n/a	79	193
1910	1,977	1,324	n/a	36 <sup>[31]</sup>	272

From Rose (2000: 162, table 6.2), Koh (1966: 325-326, 365, table 3-1, 367, table 3-3).

## Profitability

Now that we have established to some extent the geographical expansion and production characteristics of the cotton industry between 1760 and 1900, we can attempt to demonstrate its profitability. But first, we will focus on calico printing; although it is a sector often neglected, it is nonetheless important in the eighteenth-century world-economy.

### *Calico printing*

Calico printing played an important role in the cotton industry in particular, and in the European economy of the second half of the eighteenth century (Caspard 1979: 7).<sup>[32]</sup> This particular sector had been organized in factories even before the rapid advent of cotton spinning (Chapman and Chassagne 1981: 3). The industry was mostly located in France, Great Britain, Switzerland, and Mulhouse. Based on miscellaneous sources, Chapman and Chassagne have accounted for the number of firms<sup>[33]</sup> located in these countries and have estimated the total production (million of meters) in 1785 to amount to 16.0 in France (including Alsace), 12.4 in Great Britain<sup>[34]</sup>, 3.2 in Neuch-âtel, and 3.0 in Mulhouse. Very early on, it was not unusual for workshops to employ

hundreds workers, and to possess a large amount of capital. For example, in the 1770's, the most important French, British, and Swiss firms reached millions of Livres or thousands Pounds. The industry also progressed because of chemical and mechanical innovations, which improved production (Caspard 1979: 7; Chapman and Chassagne 1981: 203, 10-13).

Among prominent calico printers a few names come to the fore; Robert Peel in England, Christoff-Philipp Oberkampf in Jouy, Johann Heinrich von Schuele in Augsburg, Joseph Leitenberg in Bohemia, and Dupasquier La Fabrique-Neuve de Cortailod (Neuchâtel).[35] We do possess detailed account of La Fabrique-Neuve de Cortailod and Oberkampf of Jouy, along with other general information regarding the industry.[36] Based on these, we shall attempt to estimate the degree of success of calico printing in the second half of the eighteenth and early nineteenth century.

### Profits and return on capital

An alternative in understanding the success of firms is to calculate the benefit margins or the return on capital. Scant information for the period prior to the 1780's does not permit a precise calculation. However, between 1750 and 1760, the return on capital has been said to be exceptional for calico printing in general. It continued to be lucrative until the early nineteenth century. In 1769, Abram de Pury wrote that he could not believe the amount profitable returns he made after contributing money to a calico-printing firm. In Basel, Ryhner affirmed that calico printing was at its best. Finally in Mulhouse, two years earlier, Mathieu Mieg declared that calico printers made money while sleeping (quoted in Caspard 1979: 164). In England, Thomas Phillips is recognized for having made "huge profits" in the late eighteenth century (Howe 1984: 16). From this assessment, it is undeniable that calico printing offered great potential regarding profit making. However, the question is how did this translate into numbers?

In 1766, Reyhner, the luxury calico printer established in Basel, reported his profit rate to be an average of 13.55 percent.[37] The same year, La Fabrique-Neuve recorded a profit rate of 14.3 percent, but a return calculated as return on sales (turnover: see endnote 39). Based on the Fabrique-Neuve's records, Caspard's calculations of the profit rates[38] averaged between 21 and 18 percents in the decades spanning the 1750's to 1790's (Caspard 1979: 200, see table

Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

in annex VIII). For a period of twelve years following 1770, Schule's returns on capital averaged 30 per cent (Chapman and Chassagne 1981: 203). The average returns on capital for the Fabrique-Neuve from the 1780's to 1815 were more than 30 percent, however the profit margin on turnover for the same period amounted to about 17 percent (Caspard 1979: 165, 200). In comparison the returns on capital at Oberkampf of Jouy, the averages from 1770 to 1815, were about 14 percent and characterized by tremendous fluctuations over the years (from 30 percent return in 1770 down to 9 percent in 1780's up again to 35.5 percent in 1792 down to 12 percent in 1800 and finally a loss of -4.2 percent in 1813-14 (Chapman and Chassagne 1981: 137). The differences in percentage can partly be explained depending on whether a firm worked on commission or not.[39]

After the Napoleonic wars, business did not flourish as before. By the 1840's, most calico printers had difficulties in keeping with the increase competition in the mass export market. For example, in England, several important calico printers (Peel, Turner, and the brothers Hargreaves) sold their establishments, turned to spinning and weaving, or abandoned the trade in the 1840's (Howe 1984: 15). La Fabrique-Neuve reflects the general context, between 1818 and 1854 the firm was not as successful as in previous decades, left with important stocks, lower margins, and losses. From 1838 to 1840, profits were still made; however, afterwards it registered losses and eventually closed in 1854.

### *Cotton manufacture*

Besides calico printing, technical innovations transformed cotton spinning which eventually became dominant in the 1780's. As already discussed, England first monopolized production and eventually expanded geographically to the Continent, the United States, India and Japan.

If, in general, the British cotton industry was mostly constituted of small to medium size factories and only a few firms left adequate records, we can ask: how successful were small factories compared to larger ones? Three scholars, Lloyd-Jones, Le Roux, and Gatrell analyzed the viability of small, medium and large firms between 1815 and 1841. They based their research on two contemporary surveys, the Manchester Rate Books of 1815 and the Factory Inspector's survey of 1841. The three scholars came to slightly different conclusions on the nature of the most vulnerable firms. Lloyd-Jones and Le

Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

Roux, focusing on the 1815 material, concluded that small firms were more vulnerable, and those middle-sized ones were more successful overall. Gatrell, on the other hand, focusing of the 1841 material concluded that the difference between the two, small versus medium size, was not significant (Chapman 1979, 1987: 30; Gatrell 1977; Lloyd-Jones and Le Roux 1980). Both conclude, however, that the cotton industry was not solely dominated by a selected number of large factory owners.

Overall, while the pre-1815 period combined a number of large and small firms, post-1815 witnessed a growing number of medium size firms, however, still accompanied by small and large ones. While in 1815, 8 percent of firms employed more than 500 workers, 9 percent did in 1841. Their share of the labor force amounted respectively to 44 and 32 percent (Lloyd-Jones and Le Roux 1980: 74). But how successful were small to medium firms in comparison with large ones? While it has been argued, "success was not the monopoly of giants" (Crouzet 1982: 204; see also Gatrell 1977), Chapman, instead, cautions that in times of financial strain, small factory owners who benefited from limited connections and financial access were more vulnerable than large owners with better networks (1987: 32-33).

Accordingly, because of a lack of adequate aggregate data, we shall attempt to illustrate the general trends of the cotton industry in analyzing reports of specific prominent firms for the period under study. A few British, American and Japanese cotton manufactures left us precious records, which have been unearthed from the archives by various scholars. First, we shall proceed in uncovering information regarding the overall cost of production, then turn to specific results of particular geographic locations to finally attempt establishing the general profit rates of the cotton industry in the eighteenth and nineteenth-century world-economy.

### Costs of production

In the cotton industry, capital investment consisted of fixed and variable capital.[40] Overall, during the early period, the cotton industry required a relatively small amount of fixed capital in order to operate.[41] For instance, after Cowpe, Oldknow & Co.'s creation, during the period 1790-1795 fixed capital amounted to about half the total, however, the following three years it only amounted to about one third (Chapman 1967: 125-126).[42] Early on, up to

1776-1785, the major source of capital came from retained profits. In Britain, especially prior to the mid-nineteenth century, joint-stock companies hardly existed. Firms' owners or partners relied on personal savings and contributions in order to raise their initial capital (Singleton 1997: 41). Small firms often depended on family members or reliable local contacts in raising adequate assets. Moreover, suppliers on many occasions allowed 4 to 8 months credit to their customers, which was another way to accumulate enough capital (after producing and selling cotton goods) to pay their bills (Chapman 1987: 33).

Even so the need for fixed capital rose over the years; in general, the cost of cotton was in comparison much higher. Overall across time and space, the cost of cotton despite a gradual decrease in prices still represented a large percentage of the total cost of production. For example, in the United States, Almy and Brown's cost of raw cotton amounted to two-thirds of total expenditures in 1794 (Ware 1931: 124). In the 1830's, the Ashworth's New Eagerly mill in England devoted 70 percent of its expenses to acquire raw cotton, 15 percent to pay wages, and 15 percent reserved for capital and overheads (Boyson 1970: 48, footnote 2). Circa 1840 based on Montgomery's (1969) estimates, cost per yard in an American mill consecrated 25.6 percent of its total cost for wages, 15.38 percent on capital (including interest, insurance, depreciation and power), and 59 percent on cotton (including transport). Comparatively, a British mill devoted 23 percent to wages, 5.29 percent to capital and 71.7 percent to cotton (Jeremy 1990: 38). Law, in his study of Fieldens of Todmorden (GB), reported that:

Depending of the level of activity and cotton prices and margins, the annual turnover of the spinning and weaving business in Todmorden in the 1850's would lie between £300,000/£450,000. In round figures the cotton bill would be around £150,000/£250,000 and the direct wage bill between £60,000 and £80,000 per year. ... [Then] there were wage costs that were indirect overhead which in the fifties were of the order of £13,000/14,000 per year; this included the wages of mechanics, masons and other craftsmen, and ancillary staff (Law 1995: 111).

In Japan, early on the cost of raw cotton "represented 60-70 per cent of the cost of spinning yarn" (Farnie and Abe 2000: 132). In the 1998 world-economy, the cost of cotton still represented a large share of input costs. For example, in Turkey (the fifth largest consumer of cotton), cotton yarn<sup>[43]</sup> amounted to an average of 64 percent of the total costs of textile production. Labor costs were about 17 percent (Tan 2001: 26, 41).

Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

However in contrast, the prices of inputs or outputs have diminished over time. T.S. Ashton constructed indices of annual average of British cotton prices (1829 = 100). Over the years, the cost of cotton yarn continuously declined. In 1795 the index was 252, decreased to 186 in 1815, further diminished to 118 in 1837, and finally reached 94 in 1850 (Crouzet 1982: 196). The price of Sea Island raw cotton and the price of yarn in England gradually declined from the 1790's to the 1840's. In 1799, the price of raw cotton per lb amounted to 25p to 26p; in 1834 it was only 7 ½ - 12 ½ p (Lee 1972: 137, based on Ure 1970). While the price of raw cotton might have been three to four times higher on the Continent than in England during the Napoleonic wars, the gap was much reduced by 1910. The cost of cotton, including transportation was \$0.0015 per lb cheaper in New England than in Lancashire. In contrast, the input cost in France and Germany were only \$0.0001 more per lb (Clark 1987: 144-145).

Although the wage ratio to the total cost of production varied slightly across centers of production, wage rates differed according to locations. English wages were rather stable in the first half of the nineteenth century, however decreasing slightly in the 1920's (Lee 1972: 141). On the continent, in the 1830's, "hourly wages compared with Manchester were about 37 percent in Mulhausen in the Alsace, 28 percent in Zurich, 25 percent in some mills in the Vosges, 38 percent in Ghent Belgium, 47 percent in Rouen, about 36 percent in Austria, and less than 25 percent in Prussia" (Clark 1987: 142). Only in the United States and Canada were wage rates higher than in Great Britain. By 1910, weekly wage rates in England were 65 percent of that of the United States (New England and the South combined). German and French rates were 76 and 74 percent of British rates. More drastically, still based on England, Japanese and Indian wage rates were 16 and 15.6 percent respectively. The lowest ones were Chinese with 10.8 percent (Clark 1987: 146, based on the Special Agents Series of the U.S. Bureau of Foreign and Domestic commerce and the U.S. Tariff Board report on Cotton Manufactures and other sources of 1910). In 1998, hourly labor costs were among the highest in Germany, Italy and the United States averaging \$21.48, \$15.81 and \$12.97 respectively. Compared to the United States, wage rates in Turkey, China, India and Indonesia were 12.12 percent, 4.78 percent, 4.62 percent, and 1.85 percent correspondingly (Tan 2001: 38, based on Werner). Not only are contemporary wage rates higher in Germany than in the United States, the gap between the highest and lowest ones is deeper today than a hundred years ago.



Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

Notwithstanding supplying most foreign markets, British cotton exports were never taxed during the nineteenth century, and the import duty on raw cotton<sup>[44]</sup> in existence since 1798 was eventually eliminated in 1845 (Farnie 1979: 5, 38). In France, despite an attempt at eliminating the extremely high custom duty on raw cotton imposed since the Revolution, the act of 1816 further enforced a duty ranging between 15 to 50 francs depending on the quality of short or long staple cotton (Dunham 1928: 284-85). It was not until the 1860's that tariffs were relaxed. In the United States, in the early nineteenth century, "tax exemptions" were allocated to cotton manufactures (Rose 2000: 46). In 1882, the Japanese Spinner Association was created. In order to compete more fully in the Asian export market (especially to China), the Spinner Association lobbied to eliminate the export tax on cotton yarn; a request finally guaranteed in 1894. The next move was of abolishing the cotton tariff, which eventually happened in 1896 (Fletcher 1998).

During the nineteenth century despite continued growth of the French cotton industry, Britain still succeeded in producing more cheaply. Based on an 1829 survey, Houdoy evaluated the cost of production for two similar cotton spinning firms in France and England, and found costs in the former to be higher than in the latter. He argues that "Il Angleterre, produisant à très bas prix, avec un outillage plus perfectionné que le notre, et des établissements qui lui coûtaient mois cher, notre infériorité sur ce point était plus grande encore" (1903: 51-52). However, based on the commercial inquiry of 1834, it had been established that coarse cotton was spun more cheaply in Alsace than in England (Shulze-Gaevernitz 1895: 37).

Before the Anglo-French Treaty of 1860, it was estimated that the yearly cost of production per spindle in France was about 16 francs, and only 8 francs in Britain. In the 1870's, based on Legrand, Houdoy compared the cost of production per spindle<sup>[45]</sup> in Britain and France. Based on 28 counts, the total<sup>[46]</sup> in favor of Britain was 5 francs 67 (Houdoy 1903: 80, 301)

## Profit levels

As mentioned earlier, successful firms often expanded through retained profits. Various sources seem to agree that the greatest profit returns were made prior to 1815. According to Howe, the pre-1800 years were a period of "monopoly" profits, for the large-scale producer, although losses were not uncommon: trading was

poor in particular years, as in 1793 and 1797, while accounting techniques were weak (1984: 24). Several indications support the consensus that higher profits were made during the war period than between 1815 and 1840; the proof being that the "gap between price levels for cotton and yarn prices narrows strikingly through the first half of the century" (Honeyman 1982: 58; Lee 1972: 140-141[47]). In addition, Schulze-Gaevernitz's study estimates falling profits in the English spinning industry from 1784 to 1832 in establishing the difference between the price of 1 lb. of yarn, No. 40 twist and the price of the necessary cotton for producing it. He concluded that the balance for expenses and profits went from 8s.11d in 1784 to 0s.4d in 1832 (Schulze-Gaevernitz 1895: 35).[48] For later periods based on Ellison, mill margins between 1859 and 1860 amounted to "8d per pound cloth," and its average diminished to 5.5d between 1865 and 1870. In the 1870's mill margins regained ground and reached 7d per pound, but further fell again by 1872 to 4.5d per pound and eventually diminished even further in following years (Ellison, quoted in Law 1995: 130).

Nevertheless, many scholars refer to the famous Kinkman Finlay's testimony (on the behalf of the cotton manufactures) to the Select Committee of the Commons in 1833 declaring that profits by then were small because of deepening competition.[49] He added "I think its character is one of great expansion, of rapid scale and activity, but making very moderate profits" (quoted in Barr 2000: 141). Still according to Finlay, higher profits, especially in spinning, were recorded earlier, when "competition was less intense and prices were much higher" (Honeyman 1982: 58). He was also quoted saying "the best time that I ever knew in the spinning trade was about 1802; it was, however, even better before that" (quoted in Lee 1972: 139). Crouzet, referring to the cotton manufacture as well as other industries, pointed out that return on capital often reached up to 20 per cent during good years, especially prior to 1815.[50] Cottrell, on the other hand, noticed a decrease in profit rates during the second quarter of the nineteenth century (1980: 24).

Again, how did these testimonies translate into numbers? Prior to the 1800, in spite of an acknowledged recognition of high profit making, only a few records are fully accessible. For example, under the Arkwright's patent, "the Robinsons of Nottingham ... were earning 100 percent on their investment in mills and plant in 1784" (Chapman 1987: 31). But for the twenty year period 1778-1798, the average return on capital (average £46,787) for Cradwell and Birley was 13.1 per cent (Howe 1984: 27). On the other hand, a few firms have left us with more

detailed records, and one of them consists of M'Connel and Kennedy's partnership which was established in 1795 with an initial capital of £ 1,632.12.1. Before deciding to specialize in cotton spinning, the partners were involved in the machine making business, a sector they eventually abandoned in the early 1800's. Adam and George Murray, who also specialized in fine cotton spinning, were M'Connel and Kennedy's biggest competitor, and the two, according to Lee, controlled "the fine yard market during the war." In 1811, the valuation of their respective firms amounted to £ 20,455.16.0 for Murray and £18,152.14.0 for M'Connel & Kennedy (Lee 1972: 27).

M'Connel & Kennedy was essentially geared to the European export market, which experienced trial and tribulation during the Napoleonic Wars. In this instance, the firm reflected the state of the British export market which began to expand in the 1790's, and by 1805, two-thirds of the total output was sold abroad because of an adequate demand and a general lack of competition from Europe. During the Napoleonic Wars (and the continental blockade), export was a difficult undertaking, but the firms who succeeded in selling products abroad did get excellent returns (Lee 1972: 52). At the end of hostilities in 1815, the market in general and export to Europe in particular, was no longer as lucrative, with prices at times reduced to half what they had once been. Overall, the partnership faced slowdowns between 1808-1809 during the Continental Blockade, and during the American Embargo of 1807-1809/1814. In general, the industry experienced successive trade slumps during 1808-1810, 1814, 1815-16, 1819 and 1825-26 (Lee 1972: 36). Similarly, in Alsace, the firm Méquillet et cie also experienced an economic downturn in 1810-11, and again in 1814— a crisis that affected the Empire in general (Fohlen 1956: 20-25).

Fluctuating results from one year to another were not uncommon overall. For example, the Pleasley cotton mill of Cowpe, Oldknow & Co averaged return on capital amounting to 36% between 1790 and 1792, but recorded a loss the following year, perhaps somewhat explained as the result of war with France. Then the 1794-1797 average reached 16.44 percent (1795 missing) (Pigott 1949: 37).

Over the course of 12 years (1798 to 1809) despite drastically different annual results, the two firms of M'Connel & Kennedy and Pleasey mill of Cowpe, Oldknow, Siddon & Co averaged 18.9 percent return on capital.<sup>[51]</sup> The period 1799-1802/1804 was the most fruitful for M'Connel & Kennedy with three years of returns of more than 30 percent (Lee 1972: 167, table 13; Pigott 1949: 37-38). N. Dugdale, with a much smaller average capital, managed a 24.8 percent return

between 1797 and 1802 (Howe 1984: 27). As for Cowpe, Odknow and Siddon & Co, the average return between 1797 and 1803 was 28 percent (Pigott, 1949: 37-38). Therefore, the average of the three firms amounted to 26.34 percent between 1797 and 1802. However, for M'Connel and Cowpe, Oldknow the average returns dropped drastically to only 5.2 and 8.6 percent respectively between 1805 and 1809.

How did these results compare to the nascent industry on the continent? Some information relating to the cost of cloth production (not spinning) in northern France (département du Nord)[52] indicates the growing importance of the cotton industry with the return on sales amounting to 4.3 percent in 1789 and 10 percent in 1801 (Houday 1903: 30).[53]

For the period following the Napoleonic Wars up to the 1880s, a few surviving records of firms exist.[54] For the industry in general, after mediocre results following the end of hostilities, profit margins had increased between 1818 and 1825, and had decreased between 1826 and 1830. Despite uneven results among firms, the average returns did not exceed 10 percent for the period spanning the late 1810s and the 1820's. The firm Thomson, Chippindall averaged from 1812 to 1826 a return on capital of 7.8 percent (Howe 1984: 27). If we compare results between the Gregs and the Ashworths,[55] the former reflects the industry's trend more than the latter. Overall, if we compare the degree of success of the two firms over a period of twelve years (1819-1830) the Gregs' return on capital of 13.6 per cent was more than twice as much as the Ashworths' 5.2 percent. In combining the two we obtain an average of 9.18 percent (Rose 1986: 53; Boyson 1970:18). For a shorter time period, Thornber made 7.8 percent average return on capital from 1821 to 1825 (Howe 1984: 27), the Gregs returns were 17.6 percent and the Ashworths 4.9 per cent, thus totaling an average of 10.1 percent for the three firms.

In this context, how did the Alsatian firm Méquillet-Noblot perform during this period? Overall, results were rather positive from 1818 to 1826, but not as good from 1827 to 1832 with no registered profits at times, thus reflecting the general situation in Britain (see Fohlen 1956: 135, annexe 15— profits et pertes). Based on the firm's balance sheet of 1817, the return on capital (invested by three partners) was 4.3 percent (Fohlen 1956: 133).[56]

The 1830's and 1840's were generally marked with recession and bad trading years, mixed on occasions with higher returns for some. The Gregs were marred

with losses in 1833-34 and again in 1837 and 1840 (Rose 1986: 62). The following downturn years 1837-39 imposed a loss of more than £33,000 for M'Connel and Kennedy reflecting the Gregs' experience, as well as the a general economic depression that affected some firms more severely than others (Lee 1972: 140; Howe 1984: 25). The same fate awaited the Ashworths at New Eagerly with negative returns from 1839 to 1842 (Boyson 1970: 30). However, for short 3-4 year periods, some firms succeeded to average returns of 10-11 percent.[57] Overall, however, returns were in the low single digits. The Peels and Hollins, Siddon & Co (previously known as Cowpe, Oldknow ...) barely enjoyed a positive return of 2.1 percent and 1.2 percent from 1831 to 1834 (Howe 1984: 27; Pigott 1949: 72). The average return on capital of New Eagly (Ashworth) amounted to 3.78 percent for the period of 1832-1841, characterize by yearly uneven results. The mill at Egerton averaged a return of 2.3 percent with similar fluctuations and losses on capital employed between 1838 and 1840 (Boyson 1970: 30).[58] On the whole, a drastic "decline in profits ... in the 1840's" was recorded (Farnie 1979: 202). In the early forties, Hollins and Co. lost money as well. The Fieldens after having performed well in the previous decade registered very low or negative returns (Law 1995: 66). The early forties were quite dismal for both the Fieldens and Ashworths (New Eagley) with 1.84 percent and 0.6 percent average annual returns on capital from 1841 to 1845. In general, the 1830's and 1840's were characteristic of great fluctuations and inconsistent returns. Despite the unequal results, the average returns were very modest.

The financial results of Méquillet-Noblot during the 1830's up to the mid-fifties did not replicate previous success. Results were simply average or even negative, especially during the 1840's (Fohlen 1956: 59, 135-136).

In the early 1850's the state of the cotton industry recovered overall and continued to offer positive returns in general up to the 1870's, but still with various fluctuations and temporary recession. According to Farnie "a plateau of relatively gradual decline" characterized the British cotton industry from 1845 to 1885 (Farnie 1979: 202).[59] For example, Law already compared the results of Henry Ashworth and the Fielden Brothers in reporting that "the results at Ashworth's New Eagley Factory, also a combined spinning and weaving enterprise, if on the fine cotton side, show for the years 1854 to 1861 and average capital employed of £70,298, and an average profit of £7,174 after paying interest of 5 percent on the capital. These results represent an average return on capital of about 15 percent, comparable to that achieved by Fielden Brothers in

much the same period of 24 percent on a much larger capital" (Law 1995: 114).[60] For the early 1860's, Law and Boyson, based on Watts, estimated the average profit of the industry between 1862 and 1865 (during the cotton famine) to average 12.5 percent (Boyson 1970: 69; Law 1995: 118). The average for both Fieldens and Ashworth were 19 and 14 percent respectively, therefore slightly higher than the industry's average (Law 1995: 118).[61] Based on Ashworth's yearly return on capital, we can establish averages for different periods up to 1880: 1855-1864: 10 percent, 1865-1874: 8.6 percent, or 1865-1879: 7.9 percent (Boyson 1970: 66, see page 68, table 14 for detailed returns).

Boyson notices that in the 1860's and 1870's surplus capital was generally not reinvested in the firm, but was instead given out as shares; thus reflecting a common practice of the cotton firms at the time when plague with a "low rate of reinvestment" (Boyson 1970: 67). He resumes the situation of the firms between 1854 and 1879 in the following terms:

New Eagley's profits on the capital employed from 1854 to 1879 averaged 8.1 percent in addition to the continued payment of interest on all loan and partners' capital. To arrive, therefore at figures of the true profit the interest paid on the capital in excess of the capital employed should be added. This averaged 0.6 percent on the capital employed throughout the period and thus the industrial return on capital employed at New Eagley from 1854 to 1879 was 8.1 percent plus 5 percent interest and 0.6 percent, a total of 13.7 percent (Boyson 1970: 67).

The "Ashworths' profits from 1875 to 1878 are remarkable since there was reduced output and partial depression in the Lancashire cotton industry." Boyson also points out the growing competition from France after 1872 as a possible factor of increasing difficulties encountered (Boyson 1970: 69). For the Fielden Brothers at Todmorden (combining weaving and spinning) the period following the American Civil war was marred with poor returns or losses, the situation even worsened in the mid 1870's. Law notices that between 1866 and 1889, the firm experienced negative returns (losses) "thirteen out of the twenty four years" (Law 1995: 128, and based on table XVIII, 129). As for the hosiery firm of W. Hollins and Co. the results were surprisingly high with 26 percent returns on paid up nominal capital in 1873, 24 percent the following year, and then decreasing to 18 in 1875-76 to reach 9 percent in 1881 (Pigott 1949: 86). The firm's average returns from 1873 and 1881 were 15.4 percent, higher than the average returns for the industry as a whole. In the latter part of the century, both French and German (Saxony who

was already a serious competitor in the 1830's) hosiery industries were still competing with the English (Pigott 1949: 83).

Regardless, the overall situation of the cotton industry in Britain was characterized with a number of failed businesses. Farnie reports "The number of formal bankruptcies averaged only 31.6 per annum between 1873 and 1896, with one marked peak of 66 per annum in 1877-9, and thus declined to one-third of the average annual rate of 101 during the deep post-Famine depression of 1865-69" (1979: 204). In the last quarter of the nineteenth century, mill margins continued to decrease even further, indicating a loss of competitive advantage overall (1979: 203).

Besides the British and continental cotton industry, the American cotton trade expanded fairly quickly in the 1820's supplying a growing internal market. Before looking for general trends, let us first analyze the state of the American industry and then evaluate the results in consort with those from Britain.

Before 1807, the American cotton industry had been prosperous in general, but on a small scale; however, after the embargo cotton manufacturing began expanding, since the market relied less heavily on British textiles and protectionist measures were introduced (Rose 2000: 46). Although the post-war years 1818 and 1819 were particularly bad ones, business, nonetheless, picked up in the 1820's. Between 1817 and 1821, dividends in Waltham averaged 19% percent a year, and in 1822, dividends increased to 27% percent. Dividends in the Lowell companies in 1830 were 8, 6 and 11 percent and increased to 18, 18% and 24 per cent respectively in 1831 (Ware 1931: 140-41, 143).

Despite the fact that it is difficult to estimate the rate of profit of the cotton industry for the whole period, Ware offers us rough estimates.

From 1827 to 1846 the average dividend from the large companies was 9 per cent. This was during the most prosperous period of the industry and from the most successful mills. If we averaged with these the dividends of the small mills, including those which failed in 1829 and 1837 while the larger ones carried safely on, the percentage might be considerably lowered. Moreover, except for the Waltham company whose early large dividend were due to the power loom and the machine shop, the rates from 1816 to 1827 were lower than in the later period. An average including all mills and the whole period from 1816 to 1846 might very probably show little over three per cent as the return on capital invested in the business (Ware 1931: 156).

Beginning in the 1830's, we can base our analysis on the Baker samples.[63] The sample offers a fairly complete report up to the late 1880's, with reports on profits as percent of sales, profits as percent of net worth, and percentage return to capital. Overall, the trend of profits as percent of sales from 1836 to 1886 tends to decline. For example, the average profit from 1836 to 1839 was 13.25 percent, it increased however to 15.23 percent from 1840 to 1849, declined to 8.7 percent between 1850 and 1859, increased to 9.4 percent from 1860 to 1869 (however results for 1862-1865 are missing), decreased again to 5.95 percent in 1870-1879, and finally reached 6.5 percent from 1880 to 1886 (McGoudrick 1968: 99, see table 13 for detailed yearly returns). McGoudrick also examined profits as percent of net worth and sales.[64] Although percentages are following similar trends, they tend to differ somewhat. He explains the discrepancy between profit to sale and profit to net worth:

[t]his divergence between the profit/sales and profit/equity capital trends was caused by a large secular decline in requirements for equity capital per unit of output ... [M]ost of this decline resulted from a fall in fixed and working capital per dollar of sales. Debt rose only moderately relative to total assets. Thus, the capital/output ratio was declining, and this permitted a steady fall in the profit share of output without any noticeable long-term decline in the profit to equity rate (McGoulick 1968: 100).[65]

The results on returns to capital are based on three firms of the Baker samples: Merrimack, Boston and Hamilton for the period 1837-1861, and two firms Naumkeag and Pepperell for the period 1853-1861 and 1872-1880. The average return from 1837 to 1839 amounted to 9.8 percent, increased to 10.5 percent from 1840 to 1849, and decreased to 9.2 percent for 1850-1859. The second batch (Naumkeag and Pepperell) averaged 9.8 percent between 1853 and 1861, no result in the following decade, and decreased to 8.79 percent from 1872 to 1879 (McGoulick 1968: 108-109).

## Conclusions

Are there any comparisons we can establish regarding the British and American cotton industries? During the Whaltham period in the early 1820's, dividends were fairly high for a couple of years, with a percentage close to or higher than 20 percent. In Britain, the average returns on capital seemed to have balanced around 9 and 10 per cent. In Britain, contrary to the United States, the 1830's



and 1840's seemed to have been faced with bigger fluctuations and negative returns, although apparently small U.S. firms had times of struggle. Certainly results are scattered and fluctuated between losses and fairly decent positive returns, but the average returns most probably were lower than 6 percent. In the U.S. the average seemed to have been around 10 percent. As mentioned previously, the British cotton industry regained potential in the 1850's and 1860's. The small sample of British firms compared to the U.S. ones, seems to indicate that percentage returns were closer, averaging between 8 and 10 percent. After the 1870's the British cotton industry experienced mixed results, while some firms managed to register positive results, the industry in general did not fair very well. Overall, despite the growing importance of the American cotton industry in the world-economy, it seems that in spite of better returns than in Britain, especially in the period of the 1830's through the 1840's, the heydays of cotton in the late eighteenth and early nineteenth century were never to be recaptured, suggesting the decline of what had been the leading industry of the capitalist world-economy as new industries others emerged with high rates of profit to assure global accumulation.

Finally, in the latter part of the nineteenth century the cotton industry expanded as far as Japan. Some information is available regarding the early years. One of the most prominent firms, "the Osaka Spinning Mill distributed dividends based on ... profit percentage," which amounted to an average of 11.6 per cent from 1883 to 1885 and increased to 27.6 per cent between 1887 and 1889 (Koh 1966: 38). Although the results are those of a single firm, the percentages are quite high, especially those of the last three years. We can even compare those with the most prosperous years of the British cotton industry in the late eighteenth century. Other results are available to us for the early twentieth century. Kuwahara reported the returns on paid-up capital for the so-called "Big nine firms" in 1906-1908.[66] The results are tremendous in recording average returns of 72.23 percent for 1906, 59.53 percent the following year, and finally a lower return of 25.7 percent in 1908 (1998: 125, based on table 9). If we contrast those results with those of seven "small to medium firms," although we obtain smaller returns on paid-up capital of 52.85, 57.47 and 7.8 percent respectively, the first two years record remarkable returns while we notice a considerable decrease in 1908 (1998: 125). Generally, the returns on paid-up capital are very high, even more so for the largest firms. In 1908 a relative slump was suffered, but the average return for the largest companies still averaged 20 percent. Kuwahara contends that since these "companies had established oligopolies in

the principal cotton-yarn markets at home ... fluctuations in either domestic or foreign markets had relatively little impact on them" (1998: 128-130). However, the small-to-medium firms had more difficulties in competing and some even suffered from negative returns (1998: 130).

Other information regarding dividends based on percentage of paid-in capital for Japanese domestic spinning companies show an average of 14.41 percent from 1903 to 1910 (Duus 1998: 36, based on table 3.2) and rose to more than 50 percent in 1918-1920.

What can we infer from these observations? How does the Japanese cotton industry fair in comparison to England, the continent and the United States? From the above samples it seems that the return on capital of the Japanese spinning industry was extremely high. However, the samples cover only three years. Comparatively, the dividends of the British cotton spinning industry from 1906 to 1908 averaged 9.66 percent, 15.8 percent and 11.75 percent respectively (higher averages than previous and following years). After the First World War, dividends also reached much higher averages than the norm, from 16.2 percent in 1818 to 21.25 percent the following year and finally 40.21 percent in 1920. Nonetheless, in 1921 the percentage had decreased to 9.9 (see Sandberg 1974: 105, table 15 for detailed returns from 1884 to 1925). So the sample from Japan might be reflecting a global peak for a very limited number of years. And we should also understand that the results represent only a small portion of worldwide averages.

In sum, the cotton industry first established its supremacy in Britain in the second half of the eighteenth century and recorded its highest returns prior to 1815. While manufacturing spread to the continent under protectionist measures, the industry's results never surpassed those of Britain during its best period. By the time the industry spread to the United States in the early nineteenth century, pioneer firms recorded high returns, but overall, while the American industry fared slightly better than the British, especially in the 1830's and 1840's, its results never consistently rivaled those from the heyday of cotton in Britain. Once Japan entered the fray in the late nineteenth century, its monopolistic spinning firms seemed to have rivaled or even surpassed other world manufacturers. Although Japan benefited from the highest returns in the early twentieth century, during the same period returns were relatively high in Britain as well for a limited numbers of years just preceding and following the First World War. But King Cotton that first ruled in Britain in the late

eighteenth and early nineteenth century and despite many emulators over time and space, would never recapture the grandeur of its yesteryears.

## Endnotes

[1] Among divers innovations, the Hargreaves spinning jenny was created in 1764, later improved by Arkwright, and finally further improved by the Crompton mule in 1779 (see Pigot 1949: 17-18; Deane and Cole 1967: 183).

[2] For example, the recorded number of power looms and handlooms in 1835 were 109,000 and 188,000 respectively. Ten years later (1845), the numbers were 225,000 and 60,000 respectively (Crouzet 1982: 199). Likewise, the period between 1830 and 1860 recorded the largest number of firms that combined spinning and weaving (vertical integration). Most produced coarse spinning and plain weaving. However, by the 1850's, specialization began to take precedence in locating spinning in south Lancashire and weaving in north Lancashire by the 1880's (see Farnie 1979).

[3] Crouzet reports that already in 1814/15, "Lancashire industries furnished 40 per cent of the total value of the country's export." A peak of 51 percent was achieved in 1830 (Crouzet 1982: 194).

[4] "The continents of Europe and America," says Ure in 1836, "possessed up to some time ago, after the peace of 1814, only factories in such small degree that they could by no means be viewed as competitors in the world's markets. To-day, however, they manipulate 750,000 bales of cotton, which is about three-fourths of our consumption, and they have become dangerous competitors in many markets which up to now belonged entirely to us" (Quoted in Schulze-Gaevernitz 1895: 37).

[5] Napoleonic Wars: referring to the period between 1792 and 1815.

[6] Calico printing originated in India, which supplied European markets until increased competition and protectionist measures diminished its potential.

[7] However, despite the continental blockade and the sea blockade (imposed by the British), trade in general still flourished either through smuggling or with the help of legal maneuvers. Furthermore, the spread of the cotton industry on the continent, in the U.S., and later on in Japan and India depended on

technological know-how first developed by the British. Therefore, all nascent industries depended on machinery of British origin, and often obtained illegally (their export was officially banned until 1843). Early on skilled operatives were also forbidden to migrate. Schulze-Gaevernitz emphasizes the importance of smuggling, "It is certainly known that tremendous quantities of English yarns went to the Continent during and after the Continental blockades. Whole industries have to attribute their present situation to smuggling" (Schulze-Gaevernitz 1895: 37).

[8] Based on John Komlos, Good reports that "after zero growth in the 1780's, value added in the cotton industry grew annually at 2.7 percent in the 1790's and at 4.9 percent in the first two decades of the nineteenth century." The textile industry was mostly concentrated in Lower Austria and Bohemia, where by the 1840's machine spinning had become prominent. For example, Lower Austria produced 48 percent of the total production of cotton spinning in 1841, while Bohemia produced 30.9 percent. The Tyrol and Vorarlberg whose industry was linked to Switzerland constituted the third region (Good 1984: 37, 50).

[9] The discrepancy had subsided by 1910, since the cost of cotton was more or less equal in Britain and on the Continent (France, Germany), or even in Asia. According to Clark "only for Mexico and Switzerland did transportation significantly raise cotton costs" (Clark 1987: 145).

[10] The English cotton industry also suffered a downturn after the Napoleonic Wars.

[11] Coarse Indian cotton products continued to enter the American market up to the implementation of the tariff of 1818 (see Ware 1931).

[12] Rose calculated the spindleage percentage located in the South which amounted to 5.21 percent in 1860, 4.12 percent in 1870, 4.71 percent in 1880, 9.64 percent in 1890, 20.76 percent in 1900 and 34.80 percent in 1910 (2000: 180).

[13] The Meiji government tried to promote the creation of spinning mills under its watch, but not very successfully. In general, private firms became the motor of the Japanese cotton industry.

[14] Chokki notes that until 1922 ring spinning machines were imported from England (1998: 6). See also Farnie and Nakaoka (2000: 9-27) for a brief discussion on the Meiji reforms and the Japanese economic development.

[15] Koh asserts that in 1887 50.8 percent and 49.2 percent of yarn imports came from Britain and India, respectively. In 1898 India's share was 0.7 percent and England 99.3 percent (1966: 24).

[16] A previous company by the name of Fort Gloster had been erected in 1818. However, it showed poor results (profits) and did not encourage the creation of other mills. It remained an isolated experiment (Koh 1966: 90).

[17] Timmins, in the case of Lancashire, cautions us about the reliability of such data since "a considerable increase occurred in the manufacture of fine cotton yarns and cloths, including muslins, which compared with coarser textiles, required smaller amounts of raw material per unit of output. Additionally, less raw cotton was wasted as packing and spinning techniques improved. For both these reasons, a more rapid growth in the volume of output would have occurred than the raw cotton figures suggest." He also argues that the "figures also give a false impression of the rise of value of the cotton industry's output, since finer cotton products were more expensive than coarse cotton and fustians" (1998: 87-88). However, the goal of our exercise here is to establish the relative importance of cotton industry over time and of its dissemination over space. See Deane and Cole (1967: 184-187) for a discussion and table of estimates of cotton-industry output, 1760-1816 in Britain and for the development of cotton manufacture of the United Kingdom 1819-1917 (based on Ellison 1968).

[18] However, calico printing dominated the cotton industry in the 1760's and 1780's. The real growth of cotton spinning began in the last quarter of the eighteenth century.

[19] Cotton consumption estimates have been reported in slightly different amounts by other authors.

[20] Prior to 1860 there is no data for U.S. cotton consumption.

[21] Figures for 1909

[22] For 1860, the total was 184

[23] The results here are essentially based upon Farnie's computation. When referring to other sources, the numbers vary slightly since no formal world statistics existed prior to 1908. In this case, the American category includes the

U.S., Canada, Mexico and Brazil from 1870. Prior to it only the U.S. was computed. For Asia, India and Japan are computed for 1870-1880, joined by China for the next decades (Farnie 2004: 23-24, see table 2.1).

[24] The figure refers to number of mills, and not firms.

[25] In Britain alone the percentage was 5.8%, based on the 1810 estimates. The calculations are based upon the estimates reported by Farnie (see Farnie 2004: 23, table 2.1).

[26] It should be noted that the number of spindles for individual firms is not consistently reported every year. Therefore, the total might be less.

[27] The firms are: Kanegafuchi Boseki Kaisha (Kanegafuchi Cotton Spinning Co.), Mie Boseki Kaisha, Fuji Gasu Boseki Kaisha, Settsu Boseki Kaisha, Osaka Cotton Spinning Co., and Osaka Godo Boseki Kaisha.

[28] As seen in Table 3, the Japanese cotton industry contrasts with the British, Continental (Germany, France, Austro/Hungary), and U.S. industry in having a much higher concentration of firms. Farnie and Abe also indicate that "the five leading firms raised their share of the total mule-equivalent spindleage from 23.5 per cent in 1898 to 58 per cent in 1913 (2000: 123).

[29] The figure is for the years 1889/1890 to 1893/1894.

[30] The number of firms has diminished; however, the number of mills has augmented

[31] In the United States in 1890, 62 percent of production was done with ring spindles and eventually reached 87 percent by 1913. On the other hand, Britain employed only 19 percent of ring spindles for its production in 1913 (Lazonick 1986: 19).

[32] The ban on calico printing had been lifted in France in 1759 and in England in 1774. Nevertheless, the ban on production had been more successful than the selling prohibition which had been bypassed through smuggling to both countries.

[33] Between 1760/62 and 1785, the number of French firms rose from about 42 to 115. During the same period, the number of English firms went from 28 to 111. Finally, in Neuchâtel the number went from 9 to 10 and in Mulhouse, from

15 to 21. The industry also spread to other locations; by the 1790's, manufacturing units are found in Bohemia-Moravia, Hamburg, Saxony (Chapman and Chassagne 1981: 8, 11).

[34] See Fitton and Wadsworth (1968: 74-75) for the increase in calico yardage in Britain between 1775 and 1783.

[35] Prominent calico printers were also found among merchants who often invested some of their capital in the industry, therefore making it difficult to adequately assess their revenues pertaining solely to the industry (Chapman and Chassagne 1981: 185).

[36] La Fabrique-Neuve was located in Neuchâtel, Switzerland. At the date of its creation in 1752, Neuchâtel was under Prussian control. The firm was of importance in Europe, and served as a model for Oberkamf. In fact, La Fabrique-Neuve dominated calico printing during that period, and its French and Alsatian counterparts desperately wanted to hire its workers, or Swiss calico printer in general (Caspard 1979: 159). The firm specialized in the export market for luxury items, and was financially successful until 1818, less so afterwards and finally closed in 1854. At the end of the eighteenth century, its total production equaled 4 percent of the Swiss production, 3.5 percent of the French and 2 percent of the English, while in the 1840's it decreased to 4 percent, 1.2 percent and 0.3 percent, respectively (Caspard 1979: 127). In England, the Peels were prominent calico printers who later became involved in spinning and weaving. Unfortunately, no firm records are available for the Peels. The Lancashire firm of Livesey Hargreaves & Co was said to employ "between 700 and 1000 printers during the 1780's. However in 1788, when production of cotton goods for a time overtook consumption and credit was too freely extended, the firm was forced into bankruptcy with debts reputedly amounting to a massive £1.5 million" (Timmins 1998: 97). Regardless, the printing trade continued to expand.

[37] He reported results four different types of products: ordinary calico, 11.2 percent; handkerchiefs no. 50, 9.8 percent; fine cloth no. 50, 13.3 percent; and other (Peruvian) 19.9 percent. He based his calculation in establishing the percentage return on cost price, calculated as follows: Profit x 100/cost price. Could we assume that the return on sales would consist of adding profits to the price cost, and then the percentage return on sales would be slightly less (Caspard 1979: 158)?

[38] Caspard's calculation of profit rate (profit margin) in this instance equals gross profit x 100 and divided by the annual turnover. The author also points out that producers of luxury items tended to register greater profit margins during downturns. One of the reasons being the cost of dye was higher during periods of increased demand for the product. Caspard noticed that "L'Alinsi, le boom de la production, entre 1754 et 1766, la [marge de bénéficiel] vit passer de 22.5 à 14.3% du chiffre d'affaires, tandis que de 1767 à 1775, en pleine période de marasme, elle remontait à 22.7%. De même, les années 1792-1797 virent la production bondir de 27.293 à 44.290 pièces, tandis que la marge chutait de 26.5 à 16.9%" (Caspard 1979: 157-58).

[39] Chapman notes that "recurrent commercial crises could threaten the solvency of even the most stable business ... as Oberkampf found following a collapse in profits in the years 1793-1796. It was perhaps because of the omnipresent threat of a run on working capital that our English and French entrepreneurs retained wealthy partners for most of their business careers, while Dupasquier (Fabrique-Neuve) worked on commission for merchants houses to which he was closely tied" (Chapman and Chassagne 1981: 203). Caspard comes to the same conclusion. Overall, industrial profits seemed to have been more even over time than commercial ones. Between 1783 and 1795, industrial profits never went below 16 percent, but commercial ones (Pourtalès) recorded negative results in 1789, 1791 and 1793 (Caspard 1979: 168). During 1792-1798, La Fabrique benefited from a 50 percent return, Pourtalès, on the other hand, recorded only a 6 percent return in 1790-1795. Furthermore, it seems that calico printers who worked through an agent benefited from greater returns than those who combined both printing and selling. Caspard compared the results of Oberkampf (which combined the two activities) and la Fabrique-Neuve (which worked through an agent) and concluded that while both firms possessed similar outputs, their results differed. For example, during the period 1783-1792, Oberkampf had a return of 9 percent while la Fabrique-Neuve's amounted to 38 percent (1979: 168). Therefore, Caspard points out that depending on the modes of investments, profits and profit rates did not necessarily coincide. Back in 1766, Ryhner calculated that two firms producing similar output would not enjoy the same profit rates depending on their modes of distribution. Caspard summarizes the example: "Selon son hypothèse, chaque fabrique comprend 45 tables d'impression, et travaille 36 semaines par an. Pendant ce laps de temps elle imprime 13,608 indiennes ordinaires et 3,600 pièces fines, soit 17,208 pièces en



tout. Pour imprimer ces toiles, l'entreprise A, qui travaille pour son compte, doit immobiliser en toiles blanches, frais de fabrication et stocks 272,511 florins qui lui rapportent 18,873 florins, soit 6.9% de profit. L'entreprise B, qui travaille à façon, ne doit immobiliser que 23,433 florins en frais de fabrication rapportant un profit annuel de 10,910 florins, soit 46.5%" (Caspard 1979: 168).

[40] Fixed capital: buildings, machinery; working capital: funds to purchase inputs (cotton), pay wages, hold stocks; "in the interval between the beginning of each round of production and the final receipt of payments from customers (see Singleton 1997: 40).

[41] In contrast, in calico printing working capital was even more important. Howe reports that "Iflor calico printing as a whole in 1834, the ratio of working capital to fixed capital was 6.4:5.4 compared with 7.4:14.8 in manufacturing (1984: 16, quoted in footnote 59).

[42] Based on several insurance records, Chapman argues that Oldknow, Cowpe & Co. were fairly representative of other contemporary (hosiery) firms' valuation (see 1967: 125- 135).

[43] Note the reference is made to cotton yarn and not raw cotton.

[44] In 1815 the duty amounted to "2d per lb on British ships and 3d per lb on foreign" (Lloyd-Jones and Lewis 1988: 70).

[45] The average annual cost per spindle is obtained by adding together the cost of labor, energy, interest-depreciation, and other general costs (transports, maintenance, insurances ...) (Houdoy 1903: 298).

[46] The detailed difference was as follows: interests and depreciation, 2 francs 50; lighting, 0.10 francs; energy, 0.76 francs; labor, 1 franc; and overall costs, 1 franc 40 (Houdoy 1903: 301).

[47] Lee attributes the decline in profits after the Napoleonic Wars more to "the decline in price margin between cotton and yarn throughout this period ... wages were fairly steady, falling only a little from the middle of the 1820's" (Lee 1972: 141).

[48] The balance in 1797 was 4s.2d., 1s. in 1812, .0s.7d in 1822 (Schulze-Gaevernitz 1895: 35).

[49] Lee quotes Finlay's remarks: "I attribute the low state of profit not to any sort of demand, if we compare the demand now with the demand at any former period, but to an extremely extensive production with reference to the demand, arising out of a great competition, doubtless caused by the high rate of profit in former times, which, by attracting a large amount of capital to the business, has necessarily led to the low rate of profit we now see" (Lee 1972: 139).

[50] Crouzet's estimation included not only the cotton industry, but others as well, thus inferring that high returns were not exclusive to cotton. He further notes "even in poor years profits were respectable, especially when one remembers that the partners of a firm first assured themselves of a fixed interest (generally 5 percent) on their capital, and only the earnings over and above this were considered as 'profits'; they were, in fact, net profits, and statistics dealing only with such figures tend to minimize the return on capital" (Crouzet 1972: 196).

[51] Howe based on Lee, reports slightly different figures for the same period with an average return on capital of 16 percent for M'Connel & Kennedy (1984: 27).

[52] However, despite its relevance, the department du Nord was not as important as Alsace then.

[53] The production of cloth increased from 1,275 pieces in 1789 to 88, 850 in 1801 with a cost of production of Frs. 112,200 and Frs. 6,858,930, and profits of Frs. 5,100 and Frs. 762,930 respectively. Can we assume from this that in adding the amount of profit to the cost price (prix de revient) we obtain the sales price? If so, we can then calculate the percentage return on sales and obtain the above results. While the percentage grew, it seems that it was still comparatively smaller than in Britain.

[54] Beside those already mentioned, there are the Gregs of Quarry Bank Mill (with 5 mills), the Ashworth cotton enterprise (two mills: New Eagley combined spinning and weaving and Egerton with both spinning and fine spinning), and the Fildens of Todmorden. Moreover, little data exist about other firms, however limited in years.

[55] The two mill firm expanded tremendously from 1818 to 1831. Although the owners were not among the largest fine spinners in the industry, their firm was renowned for its technical superiority (Boyson 1970: 47). The Gregs were

prominent cotton spinners and weavers. We should keep in mind that for the Gregs the returns consist of profit plus interest on partners' capital and the rent paid to Samuel Greg. On the other hand, Ashworth's returns have deducted interests. For detailed returns on capital for the Gregs and Ashworths, see Rose (1986: 53) and Boyson (1970: 18).

[56] The profit for that year is much smaller than the next seven years. Having no reports on capital invested for those years, we cannot calculate the percentage returns; nonetheless, we can assume that they were higher than in 1817. While the profit in 1817 was 6,000 francs, the average profits from 1818 to 1824 were 27,214 francs.

[57] Although there are no more explicit records for M'Connel and Kennedy after 1809, Lee managed to assess average returns of 9, 8 and 13 percent for the three-year period 1834-1836 (Lee 1972: 140). Calculation was based on the valuation of fixed capital. At Hollins and Co., the average return from 1837 and 1839 (despite an economic downturn) amounted to 11.3 percent (Pigot 1949: 72). As for Fieldens, the average from 1837 to 1840 was of 9.5 percent (Law 1995: 66). Profit includes both interest, and profit. For yearly profits, see Law (1995: 66, table VII).

[58] See Law (1995: 66), who comes in with slightly different estimates: "the Ashworths during this period were averaging 8 to 9 percent and this was the range Henry Ashworth was to quote to a House of Lords Committee in 1846. R.H. Greg of Styal was to suggest to the same committee that 7.5 percent was a representative return." (But it is unclear what years exactly are referred to in the 1830's).

[59] Farnie calculated the "average annual gross return to capital in the cotton industry" based on pence per lb of cotton consumed as follows: 1850-72, 6.49 percent; 1873-96, 6.16 percent (Farnie 1979: 202, table 10).

[60] Although we do not possess profit rates for the Gregs, we can compare their results somewhat with those of the Fieldens since mill-margins can serve as an indicator. Greg's mill-margins are slightly lower than those of Fieldens; however, both follow the same trend: increasing in the second half of the 1850's, slightly decreasing in 1861, and again growing between 1863 and 1865 (see Rose 1986: 72-3 and Law 1995: 113-14).

[61] Boyson reminds us that "it was generally recognized that the larger than average firm should be more profitable" (Boyson 1970: 69).

[62] According to Farnie: "Mill margins did not return to their level of 1872 until 1904 and reached their nadir during the crisis of 1891-3, when the value of gross production sank more sharply than in 1873-79, the volume of imports of raw cotton declined by 29 percent, the value of yarn exports shrank by 26.6 percent and the value of the exports of cotton manufactures to the Far East sank by 27 percent. Even the favored thread industry suffered a recession in the volume of its exports between 1889 and 1894. The severity of that particular depression was clearly manifested in the increase in cut-throat competition" (1979: 203).

[63] The Baker sample consists of a "changing sample of between 7 and 11 companies entering and leaving the sample." The companies are: Boston (entry sample: 1836—exit from sample 1862), Merrimack (1836—1887), Hamilton (1836—1887), Nashua (1836—1887), Tremont (1836—1866), Suffolk (1836—1866), Lawrence (1836—1862), Dwight (1843—1887), Naumkeag (1851—1887), Pepperell (1853—1887), Lyman (1855—1887). The companies, with the exception of Numkeag, were organized on the Waltham-Lowell type. See McGouldrick (1968: 3-4), who asserts that the Baker sample, although being only a percentage of the total industry, is fairly representative of middle-large firms of the same type.

[64] McGouldrick calculates the different profit rates as follows: profit to net worth demonstrates earnings per unit of invested capital; profit to sales evaluates the share of gross output going to owners of equity capital; return to capital as a percent of total assets (rate of return to capital) regards the sum of profits; and interest expense divided by total assets (see 1968: 98-9, 106).

[65] In the same vein, McGouldrick also notices that "Unlike profits to net worth, profits to sales declined steeply from the 1830's to the 1880's. Whether based on peak-to-peak or trough-to-through averages of whole profit cycles, earnings per dollar of sales fell by over 40 percent between the first and last profit cycles. By contrast, there was no downward trend in profits as a percent of invested capital" (1968: 100).

Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

[66] The firms are: Kanegafuchi, Mie, Fuji Gasu, Settsu, Osaka, Osaka Union, Japan, Kishiwada, and Amagasaki.

## References

- Barr, Kenneth (2000) *The Metamorphosis of Business Enterprise (India, England)*, Ph.D. Dissertation, Binghamton, State University of New York at Binghamton
- Boyson, Rhodes (1970) *The Ashworth Cotton Enterprise: The Rise and Fall of a Family Firm, 1818-1880*, Oxford, Oxford Clarendon Press
- Caspar, Pierre (1979) *La Fabrique-Neuve de Cortaillod: Entreprise et profit pendant la Révolution industrielle 1752-1854*, Paris, Publications de la Sorbonne Université de Paris I Panthéon-Sorbonne, Editions Universitaires de Fribourg
- Chapman, Stanley D. (1967) *The Early Factory Masters: The Transition to the Factory System in the Midlands Textile Industry*, New York, Augustus M. Kelly
- Chapman, Stanley D. (1979) 'Financial restraints on the growth of firms in the cotton industry', *Economic History Review*, Second Series, XXXII, 1, 50-69
- Chapman, Stanley D. (1987) *The Cotton Industry in the Industrial Revolution*, Second Edition (First Edition 1972), Houndmills and London, MacMillan Education Ltd.
- Chapman, Stanley D. and Chassagne, Serge (1981) *European Textile Printers in the Eighteenth Century: A Study of Peel and Oberkampf*, London, Heinemann Educational Book
- Chassagne, Serge (1991) *Le coton et ses patrons: France, 1760-1840*, Paris, Éditions de l'École des Hautes Études en Science Sociales
- Chokki, Toshiaki (1998) 'Labor management in the cotton spinning industry', in Michael Smitka (ed.), *The Textile Industry and the Rise of the Japanese Economy*, New York and London, Garland Publishing, Inc., 1-23
- Clark, Gregory (1987) 'Why isn't the whole world developed? Lessons from the cotton mills', *Journal of Economic History*, 47, 1, 141-73

Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

Cottrell, P.L. (1980) *Industrial Finance 1830-1914: The Finance and Organization of English Manufacturing Industry*, London and New York, Methuen

Crouzet, François (1964) 'War, blockade and economic change in Europe, 1792-1815', *Journal of Economic History*, 24, 4, 567-88

Crouzet, François (1972) 'Capital Formation in Great Britain during the Industrial Revolution', in Peter Mathias (ed.), *Debates in Economic History: Capital Formation in the Industrial Revolution*, London, Methuen, 162-222

Crouzet, François (1982) *The Victorian Economy*, Translated by Anthony Forester, New York, Columbia University Press

Crouzet, François (1990) *Britain Ascendant: Comparative Studies in Franco-British Economic History*, Translated by Martin Thom, Cambridge, Cambridge University Press

Deane, Phyllis (1965) *The First Industrial Revolution*, Cambridge, Cambridge University Press.

Deane, Phyllis and W.A. Cole (1967) *British Economic Growth, 1688-1959*, Second Edition (First edition, 1962), Cambridge, Cambridge University Press

Dunham, A. L. (1928) 'The development of the cotton industry in France and the Anglo-French Treaty of Commerce of 1860', *Economic History Review*, I, 2, 281-307

Duus, Peter (1998) 'Zaikabo: Japanese cotton mills in China, 1895-1937', in Michael Smitka (ed.), *The Textile Industry and the Rise of the Japanese Economy*, New York and London, Garland Publishing, 27-62

Ellison, Thomas (1968) *The Cotton Trade of Great Britain*, Second Edition (First Edition, 1886), London, Frank Cass

Farnie, Douglas A. (1979) *The English Cotton Industry and the World Market, 1815 to 1896*, Oxford, Oxford University Press

Farnie, Douglas (2004) 'The role of merchants as prime movers in the expansion of the cotton industry, 1760-1990', in Douglas Farnie and David Jeremy (eds.), *The Fiber that Changed the World*, Oxford, Oxford University Press, 15-55

Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

Farnie, Douglas A. and Takeshi Abe (2000) 'Japan, Lancashire and the Asian market for cotton manufactures, 1890-1990', in Douglas A. Farnie, Tetsuro Nakaoka, David J. Jeremy, John F. Wilson and Takeshi Abe (eds.), *Region and Strategy in Britain and Japan: Business in Lancashire and Kansai, 1890-1990*, London and New York, Routledge, 115-57

Farnie, Douglas A. and Tetsuro Nakaoka (2000) 'Region and nation,' in Douglas Farnie, Tetsuro Nakaoka, David Jeremy, John Wilson and Takeshi Abe (eds.), *Region and Strategy in Britain and Japan: Business in Lancashire and Kansai, 1890-1990*, London and New York, Routledge, 9-77

Fitton, R.S. and A.P. Wadsworth (1968) *The Strutts and the Arkwrights, 1758-1830: A Study of the Early Factory System*, New York, Augustus M. Kelley

Fletcher, Miles W. (1998) 'The Japan spinners association: creating industrial policy in Meiji Japan', in Michael Smitka (ed.), *The Textile Industry and the Rise of the Japanese Economy*, New York and London, Garland, 63-89

Fohlen, Claude (1956) *L'Industrie Textile au Temps du Second Empire*, Paris, Librairie Plon

Gatrell, V.A.C. (1977) 'Labour, power, and the size of firms in Lancashire cotton in the second quarter of the nineteenth century', *Economic History Review*, Second Series, 30, 95-139

Good, David F. (1984) *The Economic Rise of the Habsburg Empire, 1750-1914*, Berkeley, Los Angeles and London, University of California Press

Honeyman, Katina (1982) *Origins of Enterprise Business: Leadership in the Industrial Revolution*, New York, St. Martin's Press

Houdoy, Jules (1903) *La Filature de Coton dans le Nord de la France: Histoire-Monographie— Conditions de Travail*, Paris, Arthur Rousseau Éditeur

Howe, Anthony (1984) *The Cotton Masters, 1830-1860*, Oxford, Clarendon Press

Irvin, Douglas and Peter Temin (2000) 'The antebellum tariff on cotton textiles revisited', Working paper No W7825

Jeremy, David J. (1990) *Technology and Power in the Early American Cotton Industry: James Montgomery, the Second Edition of His "Cotton Manufacture"*

Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

(1840), and the "Justitia" Controversy about Relative Power Costs, Philadelphia, American Philosophical Society

Koh, Sung Jae (1966) *Stages of Industrial Development in Asia: A Comparative History of the Cotton Industry in Japan, India, China, and Korea*, Philadelphia, University of Pennsylvania Press

Kuwahara, Tetsuya (1998) 'The establishment of oligopoly in the Japanese cotton-spinning industry and the business strategies of latecomers: the case of Naigaiwata & Co., Ltd.', Translated by Steven Ericson, in Michael Smitka (ed.), *The Textile Industry and the Rise of the Japanese Economy*, New York and London, Garland, 113-44

Law, Brian R. (1995) *Fieldens of Todmorden: A Nineteenth Century Business Dynasty*, Littleborough Lancashire, George Kelsall

Lazonick, William (1986) 'The cotton industry', in Bernard Elbaum and William Lazonick (eds.), *The Decline of the British Economy*, Oxford, Clarendon Press

Lee, C.H. (1972) *A cotton Enterprise, 1795-1840: A History of M'Connell & Kennedy Fine Cotton Spinners*, Manchester, Manchester University Press

Lloyd-Jones, Roger and Le Roux, A. A. (1980) 'The size of firms in the cotton industry: Manchester, 1815-1841', *Economic History Review*, Second Series, XXI, 1, 72-82

Lloyd-Jones, Roger and Lewis, M.J. (1988) *Manchester and the Age of the Factory: The Business Structure of Cottonopolis in the Industrial Revolution*, London, New York and Sidney, Croom Helm

McGouldrick, Paul F. (1968) *New England Textiles in the Nineteenth Century*, Cambridge, Mass., Harvard University Press

Mitchell, Brian R. (1988) *British Historical Statistics*, Cambridge, Cambridge University Press

Mitchell, Brian R. (1992) *International Historical Statistics: Europe, 1750-1988*, Third Edition, New York, Stockton Press



Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

Mitchell, Brian R. (1993) *International Historical Statistics: The Americas, 1750-1988*, Second Edition, New York, Stockton Press

Montgomery, James (1969) *A Practical Detail of the Cotton Manufacture of the United States of America and the State of the Cotton Manufacture of that Country Contrasted and Compared with that of Great Britain*, Reprints of Economic Classics (first published, 1840), New York, Augustus M. Kelly

Pigott, Stanley (1949) *Hollins: A Study of Industry, 1784-1949*, Nottingham, William Hollins

Rose, Mary B. (1986) *The Greggs of Quarry Bank Mill: The Rise and Decline of a Family Firm, 1750-1914*, Cambridge, Cambridge University Press

Rose, Mary B. (2000) *Firms, Networks and Business Values: The British and American Cotton Industries since 1750*, Cambridge, Cambridge University Press

Sandberg, Lars (1974) *Lancashire in Decline: A Study in Entrepreneurship, Technology, and International Trade*, Columbus, Ohio State University

Saxonhouse, Gary and Gavin Wright (1998) 'Rings and mules around the world: a comparative study in technological choice', in Michael Smitka (ed.), *The Textile Industry and the Rise of the Japanese Economy*, New York and London, Garland, 241-70

Schulze-Gaevernitz, G. (1895) *The Cotton Trade in England and on the Continent: A Study in the Field of the Cotton Industry*, Translated by Oscar S. Hall, London, Simpkin, Marshall, Hamilton, Kent, and Co., LTD.

Seki, Keizo (1956) *The Cotton Industry of Japan*, Tokyo. Maruzen Co., Ltd.

Singleton, John (1997) *The World Textile Industry*, London and New York, Routledge

Singleton, John (2004) 'The Lancashire cotton industry, the Royal Navy, and the British Empire, c.1700-1960', in Douglas Farnie and David Jeremy (eds.), *The Fiber that Changed the World: The Cotton Industry in International Perspective, 1600-1990s*, Oxford, Oxford University Press, 57-84

Takamura, Naosuke (1982) *Kindai Nippon Mengyo to Chugoku - The Modern Japanese Industry and China*, Tokyo, Daigaku shuppankai

Molk, Florence (2010) 'The rise, maturity and geographic diffusion of the cotton industry, 1760-1900', *The Journal of Philosophical Economics*, IV:1, 104-145

Tan, Baris (2001) 'Overview of the Turkish textile and apparel industry', Cambridge, Harvard Center for Textile & Apparel Research, Online publication at [www.hctar.org/pages/pubs.html](http://www.hctar.org/pages/pubs.html)

Timmins, Geoffrey (1998) *Made in Lancashire: A History of Regional Industrialization*, Manchester and New York, Manchester University Press, St. Martin's Press

Tucker, Barbara M. (1984) *Samuel Slater and the Origins of the American Textile Industry, 1790-1860*, Ithaca and London, Cornell University Press

Ure, Andrew (1970) *The Cotton Manufacture of Great Britain*, Reprint (First Edition, 1836), New York and London, Johnson Reprint Corporation

Voortman, J (1940) *Les Débuts de l'Industrie Cotonnière et les Crises Economiques: L'Industrie Cotonnière Gantoise sous le Régime Français et le Régime Hollandais d'après les archives de la maison A. Voortman*, Gand, Imprimerie L. Vanmelle S.A.

Ware, Caroline (1931) *The Early New England Cotton Manufacture: A Study in Industrial Beginnings*, Boston and New York, Houghton Mifflin, Riverside Press Cambridge

Yonekawa, Shin-ichi (1998) 'The growth of cotton spinning firms: a comparative study', in Michael Smitka (ed.), *The Textile Industry and the Rise of the Japanese Economy*, New York and London, Garland, 319-56

Florence Molk is Adjunct Instructor of Sociology, St. Lawrence University, Canton, USA ([bf21526@binghamton.edu](mailto:bf21526@binghamton.edu))