

Tracking the elusive French productivity lag in industry 1840-1973

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Introduction

At twenty years' interval, economic gloom and the 'decline syndrome' seem to have switched sides. It is now France's turn to be in the grips of self-doubt¹ (amid other turmoil). Meanwhile the uninterrupted flow of Britons taking up residence across the Channel maintains the belief that quality of life – if not necessarily working conditions – remains superior there.

Anglo-French comparisons have long been a staple of the historical literature (perhaps going back to Shakespeare's *Henry V*) and economic historians have been especially keen on the exercise. Among the European nations which first pushed forth industrialization, they seemed to illustrate two different, even opposite, paths of development commensurate to their allegedly different life styles and 'cultures.' Thus, France seemingly managed to achieve 'in the end' comparable standards of living while avoiding the worse evils of 'all-out' industrialization and securing a more humane, more 'balanced' pattern of development. One should always be wary, however, of pronouncements with regard to the neighbour's grass behind greener on the other side.

After a century of deprecating French marked inferiority in economic achievement vis-à-vis its long time main rival (from Taine to Crouzet), the mood has recently undergone a marked change. Over the past thirty years the French path of industrialization has been shown in a more favourable light while, at the same time as historians were increasingly questioning the reality of Britain's industrial calling². While British performance appeared not so much exceptional as atypical in Western Europe, French performance was not only rehabilitated among 19th Century industrializers but given even a place of choice, even of honour: by the 1970s the country had achieved living standards and productivity performance comparable to those of the new 'technological leader' and bypassed the forerunner in modern economic development.

Such a vision was substantiated by findings of a new set of national accounts initiated in the 1960s which seems to indicate that France had, during the post-war, made 'Malthusianism' and

¹ See Nicolas Baverez, *La France qui tombe* (2003) and, *Nouveau monde, vieille France* (2005) and Eric Le Boucher, *Economiquement incorrect* (2005).

² See N.F.R. Crafts, *British Economic Growth during the Industrial Revolution* (1985); W. D. Rubinstein, *Capitalism, Culture and Decline in Britain, 1750-1990* (1992).

the 'stalemate society' a thing of the past³ and that, before, its economic record could be viewed in a more favourable light.

In this paper we offer an alternative to national accounts-based comparisons of output and incomes by addressing the comparison of British and French performance from a different angle. Rather than reverting to input (labour) and output indicators derived from reconstructed national accounts, we use the heretofore-untested methodology of the benchmark estimation procedure (van Ark, 1993). So far, measurements of Anglo-French performance have used constant price indicators derived from a pyramid of indirectly estimated output series (from decennial averages at constant prices in the French case). Here we use 'first-hand' determination of industrial output levels and combine them with readily available labour inputs data to obtain comparative indicators of labour productivity for a variety (10) of benchmark years spanning the age of industrialization to that of de-industrialization.

I. Act One: France's industrial 'take-off' (1840-70)

There is an endemic tendency among French economic historians to deny the applicability of the Rostowian 'take-off' to the course of French industrialisation in the 19th Century (Marczewski, 1963) – some going as far as to question the very existence of an 'industrial revolution' (Gillet, 1970)⁴. Extended *ad absurdum* the claim for such brand of French exceptionalism would amount to the contention that France became an industrial economy without ever going through a process of industrialisation.

However, most economic indicators concur – both 'ancient' and 'modern'⁵: the course of French economic growth exhibits a clearly identifiable "bend" in industrialisation in the period spanning "the second decade of the July monarchy and the authoritarian period [the first decade] of the Second Empire" (Crouzet, 1970, p. 57) – in short-hand: the 1840s and 1850s. This observation corroborates the contention of contemporary eyewitnesses such as Adolphe Blanqui and Michel Chevalier (1806-1879) as well as the observation of many more descriptive economic historians from Clapham (1936) to Dunham (1955).

The government of the July monarchy, often described as the first 'pro-business' administration of the modern age, initiated, in addition to setting up the statistical agency, the first modern population census (1831) due to be taken henceforth on a quinquennial basis. In 1839 it ordered a nation-wide industrial enquiry, which was set afoot in 1840. Though it took four years for its completion, it represents a first-rate source of quantitative and descriptive information. The experiment was repeated in 1861-65 under the government of Napoleon III. Those are the two first-hand statistical sources of information on the progress of French industry during the 19th Century (Chanut et al. 2000). Both sources are similar in scope and coverage.

³ 'Malthusianism' is attributed to Alfred Sauvy and 'the stalemate society' to the sociologist Stanley Hoffmann.

⁴ This feeling was shared by John Clapham (1936, p. 52).

⁵ Crouzet, 1970; Lévy-Leboyer, 1971, 1985; Toutain, 1987, 1996.

They focus on the '*grande industrie*' or manufacturing industry, that is industrial establishments with ten employees or more – the '*petite industrie*' or crafts was supposed to be surveyed in a separate operation which was never set up. As a result, the coverage of either 'enquiry' can be assumed to be about a quarter of all industrial employment broadly defined.

Data were collected from individual firms on full-time employment and wage rates, turnover (total sales), costs of raw materials and fuel, the rental value of premises (basis for the business tax), as well as inanimate power (sorted out by source: mills and steam-engines essentially). There are no entries for inventories or capital depreciation. These data were then aggregated by '*arrondissement*' (districts) and '*département*' (counties), the basic administrative division of the French territory. The classification used (16 branches), though imperfect by today's standards, bears a strong similitude to those of the early 20th Century and are therefore amenable to comparisons with the returns of the early UK Censuses of production. While additional information was provided on industries in the cities of Paris⁶ and Lyons as well as SOEs⁷; the returns of the 1861-65 survey offer a near-complete coverage for the type of activities defined as '*grande industrie*,' while the coverage of its predecessor was only partial. Full returns for 1840-1845⁸ are available for only 63 out of a total of 86 départements leaving out therefore 23 for which the information collected was deemed incomplete or incorrect. Fortunately, the data assembled in two separate surveys by the Paris Chamber of Commerce in 1847-48 and 1860 can fill some of the gap in statistics and the census authority took care to provide its own aggregation for the whole territory.

Table 1. Aggregate results for mid-19th French manufacturing

	<i>Enquête de 1840-45</i>	<i>Enquête de 1861-65</i>
France (outside Paris)		
No. of establishments	71,497	100,163
No. of workers	1,190,410	1,467,971
Steam-engines (No.)	2,494	9,471
Mills	47,082	69,109
Rental value	F 43.7m	F 129.3m
Value of gross output	F 4167.1m	F 7130.3m
Paris area	1463.6	2625.7
Total	5639.7	9756.0
Intermediate costs	3961.7	7026.6
Value added	1677.9	2729.4
Wages and salaries	670.0	na

Because of their partial coverage, the aggregate totals provided by these two sources have rarely served as more than casual reference to historical national accounts' experts. Here we propose to treat them as sources for benchmark estimation. To the student of productivity, they offer an incomparable advantage: output and employment data come from one and the same source, which should insure *prima facie* reliable productivity indicators, comparable with those

⁶ Paris was part of the *département de la Seine* of which the remainder, the other districts (Sceaux and Saint-Denis), were included in the two enquiries.

⁷ State-Owned-Enterprises.

⁸ Simiand (1932, vol. II p. 77) considers that output figures pertain to 1845.

derived from similarly compiled industrial censuses. In addition, however, it has been deemed necessary to reconstruct the accounts for the industrial sector as a whole encompassing therefore *'grande'* and *'petite industries'* using as a basis the employment data found in the 1851 population census, the wage rates and length of working year as well as labour-output ratios derived from the various enquiries (see Appendix Table A2).

No industrial census of this or other type was taken of the British industrial sector in this period but, as every practitioner knows, British parliamentary papers contain a wealth of statistical information pertaining to industry. Furthermore, as in the French case, – and with denominator of labour productivity ratios in mind – labour inputs by branch can be reconstructed with some minor adjustments⁹ from the employment figures provided in the decennial population censuses. With the numerator in mind, in turn, two recent attempts at reconstructing the British input-output table for 1841 and 1851 provide value-added figures by industry or group of industries (Horrell, Humphries & Weale, 1994; Feinstein, 2006). In this way, one can hope to reasonably approximate actual levels of labour productivity performance.

Table 2. Distribution of value added by branch in British industry

£m	HHW 1841	CHF 1851
Mines & quarries	13.2	15.3
Metal manufacture	9.1	5.6
Metal goods, engineering	17.9	16.2
Chemicals	3.0	4.8
Textiles		50.2
Clothing	72.8	17.2
Leather		11.0
Food and drink	45.6	35.8
Paper & printing		3.6
Woodworking	12.9	14.4
Other manufactures		3.0
Brick, pottery & glass	4.3	4.8
Building	13.4	22.0
Gas and water	na	2.8
INDUSTRY	192.2	206.7

HHW: Horrell, Humphries and Weale (1994) ; CHF: Feinstein (2006)

For converting labour productivity indicators into one single currency unit, one has chosen to rely the commercial exchange rate, the construction of purchasing power parity (PPP) converters being for this period extremely hazardous. Besides, for the purpose of providing simple orders of magnitude, it has been felt that commercial rates would be appropriate¹⁰. The first batch of results appears in Table 3 below.

Table 3. Labour productivity indicators by industry (in £)

⁹ The corrections include the exclusion of dealers and merchants and the treatment of 'gainful' female employment.

¹⁰ There is a wide range of theoretical arguments that justify for the period and the countries concerned the use of commercial rates for this type of operation.

	FRANCE			BRITAIN	
	1840-45	1851	1861-65	1841	1851
Mines & quarries	33	33	55	59	48
Basic metallurgy	59	36	46	44	28
Metal goods	49	na	na	na	na
Metalworking	45	41	49	45	46
Shipbuilding	51	38	48	n/a	n/a
Chemicals	163	62	153	96	112
Textile	38	39	41	49	54
Clothing	38	38	37	49	37
Leather	43	38	96	49	69
Paper	51	53	52	n/a	44
Food & drink	70	68	106	147	139
Wood & furniture	60	43	59	n/a	77
Stone, brick, glass	43	28	41	74	64
Miscellaneous	46	72	42	n/a	142
Building	21	38	29	36	40
Fuels	112	n/a	148	140	250
INDUSTRY	43	42	53	59	64

Sources: see text.

The year of the Crystal Palace exhibition France could, on the basis of its output volume alone, justifiably to claim to be ‘the first industrial nation’ as much as Britain. But British industry employed one million less workers in its factories and workshops. By comparison, the US with a value added figure half of either Britain’s and France’s, produced twice as much per worker.

Table 4. Comparative aggregate value added, employment and productivity, 1849/51

	US	France	Britain
Value added (\$m)	464	959	957
Employment (m)	0.957	4.713	3.759
Value added per worker (\$)	485	234	255
Index	100	48	52

Already by the mid-19th Century, the transatlantic rift in overall performance, dwarfed the Anglo-French gap, a fact which was to survive for a century. Surprisingly, in the French case, final results do not differ markedly whether one takes manufacturing industry (*grande industrie*) in 1845 into account or the industrial sector as a whole (including crafts or *petite industrie*) in 1851. Detailed inspection reveals that dispersion of the results is not inordinate.

Both textiles and metalworking, two of the leading sectors of the industrial revolution exhibit very close indicators. By contrast there is a marked British superiority in the case of chemicals, food processing, fuels (coke and gas manufacture) as well as in building materials (brick, pottery and glass). These observations suggest that French industry followed in the steps of the British pioneer rather than break an alternative path.¹¹

¹¹ At this date the opposition between ‘big factory’ Britain and ‘small workshop’ France is an illusion as Clapham reminded his readers in his opening chapter of his 1926 classic.

Table 5. Share in Value added by branches in 1851

	France	Britain	USA*
Mines and quarries	5.6	9.2	5.5
Basic metallurgy	7.2	7.0	6.1
Metalworking	1.9	1.9	13.1
Shipbuilding	0.5	1.2	4.2
Chemicals	2.8	1.7	3.2
Textile	47.5	25.3	10.0
Clothing		20.2	13.0
Leather	2.7	1.3	9.1
Paper & printing	2.4	2.6	3.1
Food and drink	19.2	14.3	12.4
Woodworking	2.9	4.2	13.4
Stone, pottery and glass	6.0	3.0	2.4
Luxury and misc.	0.1	8.2	2.5

*1849

The simple counterfactual as suggested by O'Brien (1995) to swap value added shares to observe how this affects aggregate performance, reveals that industrial structure does not offer the key to the overall productivity gap. Indeed the gap widens when British branch indicators are aggregated with French weights and French indicators with British weights (70.2 vs 45.5).

Thus the evidence for the mid 19th Century tends to warrant the 'diffusionist' model of industrialisation: French industry recorded its best performance in those industries, which had adopted mass-production techniques on the British pattern. By contrast those industries that remained predominantly craft-oriented lagged behind more markedly.

2. Act Two: French vs. British industrial retardation 1870-1914¹²

During the 'late-Victorian period' Britain is perceived as having been gradually demoted from its pedestal of 'first industrial nation' by more successful 'follower countries' such as Germany and the US. After 1871, France, amputated of one of its most industrially dynamic regions (Alsace-Lorraine) seemingly failed to take advantage of the British eclipse and despite apparently quickly making up for her losses was robbed of her position as Britain's main competitor on the Continent.

During this period, sources of statistical information relating to industry tend to be less amenable to a systematic evaluation of output. In France no industrial enquiry of the type of that of 1840-45 or 1861-65 was undertaken; available surveys of industrial employment appear to deteriorate between 1866 and 1896. Only partial Surveys of gross output are on offer at different intervals for the main productions in addition to an annual survey of mining and raw iron output. Two among these stand out: that completed for 1873 by the statistical agency and the more extensive *Evaluation de la production française* of 1910-12.

¹² This section draws on Dormois and Dintenfass, 1998 Ch. 12 and Dormois 2006 Ch. 5.

To circumvent this dearth of data on output, scholars have reconstructed a series of value-added estimates by retropolation of a more or less disaggregated production estimate for a base year (an average of the final period covering either 1908-12 or 1905-13) and a separately constructed index of production. But these attempts at reconstructing accounts from the output side have not been matched by parallel undertakings from the income or consumption sides. Our strategy has consisted in reconstructing the income accounts of the French industrial sector for four benchmark-years at fairly regular intervals using data on employment by industry provided by employment censuses and workers' compensation provided in ever increasing detail in this period (yearly series by professions available from 1893).

The details for these reconstructions are provided elsewhere¹³. The results obtained for aggregate value-added in the industrial sector, which appear in col. 1 on Tables A4-A7 (Appendix), can be compared with two other series of rival indicators (constructed as has been explained from the output side). The present results seem to warrant the soundness of the Lévy-Leboyer series rather than those of Toutain whose aggregate figures seem definitely pitched too high.

Table 6. Conflicting output valuations of industrial production in France

Fm	1873	1896	1906	1911
Lévy-Leboyer	6902	9348	10887	13665
Toutain	9753	10960	13716	17084
Dormois	6798	9366	11230	13451

Upon the strength of this corroboration, it is possible to attempt an Anglo-French and further a Franco-American comparison of labour productivity. The procedure is rather straightforward for the two final benchmark years using the returns of the UK's first and second censuses of production as well as the 1905 and 1910 US Census of Manufactures. In addition, indications about the likely trend over the 1870-1914 period can be obtained from a comparison of the French results for 1873 with British indicators derived from reconstructed accounts by Feinstein (1972). Again French indicators originally expressed in current francs have been converted at the official rate the case for which is strengthened after France's formal adoption of the gold standard in 1876.¹⁴

French results appear very consistent over the whole period, a fact that would seem warranted by the procedure used. Estimates for 1911, however, are largely derived from an output approach (the 1910-12 *Evaluation*) and those for 1906 have been checked against data on gross output¹⁵.

Table 7. Labour productivity indicators by industry (in £)

in current £	FRANCE				BRITAIN		USA
	1873	1896	1906	1911	1907	1912	1909

¹³ See Dormois (2006).

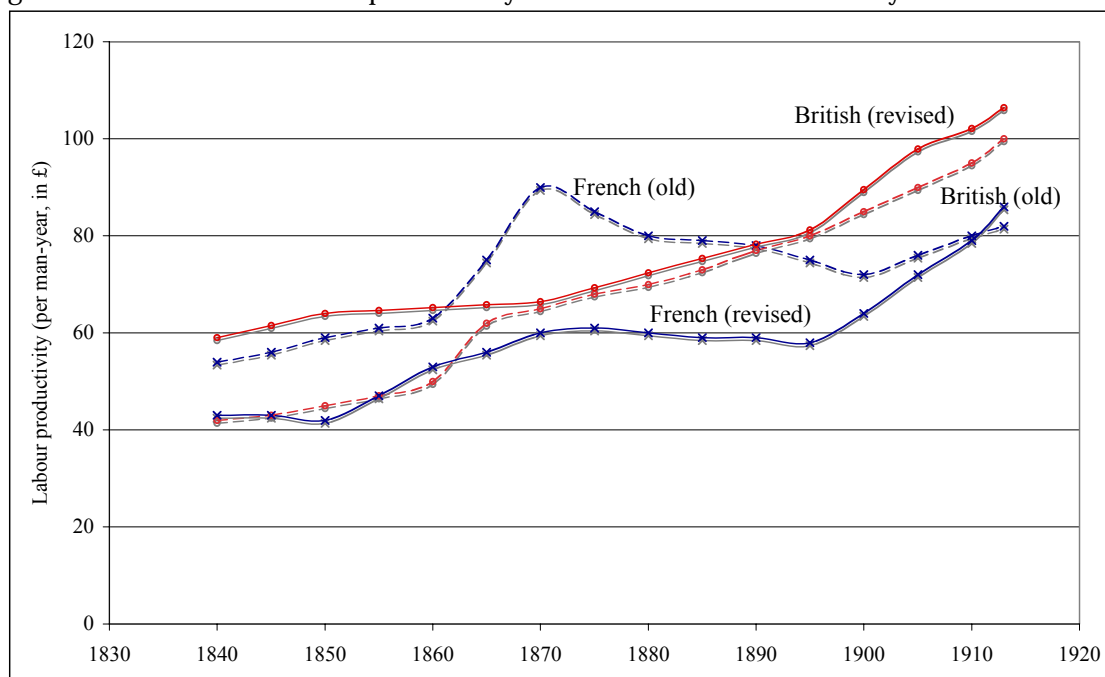
¹⁴ see McCloskey & Zecher, "How the Gold Standard Worked".

¹⁵ see Dugé de Bernonville (1918) and Dormois (1997a).

Mines & quarries	67	74	69	83	124	105	na
Basic metallurgy	56	62	125	121	106	111	na
Metalworking	59	68	94	100	103	109	na
Engineering	60	67	97	100	96	122	224
Chemicals	156	137	146	144	168	174	351
Textile	45	48	72	64	76	84	153
Clothing	51	41	34	56	63	75	227
Leather	125	86	60	115	102	119	197
Paper	85	76	94	107	104	111	267
Food & drink	135	76	124	148	193	193	423
Wood & furniture	77	73	73	101	90	98	194
Stone, brick, glass	56	58	74	35	83	84	195
Miscellaneous	91	82	na	98	134	123	273
Building	49	48	64	78	83	96	na
INDUSTRY	61	58	72	86	105	109	267

During the “great depression” the gap in performance has tended to widen to the detriment of French industry before making up somewhat during the immediate pre-war years, allegedly a period of stagnant productivity in this sector on the British side (Feinstein, Matthews and Olding-Smee, 1982, p. 222). In the meanwhile, US manufacturing maintained its advance vis-à-vis both its French and British counterparts (Broadberry, 1997). French industrial labour productivity relative to the US slipped from 44 to 26% between 1860/61 and 1896/99 before recovering to 32% on the eve of World War One (1909/11). Thus despite much-trumpeted technological prowess in new industries such as film, aircraft and car making (Caron, 1992), the modernisation of the bulk of French business seems to have been held-up in its development.

Figure 1. The course of labour productivity in French and British Industry in the 19th Century



3. Act Three: The uncertainties of the interwar¹⁶

¹⁶ This section draws on Dormois, 2004b.

World War one gave a boost to statistics collection – among other things; as a result industrial statistics are comparatively more abundant for the interwar period and they were before. In the UK three censuses of production are at hand (1924, 1930 and 1935) for the purpose of examining changes in performance and efficiency, which have been thoroughly exploited. In France, however, the government shunned for a long time an industry-wide census lest it be charged for using it for increasing tax revenues. The first index of industrial production was not produced before 1928¹⁷ and it would take time for it to come into wide use: Premier Léon Blum in 1936 had no idea what purpose it could serve in policy-making (Sauvy, 1965).

The organisation of an industrial census of the British or American type was urged on post-war governments by experts such as A. Thomas (wartime minister of munitions), E. Clemently (wartime trade and industry minister) and H. Hauser (author with H. Hitler of a extensive Survey of the French pre-war economy)¹⁸. A project first planned for 1926 petered out. Only in 1930 did it materialised in the form of an "industrial survey" to be taken at the same time as the decennial population census scheduled for March 1931. However, as returns were not made legally compulsory, only a sample of firms representing around a quarter of industrial employment actually responded. This proportion rises to about a third when small establishments – those with less than 10 employees – were excluded: those are therefore not represented in the sample.¹⁹ The British census likewise offers a comprehensive coverage of all firms with ten employees or more in the secondary sector including manufacturing, mining, construction, public utilities and the government services.

However, one may consider the sample of the French Survey broadly representative of the French industrial sector (admittedly a big if). The two sources present a strong degree of congruence in the type of information (employment by sex, labour costs, plant size, turnover, motive power and intermediate inputs) collected by both sources, in the classification and notions used (full-time employees, factory-gate prices). The 120 branches of the UK Census can fairly straightforwardly realigned on the 88-branch French nomenclature and regrouped to compose a 15-branch identical classification.

Given the monetary turbulences of the Interwar the unqualified use of the official or commercial exchange rate as a converter seems highly inappropriate. To be sure the pound-franc parity somewhat stabilised between 1927 and September 1931, in the period when the two censuses were conducted. However, the disturbances introduced by international capital flows on exchange rates makes it particularly difficult to establish where the true Franc-pound parity stood²⁰ and calls for the use of an alternative.

¹⁷ See Dessirier (1928).

¹⁸ See Henri Hauser & Henri Hitier (1917), *Enquête sur la production française et la concurrence étrangère*, Paris, Association Nationale d'Expansion Economique.

¹⁹ These represented at the time 20% of the total labour force (9.5% in the UK).

²⁰ Evidence suggests that the "franc Poincaré" became increasingly overvalued after its formal stabilisation especially on the way to the devaluation of the pound (Sicsic, 1992).

Table 8. Anglo-French price ratios by major industry, 1930

	<i>number of items</i>	<i>French price (F)</i>	<i>British price (sh.)</i>	<i>price ratio</i>
Fuel	5	955.90	6.68	143.11
Iron and steel	5	364.55	2.88	126.47
Non-ferrous metals	7	551.63	4.208	131.09
Textiles	13	5276.35	39.53	133.46
Leather	5	1459.85	9.95	146.69
Chemicals	13	3260.71	23.89	136.51
Paper	3	1255.10	11.49	109.20
Food processing	7	1947.81	13.88	140.28
Timber	2	1791.50	13.71	130.71
Building materials	4	968.35	7.90	122.62

The alternative to the official exchange rate is a purchasing power parity converter constructed from a pyramid of sector-weighted price ratios for standard commodities representing the whole industrial production. In the absence of detailed information on elaborate commodities such as machinery, the comparison was almost exclusively based on standard semi-finished goods (64 in total).

Table 9. Labour productivity indicators in industry, France and UK, 1930

	<i>Labour productivity (in £)</i>			<i>French index</i>
	<i>UK</i>	<i>France</i>	<i>USA 1929</i>	<i>UK=100</i>
0. Mining & quarrying	152.3	122.5	na	80.4
1. Iron & steel	185.8	150.5	655	81.0
2. Engineering	211.7	188.7	679	89.1
3. Non-ferrous	215.2	246.2	580	114.4
4. Vehicles	220.7	196.0	618	88.8
5. Chemicals	438.9	266.0	936	60.6
6. Textiles	140.3	109.5	401	78.0
7. Clothing	158.7	149.6	582	94.3
8. Leather	221.3	133.6	962	60.4
9. Paper & printing	272.1	170.7	584	62.7
10. Food & drink	398.4	247.8	788	62.2
11. Wood	187.7	153.7	443	81.9
12. Building materials	203.6	138.5	583	68.1
13. Miscellaneous	248.4	166.7	na	67.1
14. Building & contracting	207.4	153.6	na	74.1
Industry	211.8	170.6	na	77.6
Manufacturing	219.9	168.2	752	80.8

Branch price ratios weighted by French and British value added shares are then averaged to yield an industry-wide converter set at 131.95 francs in the pound, which will be used to express French labour productivity in British pounds. With an official rate of 123.88 francs to the pound sterling, British manufacturing undercut French prices by about 10%, even before the devaluation of September 1931.

At PPP the aggregate level of labour productivity in French industry (including mining and construction) was 77.6% of the British level (indicators for mining, not Surveyed in the French source were constructed separately) suggesting that despite its 1920s boom French industry had not significantly closed the gap with British competition since 1913. Results suggest further that insofar that British industrial performance was deteriorating by international standards, France was following her down this path of relative decline. Pre-World War One French productivity in manufacturing was 33% of the comparable US performance, but only 20-23% (depending the monetary converter used) on the eve of the Depression.

The impression of relative decline (or even outright decay as Fourastié insists for certain industries) is reinforced by the observation that productivity growth crawled in the 1920s (the growth rate recorded between 1913 and 1931 was a measly 4.6%). While French industry increased its output by 30% between 1910 and 1928, in the US output grew by 230% and 170% in the rest of the world (Bettelheim, 1947, p. 45).

Despite its questionable representativeness the French Survey affords the possibility of estimating French total industrial output for 1930 by extrapolating the results of the Surveyed sample.

Table 10. Comparative levels of labour productivity performance in manufacturing, France, UK and USA.

USA=100	1860/61	1870/73	1896/99	1904/07	1909/11	1929/30
France	40	43	30	30	32	21
UK	48	49	50	44	41	30

Source: Broadberry, 1997 and Dormois, 2006.

However, these results extracted from the Survey's returns should be viewed with the caveat in mind that they are likely to contain an upward bias: the Survey's sample represents in all likelihood the "upper crust" of France's industry sector. For one the average size of sample firms is higher than that recorded in the census for all industrial firms. The same observation applies regarding the distribution of motive power: according to the Census, only 27% of all plants, while the Survey typically represents those firms, which used inanimate power extensively. Larger units of production equipped with power-activated machinery are likely to register better performance than smaller ones devoid of motive power.

Thus, results obtained for sample firms when extrapolated without correction to the secondary sector as a whole are bound to produce an upper bound estimate of French industrial production.

Table 11. Comparative estimate of industrial production and productivity for 1930

	United	France
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	Kingdom	Toutain	Upperbound	Lowerbound
	(1)	(2)	(3)	(4)
Manufacturing output (Fbn)		149,5	130,8	120,1
in £m at PPP	1154	1109	971	891
index (UK=100)	100	96,1	84,1	77,2
in £ at official rate	1154	1207	1056	969
index (UK=100)	100	104,6	91,5	84,0
Employment (thsds)	5242	5766	5766	5766
Index (UK=100)	100	110	110	110
Labour productivity	220	192	168	155
Index (UK=100)	100	87,5	76,5	70,3

The diagnosis has usually attributed weak productivity performance and slow productivity growth to the lack of mechanical equipment and the small scale of manufacturing operations rather than faulty technology pick-up, inadequate formation and use of human capital or faulty organisation or management. Cursory inspection suggests – as interwar advocates of market reform have argued – that inadequate or obsolete machinery, lack of motive power, and suboptimal firm size could have played a role but that these proximate determinants were in turn determined by more profound mechanisms. Thus, the diffusion of up-to-date technology could have been stunted by a host of other obstacles, those associated with rigidity in the labour market, entrenched producer interests and government ill-inspired policies.

Table 12. Shrinking industrial employment in France during the Depression

	Employment (thsds) in			change (%)
	1931	1936		
Mining and quarrying	440.7	340.3		-29,5
Food and drink	541.7	553.7		+2,2
Chemicals	238.3	209.7		-13,6
Paper (incl. Rubber)	166.4	139.4		-19,4
Printing and publishing	154.8	148.7		-4,1
Textile	920.5	698.0		-31,9
Clothing and apparel	1001.1	888.4		-12,7
Straw, rush, feather and hair	26.9	20.9		-28,5
Leather	299.9	259.9		-15,4
Wood	649.3	525.5		-23,6
Metals	173.2	134.1		-29,2
Metalworking	1436.6	1252.3		-14,7
Precious metals	31.6	21.8		-45,4
Jewellery	5.5	2.9		-90,3
Stone	38.7	32.5		-18,8
Clay, brick and glass	223.1	151.9		-46,9
Building	886.1	745.3		-18,9
Miscellaneous	43.9	138.6		+68,3
Industry	7280.3	6265.7		-16,2

The situation immediately prior to the outbreak of the Second World War cannot be assessed straightforwardly. While the UK Census of 1935 provides a useful benchmark, only scanty information can be gathered in the French case. Writing immediately after the War both Bettelheim and Fourastié diagnosed a “continuous slump... a structural and not just cyclical decline.” After the onset of the Depression France’s index of industrial production never regained its pre-World War One level: it was 94 in 1935 and 85 in 1938 (100 in 1913). The industrial sector actually shrunk between 1931 and 1936 (and presumably to the end of the decade).

The national accounts for 1938 were only reconstructed in the post-war period²¹ on the basis of the implicit input-output table for 1956. The valuation of industrial output at market (current) prices for the last ‘normal’ year before the War is in the range of F136 to 318bn²².

4. Act Four: Catching-up at last?

By the end of World War Two, the outlook for French as well as for British industry couldn’t have been bleaker. In Britain, the war had pushed production capacity in key sectors to their utmost limit – leaving consumer good provision in disarray; in France, production had been disorganised, looted or abandoned; factories left to rust or dismantled. As far as wartime performance or welfare indicators can be safely devised, industrial production stood in 1945 at half of its pre-war level in France compared to more or less full capacity in Britain (Figure 2).

In his oft-reprinted classic, Fourastié (1950), latter day prophet of the ‘golden age’²³ warned at the time, that, unless France entirely reconsidered the foundations of its economic life, it faced irretrievable relegation and decline.

This was not to be, however; France joined in the other severely afflicted economies of the Continent in a spectacular catching up process, which eventually brought about a convergence club in Western Europe behind the technological leader, the USA. In the space of less than 15 years, the French managed to modernise large swathes of their industry, bringing its performance first (in the 1960s) on a par with Britain’s and later (in the 1970s) overtaking it.

This much-trumpeted feat was recognised only belatedly (as often happens) and this recognition on the French part became acute at a moment (the late 1980s) when British industry was restructuring extensively, a task which the French initiated only reluctantly and belatedly.

One reason for the belated realisation was in part the self-absorption of people and bureaucrats alike and in part the lack of interest. With regard to data collection and processing things improved markedly but only gradually. In addition to the planning agency (CGP) and the economic and financial office of the Finance ministry (SEEF), the revamped statistical agency

²¹ See SEEF, 1957.

²² Toutain’s estimate of 1987 of F162.5bn or 39.3% of GNP for 1938 seems the most reasonable.

²³ See Fourastié, 1950 (first published in 1945) ; in 1979 Fourastié published the book by which he is best known : *Les trente glorieuses*.

(under the name of INSEE) continued for some years to trace output volume for standard raw materials and commodities but without collecting (or supplying) information about costs. The 1946 and 1954 population censuses barely improved upon their pre-war predecessors. By June 1951 the provision of certain type of information by firms was made compulsory and returns of production by branches became systematic as of 1953. Not before 1963, however, was a full-scale industrial census set up, the same year the Board of Trade was completing its fourth one since the War had ended and it was not devoid of lapses.

Meanwhile, modern national accounting along lines adapted rather than borrowed from the UN guidelines was put in place between 1949 and 1955. The SEEF was able to produce the first input-output table for the French economy in 1956 (SEEF, 1960) and the accounts were henceforth reconstructed for 1938 and the gap years 1949 to 1959.

However, the nomenclature adopted for tracing back French industrial production is not suited for a detailed comparison. The industrial sector was broken down in 6 major branches (U02 to U07) and covered food-processing, energy, intermediate, capital and consumption goods and construction.

Table 13. GDP and value-added by main branch, France, 1949-54
(at current prices in million of News Francs²⁴)

(base 1971)		1949	1954
U01	Agriculture, fisheries and forestry	13702	20240
U02	Food-processing	3356	6347
U03	Energy	3085	8027
U04	Intermediate goods	7501	12839
U05	Capital goods	5654	10928
U06	Consumption goods	6164	11312
U07	Construction	4352	8612
U08	Trade	12042	21700
U09	Transport and Communications	5802	9546
U10	Services	7391	16480
U11	Real estate	1600	4956
U12	Insurance	283	520
U13	Financial services	886	2416
U14	Non-traded services	7835	16192
	Imputed banking services	- 1139	- 2691
	TOTAL	78514	147428
	VAT and customs	6404	12522
	GDP	84918	159950

No attempt was made at reconstructing the accounts for the immediate post-war years (1945-49). It was doubtless felt that the statistical base was too slim to build any serious assessment of

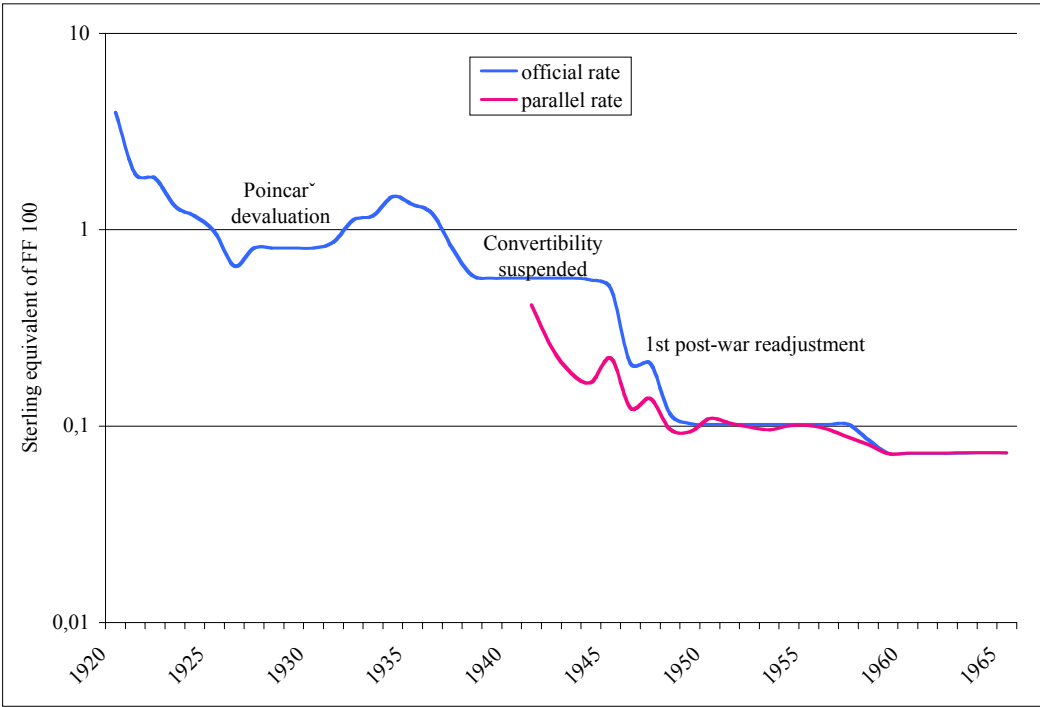
²⁴ As of 1st January, 1960 the 'New Franc' was introduced with the equivalent value of 100 'old' Francs.

the course of economic activity. It is therefore almost impossible to obtain a detailed picture of the relative position of French vis-à-vis British industry during this period.

The reconstruction of France’s industrial accounts for 1948 would be an impossible task. It is however, feasible, to obtain a rough comparison for this period by comparing the aggregate results from the British census of 1948 with those of the reconstructed French value-added accounts reproduced in Table 10.

The conversion of values in one common currency (the pound) poses evidently a major hurdle in view of the monetary confusion of the period (successive devaluations of the Franc and 1949 devaluation of the British currency). As a result, three ‘converters’ have been used: the average official exchange rate for 1948 and 1949, the ‘parallel’ (black market) rate and the PPP (purchasing power parity) rate computed by Gilbert and Kravis for industrial goods in 1950 (Gilbert & Kravis, 1954). The results are shown in Table 11.

Figure 2. The Franc pound exchange rate 1920-65



Source : INSEE, 1966, p. 562.

The impression one gathers from the last column (French indexed on British performance) is that the gap between the two countries by the late 1940s was of the same order as in 1930. French industrial production was around two thirds of its British counterpart and the productivity gap was of the order of 20-30%. During the immediate post-war years, therefore, the French apparently managed to recover the lost ground of the depression and war years. The French index of industrial production says as much: the level of 1937 was only reached in 1948 (Figure 3). Emphasis was laid on the production of energy and the utilities (especially transport)

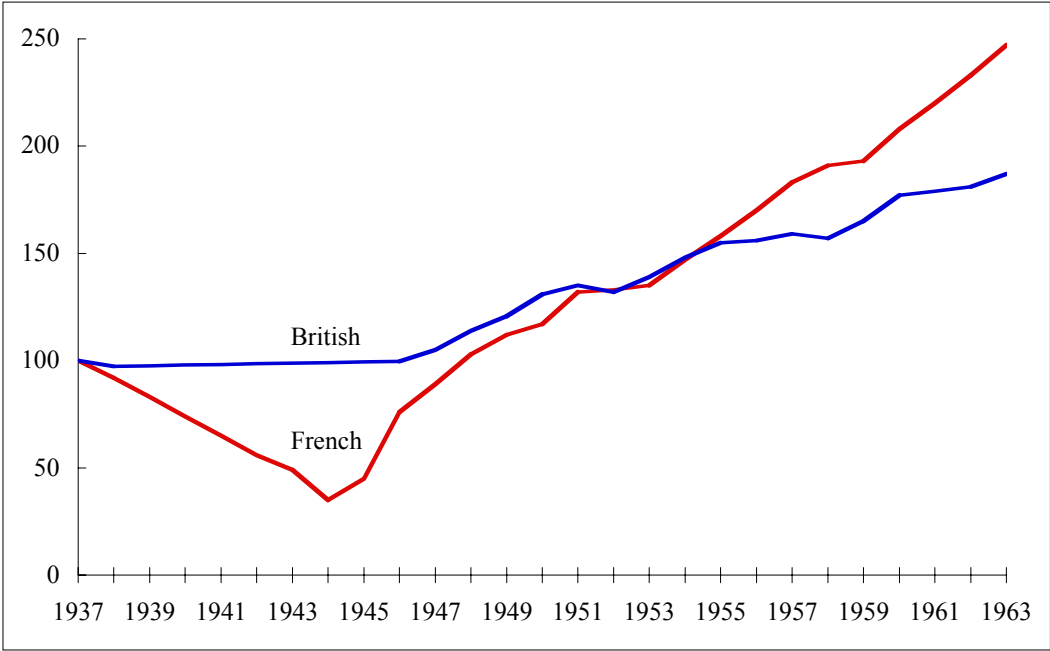
and this accounts for the fact that French performance in construction, energy and utilities was marginally better than in manufacturing.

Table 14. Anglo-French Comparison of value added, employment and productivity 1948-49

		France	Conversion rates			UK	France
		F	official	parallel	PPP	£	index
<i>Value added</i> (in million)	industry	30112	3101	2814	2895	4701	66,0
	manufacturing	22675	2335	2119	2180	4010	58,2
<i>Employment</i> (in thousands)	industry	6590				8123	81,1
	manufacturing	5098				6333	80,5
<i>Labour productivity</i> (currency units)	industry	4569	471	427	439	579	81,3
	manufacturing	4448	458	416	428	633	72,3

The catching-up process therefore made only limited gains until the end of the decade – as would be expected given the extent of destructions suffered by France; those historians who stress the ‘golden age’ only started by 1950 after the stabilization of currencies and the first year of Marshall Aid (Milward? Griffiths?) are certainly right.

Figure 3. Indices of industrial production, France and UK, 1937-63 (1937 = 100)



In order to chart the progress of this process with regard to industry, the most straightforward way to go about it would be to use 1954 and 1963 as benchmarks, the dates for two full-scale British censuses of production as well as that for the French population census (1954) and industrial census (1963). However, for the first benchmark value added data must be drawn at least partially from those computed in the 1956 input-output table and retroplated using the

production index. This procedure tends therefore to introduce an upward bias to the benefit of French performance.

Table 15. Anglo-French labour productivity in industry for 1954

	UK		FRANCE		
	£	F000	in £	OER	PPP£
Mining and quarrying	946	909.6	928	842	89
Metal manufacture	974	821.5	838	761	78
Engineering, shipbuilding, electrical goods	783	892.9	911	827	105
Vehicles	813	642.5	656	595	73
Metal goods	745	815.3	832	755	101
Precision instruments, jewellery	792	1534.7	1566	1421	179
Chemicals	1320	1104.0	1127	1022	77
Textiles	658	682.6	697	632	96
Clothing	483	698.8	713	647	134
Leather and fur	678	727.9	743	674	99
Paper and printing	907	867.1	885	803	88
Food, drink and tobacco	963	1126.8	1150	1043	108
Wood and cork	670	737.0	752	682	102
Building materials	791	1021.1	1042	945	120
Other manufacturing	769	985.2	1005	912	119
Building and contracting	618	634.0	647	587	95
Manufacturing	827	835.4	852	774	94
Industry	796	880.8	899	816	102

Table 16. Anglo-French Labour Productivity in industry for 1958

	BRITAIN			FRANCE			
	<i>Net</i>	<i>per</i>	<i>Value</i>	<i>per</i>	<i>index</i>		
	<i>Output</i>	<i>employment</i>	<i>Added</i>	<i>employment</i>			<i>person</i>
£mn	000s	£	NFmn	000s	NF	GB=100	
Food, drink and tobacco	916,5	725,9	1263	13289	563,3	23591	135
Chemicals	735,5	444,4	1656	5317	300,8	17676	77
Metal manufacture	689,3	568,4	1213	3892	370,7	10500	63
Engineering	1742,7	1732,6	1006	10254	730,6	14035	101
Ships and aircrafts	227	275,2	825	1957	173,1	11306	99
Vehicles	818,4	781,5	1047	3619	379,0	9550	66
Metal goods	439,1	472	931	4534	293,0	15477	120
Textiles	614,9	850,1	723	5597	631,8	8859	89
Leather and fur	43,3	54,4	796	349	77,9	4479	41
Clothing and footwear	308,6	528,9	583	4152	457,8	9070	113
Bricks, pottery, glass, cement	296,6	304,4	975	2678	177,3	15105	112
Paper, cardboard	211,9	253,7	835	1508	102,8	14664	127
Printing and publishing	577	541,6	1065	2201	168,9	13031	89
Wood and furniture	211,9	253,7	835	2440	239,6	10184	88
Other manufacture	227,4	247,8	913	1748	134,1	13039	103
Mining and quarrying	723,4	832,1	869	8880	325,7	27264	227
Construction	1245,1	1573,6	791	12607	1358,3	9281	85
Gas, electricity, water	621,4	382,5	1625	2235	112,1	19934	89
Manufacturing	7848	7781	1009	63535	4800,7	13,235	95
Industry	10438	10570	988	87257	6596,8	13,227	96

Alternatively French data can be aligned so as to match the returns of the 1958 British census of production. This operation would tend, at least in theory, to introduce a downward bias at the expense of French performance.

To make matters worse the currency market underwent a period of renewed turbulence in the late 1950s – the War in Algeria and its incumbent expenses in particular bearing heavily on the French accounts' balance. The Franc-pound exchange rate, which had stabilized since the early decade started to deteriorate again. In 1958, the French government had to readjust the official exchange rate from 980 Francs to the pound to 1176 in June and 1392 in December (when free convertibility was reintroduced for non-residents for the first time since 1939). With the return of inflation, the computation of PPP exchange rates is especially hazardous. However, 'parallel' (i.e. black market rates offer a guide in this respect).

The aggregate results for the two benchmarks appear broadly in line: by the end of the 1950s, French industry had more or less completed its catching-up process on British industry. While the index for 1954 may overestimate French performance, those for 1958 probably underestimate them. But they remain very close to even. In contrast to Britain, however, mining, construction and the utilities taken together outperform the manufacturing sector, especially in 1954, a reflection of the strategic importance lent to these sectors by French authorities. A handful of branches consistently register better results than their British counterparts: the food industry, clothing, and metal good industries. Conversely, in others French firms did proportionately more poorly. This is the case for basic metallurgy and vehicles; the textile (including leather) and wood industries recorded marginally inferior results. At the two extremes labour productivity in French mines apparently surged in this period at over twice the British level while the reverse was true for the leather industry.

This spectacular catching-up process is generally assigned to the differential in productivity gains during the immediate post-war decade: annual productivity growth in French industry is estimated to have been twice the pace in its British counterpart.

Table 17. Comparative annual labour productivity growth in industry, 1949-59

	Britain	USA	France
Aggregate per man-year in industry	2.4	3.2	4.7
Aggregate per man-hour in industry	2.1	3.2	4.5
Food and drink	1.0	2.7	3.3
Building materials and glass	2.0	3.1	4.5
Metals	2.2	1.8	5.5
Engineering	2.4	2.6	3.8
Chemicals	4.6	5.1	5.8
Textiles	1.4	3.9	6.6

Source: Carré, 1967, p. 22.

Still dealing at the aggregate level, the dynamic seems to have a lot to do with the overall contraction of employment and its redistribution. This has been the standard interpretation: the end of ‘Malthusian’ tendencies; the declining natality of the interwar years resulted after 1945 in a fall in the labour force, while a new set of conditions finally made possible mass migration from the primary sector.

Table 18. The sectoral distribution of employment in France 1936-63

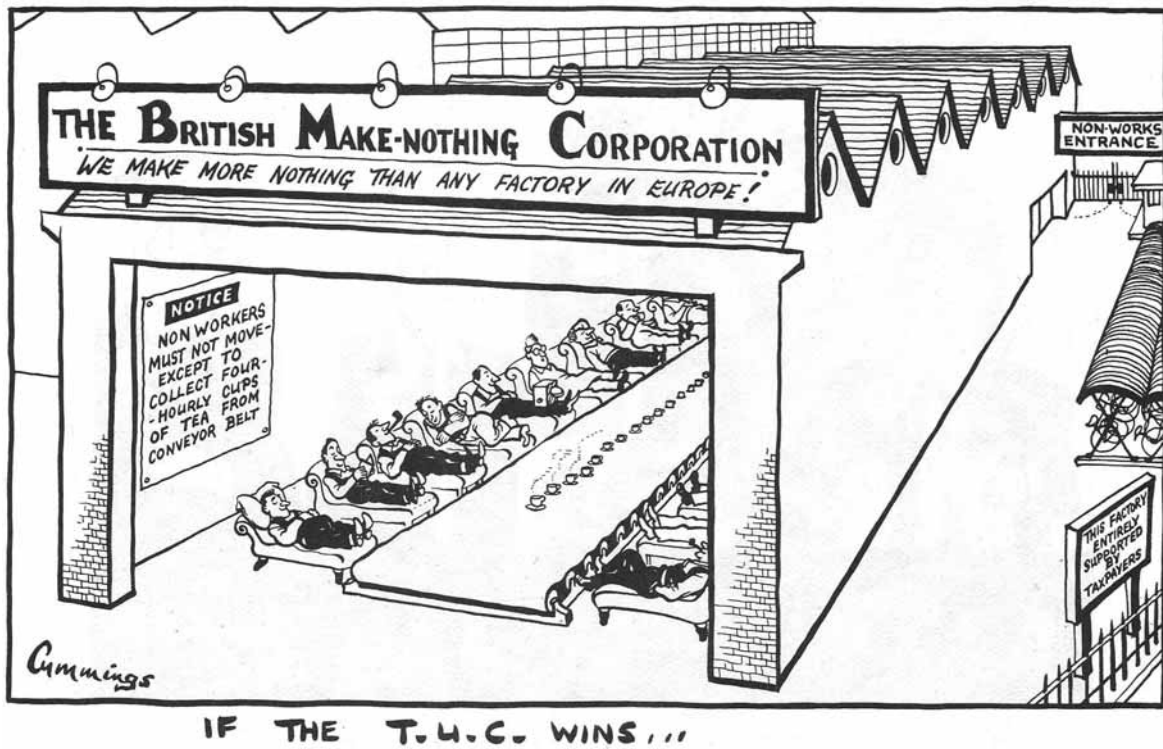
(in thsds)	1936	1946	1954	1962
Agriculture	7204	7512	5213	3772
Manufacturing	5178	5300	5017	5465
Industry	6263	6398	6918	7678
Services	6793	6169	6571	7587
Working population	20260	20530	18702	19037

To some extent the restoration of pre-war output levels with a contracting labour force mechanically induced higher productivity levels. Of the 2.3 million net exit from the agricultural sector, 1.8 million can be accounted for by exit from the labour force altogether.

The other line of argument has to do with the advantages derived from the ‘*tabula rasa*’ brought about by wartime destructions and the replacement of an old elite by a new class of managers. Tellingly the first French official report on post-war economic performance (Ministère des Finances, 1955) exalted productivity growth as the key to curing all ills. Especially under the first plan (1948-52) official propaganda stressed the need to constantly raise turnover. The 1936 law limiting the working week to 40 hours was openly disregarded – despite the adoption of a third week holiday in 1956: the average working week actually lengthened from 43.5 to 46.1 hours between 1946 and 1965. The effort bore in the area of energy, public infrastructures and construction in which France had lost ground during the interwar years: alone among the advanced nations, France was alone importing electricity (as well as coal) and had built in the 1930s only 300,000 new homes compared to 2 million in the UK (and 5 million in the US (Fourastié & Montet, 1950, p. 59). A boost was given to the replacement of machinery as well as the rebuilding of factories. It is in this particular area that Marshall aid proved decisive. Despite the politically unstable environment (“cold war”, decolonisation), industrial relations were on the whole relatively peaceful. After the general strike of 1947 (23.4 million days lost), industrial action slumped in the 1950s to this total spread over a decade.

By contrast, there was widespread feeling in Britain that workers were falling prey to ‘leisure preference’ as the cartoon below illustrates, threatening the country’s productive capacity.

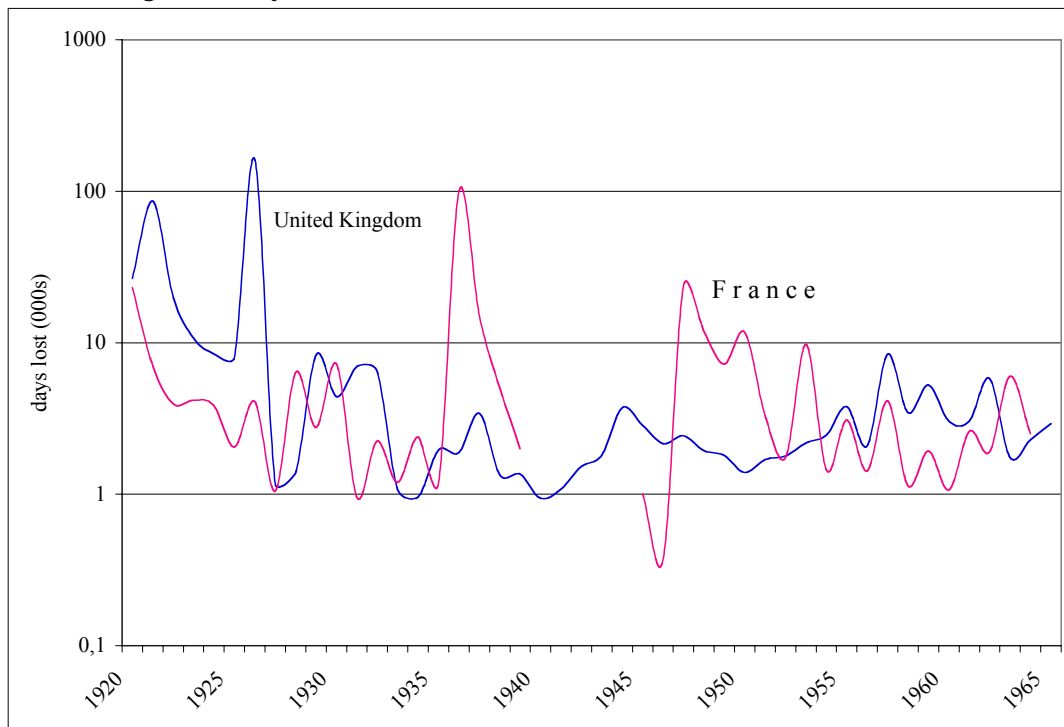
Figure 4. A view of newfound leisure preference in British factories



cartoon published in the *Daily Express* 25 July 1956.

But the industrial action record does not warrant such an explanation. Strike activity seems to have been broadly in line on the two sides of the Channel in the 1950s and 60s (Figure 5).

Figure 5. Days lost as a result of industrial action, France and Britain



By the beginning of the 1960s, the French still viewed their economy as essentially 'balanced' between agriculture and industry and their government struggled to obtain from their EEC partners the Common Agricultural Policy (1962) intended in De Gaulle's words to "have German industry finance the modernization of French agriculture."

While, for the 1950s, French industrial output can only be approached indirectly (from the input-output table for 1956 published in 1960), French authorities finally conducted a life-size industrial census. Despite all its flaws the returns of the French census essentially confirm the completion of the catching-up process.

Despite the achievement, which the completion of this survey represented, critics were quick to point to its defects and disqualify its results. For one thing, the survey was incomplete; for another, except for four branches (mining, building materials, iron and steel and metalworking—all activities whose output was closely monitored by public agencies), its results did not match the estimates obtained by the national accounts. On average labour productivity as recorded by the 1963 census appeared to be only 75% of the level drawn from the national accounts method for 1962 (Table 15). None of the production indicators – it goes without saying– warrant a fall in output or productivity from one year to the next. On the contrary, industrial growth remained robust at close to 6% across the industrial sector. Taking the 1962 numbers as the standard would therefore imply an overall performance well above (by 20%) the British equivalent at PPP. The question is therefore: which of the two assessments is likely to be more realistic?

Table 19. Anglo-French Productivity in industry for 1963

	UK £	FRANCE		Index (UK=100)
		NF	PPP £	
Mining and quarrying	1190	24157	1761	148
Metal manufacture	1449	27184	1981	137
Engineering & electrical goods	1307	16244	1184	91
Shipbuilding	1059	17205	1254	118
Vehicles	1455	18305	1334	92
Metal goods nes	1218	20817	1517	125
Chemicals and allied trades	2388	23423	1707	71
Textiles	1060	13114	956	90
Leather, leather goods and fur	1104	10400	758	69
Clothing and footwear	769	9409	686	89
Paper, printing, publishing	1449	18635	1358	94
Food drink and tobacco	1679	19854	1447	86
Bricks, pottery, glass, cement	1354	16195	1180	87
Timber and furniture	1138	11580	844	74
Other manufacturing	1301	13302	970	75
Construction	1076	10733	782	73
Gas electricity & water	2417	42833	3122	129
Manufacturing	1363	17347	1264	93
Industry	1347	16736	1220	91

Table 20. Conflicting assessments of implicit French labour productivity

(in thsds francs)	1962	1963	1962=100
Food, drink and tobacco	33,295	19,854	59.6
Mining and quarrying	19,344	20,133	104.1
Gas	46,412	36,859	79.4
Electricity	54,124	49,387	91.2
Petroleum	189,413	66,731	35.2
Building materials	20,553	21,004	102.2
Glass	21,483	18,043	84.0
Iron and steel	26,825	26,835	100.0
Non-ferrous metals	45,447	29,872	65.7
Metalworking	19,876	20,200	101.6
Mechanical engineering	20,591	19,030	92.4
Electrical engineering	23,233	16,127	69.4
Vehicles	20,767	17,303	83.3
Ship and aircraft	17,574	17,205	97.9
Chemicals and rubber	28,585	23,423	81.9
Textile	15,499	13,114	84.6
Clothing	16,403	9,409	57.4
Leather	13,364	10,400	77.8
Woodworking	15,173	11,580	76.3
Paper and cardboard	26,911	19,124	71.1
Printing and publishing	23,81	18,309	76.9
Miscellaneous	19,497	13,114	68.2
Construction	16,078	10,733	66.8
Industry	22,515	16,736	74.3

Sources: see Appendix Tables A10 and A11.

Obviously this conundrum has a lot to do with the methods used to estimate domestic output and the disregard for international comparisons. Until 1959, rather than follow the guidelines suggested by the United Nations for the establishment of National Accounts, the agency entrusted with this task, the *Service des Études Économiques et Financières* (SEEF) preferred to rely on an alternative set of assumptions, the most notorious being the emphasis laid on 'material' output and the omission of household production (Vanoli, 2002). Although this was later amended, the construction of national accounts from the output-side in the late 1950s for preceding years may have suffered from biases, which induced the overestimation of the factor cost value of output.

To the accountants of the INSEE agency and SEEF and with hindsight, the story was rather straightforward: while industrial output grew sharply between 1949 and 1963, employment grew only moderately. The working population shrunk by 1.5m people between 1946 and 1962, the primary sector lost half its employment (3.5m) while employment in manufacturing expanded by a measly 165,000. In this 'whirlwind' of structural change, new productive organisations could be put in place. This was done in an environment of relatively stable technologies where basic skills, time-discipline and on-the-job training were sufficient to operate assembly lines.

Table 21. Variations in output, employment and labour productivity 1949-63

	Output	Employment	Labour productivity
Textile, clothing, leather	4.7	-2.3	7.0
Public utilities	8.5	+1.7	6.7
Fuel (petroleum refining, natural gas)	10.3	+3.9	6.2
Chemicals	8.2	+2.2	5.9
Non-ferrous metals	5.8	+0.7	5.5
Wood & paper	5.7	+0.6	5.1
Building materials	5.8	+0.7	5.1
Coal mining (and gas manufacture)	1.8	-3.3	5.1
Transport & telecoms	5.1	+0.3	4.7
Engineering	6.8	+2.4	4.3
Basic metallurgy	4.7	+0.5	4.2
Trade	5.4	+1.3	4.1
Food-processing	4.0	-0.1	4.1
Construction	6.5	+3.5	3.0

Source: Carré, 1967, p. 19.

However, even in taking the more favourable output-labour ratios of the SEEF for 1962, it appears that by this date, French industry had barely caught up on the 'technological leader:' its labour productivity performance being on average only 40% of the recorded American indicator (Table 21), a gap slightly below the 1860s level and slightly above the pre-World War One mark (see above).

Table 22. French-American Comparison of labour productivity in 1963

	USA		FRANCE	
	(in \$)	(in FF)	(in FF)	US=100
Food and tobacco	13667	66968	33295	49.7
Textiles	7095	34766	15499	44.6
Apparel	6141	30091	16403	54.5
Wood and furniture	7541	36951	15173	41.1
Paper	12578	61632	26911	43.7
Printing	11474	56223	23810	42.3
Petroleum and coal products	24110	118139	66731	56.5
Chemicals and allied	19306	94599	28585	30.2
Leather	6338	31056	13364	43.0
Stone, clay and glass	12272	60133	21483	35.7
Primary metals	13541	66351	26835	40.4
Fabricated metals	10897	53395	20200	37.8
Machinery	11865	58139	20591	35.4
Electrical equipment	11251	55130	23233	42.1
Transport equipment	14090	69041	20767	30.1
Instruments	13046	63925	17574	27.5
Miscellaneous	9110	44639	19497	43.7
Manufacturing	12070	59143	23861	40.3

In six cases (chemicals, building materials, metal wares, machinery and transport equipment) French labour productivity was around or below a third of the US equivalent; in only two

branches (apparel and petroleum refining) was French performance above the 50% mark. Rationalization of production may have been on its way in French industry but it was still a long way to complete equalization with US indicators.

Indeed, French industry which had to some extent closed the gap on US industry up to the 1929 depression in terms of output per year, only managed to restore its initial lag by the early 1960s. In terms of output per hour, France and Britain kept apace only to be outdistanced by the US.

Table 23. The course of productivity in France, the UK and the US, 1913-1960

1913=100	<i>Output per man-year</i>			<i>Output per man-hour</i>		
	France	UK	US	France	UK	US
1929	136,5	121,6	126,7	146.4	137.8	154.4
1938	125,7	143,6	136,0	161.6	165.2	209.1
1950	146,1	159,4	177,1	161.1	186.5	252.2
1954	170,1	172,5	193,2	188.8	205.0	286.2
1958	199,3	183,3	205,7	221.2	223.9	313.7
1960	215,8	193,1	217,3	237.9	237.4	328.8

Source: Maddison, 1962, p. 231-33.

5. Final Act: End of (hi)story?

Until the 1980s there was little realization that French industrial performance was now on a par and further overtaking Britain's. Most political pundits as well as many economists were counting a breakdown of the 'capitalist system' so that such trivia as productivity growth seemed a thing of the past. Britain in the 1970s experienced both the highest degree of demand management by the government and of control of production by workers to disastrous results. The contemporary quadrupling of oil prices and adjacent monetary upheavals contributed to conceal the reality test of Western industries with the rest of the world's. Market liberalization in Europe (the 1986 *Acte Unique*) and across the world (Uruguay round of GATT) made the modernization or outright elimination of uncompetitive industries inescapable.

At first, French industry having rebuilt some of its industries from scratch more recently held faster than its British counterpart, which had anyway always been more dependent on third markets. At the acme of the 'British disease' France improved its advance, especially after the 'winter of discontent' of 1978-79 in terms of output per man-hour – when days lost as result of strikes culminated to an astounding 29 million, the highest since the great strike of 1926.

When the smoke finally dissipated, British regained some lost ground and the now inverse gap oscillated between 15 and 20% in terms of labour productivity in industry. By the same token, in terms of income per capita, France was now ahead of Britain from the 1980s onwards (van Ark,

1990, p. 67). The French lead was now especially conspicuous in fields where Britain had consistently excelled for so long, such as metallurgy and engineering, the student had finally surpassed the master.

Table 24. Hourly labour productivity in France relative to the United Kingdom (=100)

	1973	1979	1988
Food, beverages, tobacco	134.2	153.8	133.0
Textiles and apparel	102.8	118.6	115.0
Footwear and leather	100.9	97.4	124.5
Paper products	169.7	217.5	216.5
Printing and publishing	91.8	101.4	91.7
Chemicals, rubber, plastic	99.2	117.1	106.7
Stone, clay and glass	131.8	158.5	158.9
Basic metals and goods	130.0	175.1	123.3
Mechanical engineering	126.8	163.3	159.9
Electrical engineering	87.7	128.2	93.8
Wood and other	83.9	123.6	115.1
Manufacturing	112.8	141.8	125.5
Id. per annum	103.9	130.6	115.6

Source : van Ark, 1990, p. 67.

Table 25. Annual labour productivity in industry in 1984

	UK (in £)	France (in FF)	UVRs geom ave	France £	Index (UK=100)	
					PPP	Ex rate
Food and beverages	15,171	191,090	10,47	18,251	120,3	107,8
Textiles	9,020	138,999	11,48	12,108	134,2	131,9
Apparel	6,935	108,902	16,50	6,600	95,2	134,5
Leather	9,110	124,547	11,36	10,964	120,3	117,1
Wood	10,516	115,168	10,72	10,743	102,2	93,8
Paper	13,116	197,226	7,75	25,449	194,0	128,7
Printing and publishing	16,356	190,563	10,47	18,201	111,3	99,8
Chemicals, rubber, plastic	20,227	224,709	10,74	20,923	103,4	95,1
Stone, clay and glass	16,557	184,518	7,56	24,407	147,4	95,4
Basic metals	12,872	164,158	10,76	15,256	118,5	109,2
Electrical engineering	15,068	202,909	12,34	16,443	109,1	115,3
Machinery and vehicles	13,260	175,253	9,47	18,506	139,6	113,2
Instruments and other	11,590	151,482	10,47	14,468	124,8	111,9
Manufacturing	13,935	175,709	10,47	16,782	120,4	108,0

UVRs: Unit value ratios

This advance gradually unravelled, at least in terms of annual (rather than hourly) output, but French performance still seems firmly pitched ahead of Britain at least in terms of manufacturing productivity.

6. Some reasons why

6.1 Why the gap persisted

There has been, for a long time, much hand wringing to identify the sources of French apparent backwardness. Indeed some have gone as far as to argue that the gap never existed in the first place, or even that it worked in the other direction, French superiority being explained by its extensive specialisation in quality products (O'Brien & Keyder, 1978).

Earlier commentators were prone to stress natural or independent causes such as a "lack of minerals [i.e. coal] in the diet" (R. Cameron) – but free access to domestic coal reserves was only crucial for the initiator of coal-based industrialization. But the bulk of the responsibility was assigned to a set of attitudes described collectively as "Malthusian", forces that stood in the way of adaptation to competition. French industry was starved of capital because of the timidity of banks and the inability to generalise a French invention, 'mixed' banking. French entrepreneurs were held back by a preference for fixed rents rather than variable profits. French family firms favoured stability of management over expansion and openness. French consumers had their purchasing power restrained by restrictive practices, protectionism and price controls.

Economists pointed to proximate determinants and questioned whether suboptimal firm size did not prevent reaping the benefits of scale economies or whether production processes were not sufficiently mechanized. To Bettelheim (1946) and Fourastié and Montet (1950) these two factors accounted essentially for the demotion of French industry in the first half of the 20th Century. While it did not seem that French industry was particularly handicapped by the distribution of the scale of operation of its factories, the dearth of motive power and machinery was blatant: in 1938 the country numbered only 550,000 tool-machines (compared to 2m in Britain and 3m in the US) and motive power available per worker was a bare 2.4 HP (compared with 3.8 in Britain and 6.6 in the US). Following another commentator (Wagemann) average capital outlays per worker were Marks 14 in France, 30 in Germany and Britain and 40 in the US. This diagnosis came in the public domain and was shared by the vast majority of decision-makers. As a result energy provision and economies of scale became an obsession in the immediate post-war period.

6.2 Why it eventually vanished

The orthodox view is that a new political, economic and cultural environment after 1945 unleashed long-restrained productive forces and created the conditions for France to regain its place among developed nations. The transformation, sometimes heralded as a 'revolution' or 'miracle' was allegedly set in motion by the immediate post-war structural reforms and extensive government planning and intervention: it was typically a revolution from the top down.

But in so far as many economic policies inherited from the interwar survived and were indeed extended in the post-war period, one may as if the closeness of French and British industrial performance was not the result of "bad" convergence. The leap of the 'golden age' occurred itself

in closed economies the opening of which in the 1970s would reveal the lack of adaptation to the new world environment. Starting during World War One but especially after World War Two, Britain introduced the kind of market distortions, which had been part of the economic policy toolbox on the Continent for some time and which dampened competitive pressures. For all its spectacular aspect, the industrial revival of the 'golden age' never eroded the lag in terms of performance with the 'technological leader', the USA.

In terms of market power, the lost ground was never to be fully regained: France's share of industrial world production slipped from 4.4% in 1938 to 3.2% in 1953 and 3.5% in 1973 – Britain's corresponding figures being 10.7, 8.4 and 4.9 (Bairoch, 1982, p. 296, 304). The hour of reckoning would be postponed until the 1980s when large swathes of the industrial sector in both countries would be swept aside.

On the threshold of de-industrialization the French tortoise finally caught up on the British hare just as standardized mass-production was again giving way to customized flexible output runs.

6.3 Could it come back again?

Today, at the beginning of the 21st Century, things got back in order. France still leads in the European league table for hourly productivity in a much smaller industrial sector while Britain has forged back ahead in terms of GNP per capita.

Setting aside the question of whether conversion at PPP rates tends to bias comparisons of labour productivity (Honohan, 1998), the estimation of domestic output in a closed economy poses difficult problems when trying to set up international comparisons. Government price controls and trade barriers, tariff and non-tariff necessarily introduced potent biases in the valuation of goods (as well as services) almost exclusively on the domestic market. Such was the case for energy, construction and most of manufacturing until 1968 when the French government decided to lower its tariffs on manufactured imports from the EEC drastically. The manipulation of demand necessarily distorted the price mechanism and hence the measurement of productivity. This generated a chasm between supply and demand (both domestic and foreign) for a time, which tended by dissociating productivity from profitability buoyed productive performance without regard for utility.

Nevertheless, as suggested by Broadberry (1998, 2002), after paying due attention to production organisation, productivity in services, especially in transport and communication, finance and trade probably offers the most promising alley to understand productivity differentials and dynamics among industrial economies. Even a cursory inspection of productivity indicators in 2000 reveals that industry still operates as the 'leading sector' in the French economy in terms of performance, seconded by a much less productive service sector and weighed down by both agriculture and public services. In Britain, by contrast business services drive the league table in terms of productivity performance – as it already did 100 years ago.

Table 26. Employment, value added and labour productivity across the economy, 2000

	<i>Employment</i> (% of total)	<i>Value added</i> (% of total)	<i>Productivity</i> Index
Agriculture, fisheries, forestry	4.3	2.8	68
Industry	16.6	25.4	158
Food-processing	2.5	2.6	107
Consumer goods	3.0	3.1	106
Vehicles	1.0	1.5	150
Capital goods	3.2	3.5	112
Semi-finished goods	5.9	6.8	117
Energy	0.9	3.4	386
Construction	6.2	4.5	76
Private services	45.1	51.6	118
Trade	13.8	10.0	75
Transports	4.6	4.0	90
Financial services	3.1	4.7	154
Real estate	1.6	12.2	789
Professional services	13.4	15.0	116
Personal services	8.6	5.7	68
Public services	27.9	20.2	74
Education, health, social services	15.6	11.4	75
Administration	12.3	8.7	73
Economy	100 or 24.1m	100 or €1288bn	100 or €51,900

Source: Dormois, 2004, Table 8.7.

Conclusion

Dwelling at length on the, in the end, tiny differences in long-term performance between two of the most developed economies in the world may, at first sight, seem somewhat futile. But the wealth of attention devoted to the British and French ‘paths of development’ has come as much from a legitimate interest in supposedly contrasted ‘patterns’ as from a literary tradition (going back perhaps to Voltaire) of opposing French and British way of doing things. “A country where everything was different and delightful” in the words of the young Kipling returning from the Paris exhibition of 1878.²⁵ The laziness of historians too absorbed to realise that Europe (and the world) was perhaps made up of more than two countries insured the success of this type of confrontation. Nevertheless the very length of the known history of two of the oldest industrial nations makes them of natural interest to all students of economic development.

Each country, indeed each locality, harbours its own idiosyncrasies in economic as in other matters. But while one dissects these idiosyncrasies, one should not be prevented from identifying the ‘forces’ behind them which always turn out to be strikingly similar from one area to the next – as the similar fate of French and British industrial policy in the post-war illustrate. Thus, an Anglo-French comparison, while it tends to conceal the ultimate causes of the

²⁵ Quoted in *Souvenirs of France* (1933), p. 15.

successful transition of the West 'from rags to riches' – because of the similarity in social and cultural make-up, may contain useful lessons as to its logistics. From these premises it follows that the range of problems on which this type of comparison can hope to shed some light is necessarily circumscribed. So far the proximate determinants have been thoroughly investigated though the recent return of de-concentrated customized production has somewhat confused received wisdom. What remains to be investigated in detail is the impact of the economic environment at large on productivity performance. In particular, the study of productivity in the service “industries” appears to offer the most promising alleys to account for differentials in the goods producing sector (Broadberry & Ghosal, 2002; Dormois, 2005). But if any economy is to maintain rising standards of living, its success will depend on the quality and competitiveness of the environment it offers to firms and agents. In this regard recent trends reveal that the 'golden age' solution of growth 'behind closed doors' was unsustainable as the post-oil shock process of de-industrialization illustrates.

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Table A1. Value added, employment and labour productivity in France's manufacturing industry 1840-1845

	Value added (F 000)	Employment (numbers)	Labour productivity	
			in F	in £
Mines and quarries	61283	74559	822	33
Basic metallurgy	86425	58449	1479	59
Iron goods	56664	50458	1123	44
Non ferrous metals	3017	1399	2157	85
Metal goods	13087	11370	1151	46
Precious metals	657,2	531	1238	49
Shipbuilding	6030	4717	1278	51
Chemicals	33026	8046	4105	163
Textiles	568595	590735	963	38
Leather	32269	29859	1081	43
Food and drink	229144	129472	1770	70
Paper mfr.	17117	14753	1160	46
Printing and publishing	11256	7135	1578	62
Woodworking	9057	6015	1506	60
Stone, pottery and glass	59436	55312	1075	43
Fuels	5500	1943	2831	112
Public works	1790	3371	531	21
Miscellaneous	1507	1289	1169	46
Total	1151703	1049413	1097	43

Source: Statistique de la France, 1^e série, t. VIII-XI et Dormois 1999.

Table A2. Value added, employment and labour productivity in French industrial sector, 1851

	Value added (F million)	Employment (thsds)	Labour productivity	
			(in F)	(in £)
Mines and quarries	95,6	113,1	845	33
Basic metallurgy	74,5	80,1	930	36
Metalworking	81,9	77,8	1053	41
Shipbuilding	18,5	18,9	981	38
Chemicals	75,1	47,1	1593	62
Textile	1051,9	1055,7	996	39
Clothing	1314,8	1366,8	962	38
Leather	117,9	122,5	962	38
Paper	96,2	70,7	1361	53
Food and drink	986,1	565,6	1744	68
Woodworking	118,6	108,4	1094	43
Stone, pottery and glass	184,4	254,5	725	28
Luxury	13	7,1	1839	72
Building	807,4	824,8	979	38
Total	5035,9	4713	1069	42

Source: Statistique de la France, 2^e série, t. XIX et Dormois 1999.

Table A3. Value added, employment and labour productivity in French industry, 1861

	<i>Workers</i>	<i>Intermediate costs</i>		<i>Gross output</i>	<i>Value added</i>	<i>Labour prody</i>
	No.	<i>Raw mat.</i>	<i>Fuel</i>			
		(in F million)				
SOEs	31539	389.576	2.592	703.995	311.827	9887
Textile	685327	1592.156	25.358	2332.872	715.358	1044
Mines and quarries	109017	6.588	7.443	166.012	151.981	1394
Metallurgy	105366	254.449	63.051	441.476	123.976	1177
Engineering & metal goods	75302	107.963	8.106	210.290	94.221	1251
Leather	19212	155.242	0.792	203.025	46.991	2446
Woodworking	14639	54.100	0.620	78.280	23.560	1609
C�eramique	47966	29.369	17.919	96.919	49.631	1035
Chemicals	21614	197.950	9.066	291.583	84.567	3913
Building	67898	22.339	26.893	99.811	50.579	745
Lighting	4981	48.174	1.222	68.210	18.814	3777
Furniture	7401	6.421	1.034	17.278	9.823	1327
Clothing	54857	61.173	0.701	113.902	52.028	948
Food and drink	174420	2306.847	26.470	2803.819	470.502	2698
Vehicles	18371	23.167	0.888	46.717	22.662	1234
Paper and prints	54997	68.459	4.546	146.141	73.136	1330
Luxury goods	6603	6.760	0.203	13.945	6.982	1057
Total	1467971	4941.16	194.31	7130.287	1994.82	1359

Source: Dormois 1999.

Table A4. Value added, employment and labour productivity in French industry, 1873

	Value added (F million)	Labour (thsd)	Labour productivity	
			(in F)	(in �)
Mines and quarries	204,5	119,7	1708	67
Metallurgy	61,6	43,0	1433	56
Metal goods	234,8	156,9	1496	59
Engineering	180,8	118,8	1522	60
Arms	32,7	17,8	1837	72
Chemicals	116,4	23,0	5061	198
Coal products	71,4	18,0	3967	156
Textile	981,4	862,7	1138	45
Clothing	1260,7	978,2	1289	51
Leather	111,5	35,0	3186	125
Paper and printing	127,1	58,9	2158	85
Food and drink	1626,2	473,4	3435	135
Woodworking	164,1	83,3	1970	77
Furniture	103,9	52,4	1983	78
Stone, pottery and glass	105	73,7	1425	56
Luxury goods	147,6	63,5	2324	91
Building	804,4	640,9	1255	49
Miscellaneous	463,7	714,5	649	25
Industry	6797,6	4339	1567	61

Source: Dormois 2006 Ch. 5

Table A5. Value added, employment and labour productivity in French industry, 1896

	Value added	Labour	Labour productivity	
	(F million)	(thds)	(in F)	(in £)
Mines and quarries	428,4	227,1	1886	74
Metallurgy	88,7	56,2	1578	62
Metal goods	616,2	354,2	1740	68
Engineering	445,4	258,9	1720	67
Arms	75,2	44,4	1694	66
Chemicals	151,6	51,9	2921	115
Coal products	143,9	41,3	3484	137
Textile	988,3	815,8	1211	48
Clothing	1836,4	1758,5	1044	41
Leather	93,6	42,6	2197	86
Paper and printing	325,9	168,5	1934	76
Food and drink	2139,4	1104,2	1938	76
Woodworking	205,2	110,9	1850	73
Furniture	198,9	106,3	1871	73
Stone, pottery and glass	169,9	114	1490	58
Luxury goods	238,3	113,8	2094	82
Building	1194,4	983	1215	48
Miscellaneous	25,7	22	1168	46
Ensemble	9365,5	6373,3	1469	58

Source: Dormois 2006 Ch. 5.

Table A6. Value added, employment and labour productivity in French industry, 1906

	<i>Value added</i>	<i>Labour</i>	<i>Labour productivity</i>	
	in F million	in thds	in F	in £
Mines and quarries	490	280	1750	69
Iron and steel	320	70	4571	179
Metalworking	1750	758,4	2307	90
Non ferrous metals	70	28,3	2473	97
Chemicals	465	124,6	3732	146
Textile	1670	914	1827	72
Clothing	1340	1551	864	34
Leather	580	376,8	1539	60
Paper	165	69,1	2388	94
Printing	260	107,6	2416	95
Food and drink	1515	479,1	3162	124
Woodworking	1305	704,7	1852	73
Pottery and glass	295	166,8	1769	69
Building materials	105	46,6	2253	88
Building	900	550	1636	64
Industry	11230	6227	1830	72

Source: Dormois 1999.

Table A7. Value added, employment and labour productivity in French industry, 1911

	Value added	Labour	Labour productivity	
	(F million)	(in thsds)	in F	in £
Mines and quarries	918,9	361,0	2549	100
Basic metallurgy	258,6	122,1	2118	83
Metal goods	2331,3	758,4	3074	121
Non ferrous metals	112,2	44,2	2538	100
Chemicals	180,9	49,2	3677	144
Textile	1128,7	804,7	1403	55
Clothing	2138,9	1487,7	1438	56
Straw, feather, hair	654,4	287	2280	89
Leather	154,1	52,5	2935	115
Paper and rubber	241,2	92,3	2613	102
Printing	231,6	81,7	2835	111
Food and drink	1413,9	374,8	3772	148
Woodworking, furniture	1728,4	668,5	2585	101
Jewellery	214,9	29,8	7211	283
Cement, pottery and glass	90,2	102,1	883	35
Building	1234,4	624,2	1978	78
Miscellaneous	418,3	166,9	2506	98
Industry	13450,9	6106,6	2203	86

Source: Dormois 2006 Ch. 5.

Table A8. Value added, employment and labour productivity in French industry, 1930

	<i>Employment</i>	<i>Gross output</i>	<i>Interm. costs</i>	<i>Value added</i>	<i>Labour prod^d</i>
	(numbers)	(Fmillion)			(in FF)
Basic metallurgy	73,792	4630	3239	1403	19013
Metalworking	136,767	6324	3328	2996	21909
Engineering	217,570	12224	6379	5845	26867
Non-ferrous metals	15,053	1225	634	591	39235
Chemicals	96,541	9160	6017	3143	32554
Textiles	120,623	5231	3419	1806	14971
Dressmaking	63,442	3488	2197	1291	20346
Leather	50,999	3181	2248	933	18298
Paper	31,313	1748	1110	638	20369
Printing	36,026	1568	670	898	24926
Food and drink	70,667	11452	9053	2399	33944
Woodworking	74,912	3548	2001	1547	20655
Cement, pottery, glass	75,899	2631	1190	1441	18983
Building & construction	180,621	7107	3206	3802	21047
Manufacturing	1063,604	66410	41492	24931	23440
Industry	1244,225	73517	44797	28732	23092

Source: Dormois, 1998; 2004a.

Table A9. Value added, employment and labour productivity in French industry, 1956

TEI 65		Q	IC	VA	Labour	Labour
		(px FOB)				prod ^y
		(in million of NF)			(thsds)	(in F)
020	Food, drink and tobacco	31597	18308	13289	563,3	23591
030-052	Fossile fuels	12537	3866	8671	320,74	27034
040-051	Gas, water, electricity	3068	833	2235	112,12	19934
060	Building materials	2991	927	2064	130,02	15874
061	Glass	888	274	614	47,22	13003
070-071	Iron ore and scrap	1108	147	961	29,4	32687
072	Iron and steel	5906	3181	2725	194,38	14019
080	Non-ferrous ores	275	66	209	4,96	42137
082-092	Non-ferrous metals	3243	2076	1167	176,3	6619
093	Rolling mills and foundries	7725	3191	4534	292,96	15477
094	Mechanical engineering	11170	4543	6627	517,06	12817
095	Electrical engineering	6055	2428	3627	213,48	16990
096	Vehicles and cycles	7248	3629	3619	378,96	9550
097	Shipbuilding	1210	612	598	95,32	6274
098	Aircrafts	1773	662	1111	61,6	18036
099	Armaments	832	584	248	16,16	15347
100	Misc. minerals	445	74	371	19,52	19006
101-104	Chemicals & pharmaceuticals	8124	3950	4174	231,26	18049
106	Rubber goods and asbestos	2274	1331	1143	69,5	16446
110-105	Textile	13383	7786	5597	631,82	8859
116	Clothing	8061	3909	4152	457,76	9070
117-118	Leather and hides	997	648	349	77,92	4479
119	Leather goods	2566	1308	1258	144,94	8679
120-122	Wood and furniture	5239	2799	2440	239,58	10184
123-125	Paper and cardboard	2901	1393	1508	102,84	14664
126	Printing and publishing	3639	1438	2201	168,9	13031
127	Miscellaneous	3246	1498	1748	134,06	13039
130	Building and construction	21059	8452	12607	1358,32	9281
	Manufacturing	144109	70589	73720	5129,0	14373
	Industry	169654	79913	89941	6790,4	13245

Source: SEEF (1960).

Table A10. Value added and value added per person, France, 1962

1962	Value added (Fm)	Employment (thsds)	Labour Productivity (in F)
01. Agriculture and forestry	32674	3745	8,725
02. Food, drink and tobacco	21309	640	33,295
03A Fuel	3540	183	19,344
03B Gas	789	17	46,412
04. Electricity	5250	97	54,124
05. Petroleum	11933	63	189,413
06A Building materials	4049	197	20,553
06B Glass	1289	60	21,483
07. Iron and steel	6599	246	26,825
08. Non-ferrous metals	1727	38	45,447
09A Metalworking	8348	420	19,876
09B Mechanical engineering	14784	718	20,591
09C Electrical engineering	7481	322	23,233
09D Vehicles	6251	301	20,767
09E Ship and aircraft	3216	183	17,574
10. Chemicals and rubber	10262	359	28,585
11A Textile	8447	545	15,499
11B Clothing	6873	419	16,403
11C Leather	2646	198	13,364
12A Woodworking	4309	284	15,173
12B Paper and cardboard	3310	123	26,911
12C Printing and publishing	4881	205	23,810
12D Misc.	3334	171	19,497
13. Construction	25693	1598	16,078
Industry	166320	7387	22,515
14A Transport	14171	711	19,931
14B Communications	4003	293	13,662
15. Housing	12402	71	174,676
16. Other services	37087	1994	18,599
19. Trade	44069	1890	23,317
TOTAL	310726	16091	19,311

Source : Carré (1967).

Table A11. Value added, employment and labour productivity in French industry, 1963

1963	<i>Labour occupied</i>	<i>Gross output</i>	<i>Interm. inputs</i>	<i>Value added</i>	<i>Direct taxes</i>	<i>Labour prod.</i>
	numbers	F million				F
Mining, fuels, minerals	336057	22535,8	10148,8	12418,1	4300,1	24157
Pétrole et carburants	42775	13752,8	7273,9	6509,7	3655,3	66731
Solid fuels	209040	5356,1	1447,5	3908,2	339,5	17072
Iron ore	16309	838,8	381,4	457,7	26,5	26439
Other metallic ores	3961	234,7	127,1	107,8	12,1	24161
Quarries	46936	1646,4	652,7	994,3	210,4	16701
Misc. minerals	15780	665,2	253,9	411,3	55,5	22548
Salt	1256	41,8	12,3	29,1	0,8	22532
Iron & steel	252574	17357,5	10415,9	6919,1	656,4	24796
Blast furnaces	139304	9950,6	5883,1	4057,1	320,1	26826
Non-ferrous metals	18529	2722,8	2075	638,4	84,9	29872
	94741	4684,1	2457,8	2223,6	251,4	20817
Mechanical engineering	992343	49065,4	29187,2	19970,6	3796	16299
Rolling mills	80968	6366,4	4331,5	2034,6	461,5	19429
Foundries, chaudronnerie	290961	14941,5	8776,1	6176,4	1184,4	17157
Mechanical engineering	232261	13082,2	8030,6	5134,4	888,9	18279
Machinery	173022	5491,4	2914,5	2578,3	457,6	12257
Metal goods	215131	9183,9	5134,5	4046,9	803,6	15076
Shipbuilding	64018	2513,5	1344,4	1168,4	67	17205
Ships and aircrafts	528419	29388,6	18236	11157,8	1460,8	18351
Automobiles and cycles	437760	24679,6	15808	8875,9	1301,2	17303
Aircrafts	90659	4709	2428	2281,9	159,6	23410
Electrical engineering	466270	23080,6	13724,8	9372,2	1852,5	16127
Electrical equipment	345745	17612,9	10864,1	6760,5	1236,7	15977
Instruments	120525	5467,7	2860,7	2611,7	615,8	16560
Chemicals and allied	437753	35838,2	20661,6	15221,5	4967,9	23423
Chemicals	265301	21848,7	13603,3	8276,4	1381,6	25989
Rubber and asbestos	90164	4719,2	2773,5	1948,5	326,6	17988
Oil and fat	21392	2938,6	2238,6	708,8	139,2	26627
Tobacco and matches	14870	4042,2	676,2	3366,1	2913,8	30417
Plastic	46026	2289,5	1370	921,7	206,7	15535
Textiles	533772	24310,2	15537,5	8757,8	1757,8	13114
Textile manufacture	364906	18583,5	12264,3	6303,6	1323,3	13648
Subsidiaries	168866	5726,7	3273,2	2454,2	434,5	11960
Dress-making	294865	8510,7	5033,4	3480,7	706,3	9409
Leather	163536	5670,6	3483,5	2190,4	489,6	10400
Hides, leather and fur	9400	379,9	249,1	130,9	32,2	10500
Leather goods	56725	2532,7	1609,9	925	235,2	12160
Shoe-making	97411	2758	1624,5	1134,5	222,2	9365
Food and drink	359588	33060,6	24492,1	7139,1	2175,9	19854
Grain milling	41352	5797,1	4840,9	957,8	134,7	19905
Bread and biscuit	29292	1647,9	1007,3	641,9	166,2	16240
Sugar, liquor and drinks	93800	5969	3337,2	1173,5	1167,4	12510
Milk, butter and cheese	77075	9501,7	7620,5	1895,9	154,1	22599
Preserves	59879	4456	3387,4	1071,1	231,9	14015
Slaughterhouses	4951	825,8	669,9	156,4	79,4	15552
Miscellaneous	49268	4707	3567,1	1148,1	232,9	18576

Ice-making	3971	156,1	61,8	94,4	9,3	21430
Wood and furniture	236077	8360,6	4793	3569,4	835,6	11580
Felling and sawing	8456	307,3	186,8	120,4	29,4	10762
Woodworking	227621	8053,3	4606,2	3449	806,2	11611
Paper and printing	309664	16302,6	9270,7	7039,5	1268,9	18635
Paper and cardboard	124019	7603,2	4641,1	2965,8	594,1	19124
Printing and publishing	185645	8699,4	4629,6	4073,7	674,8	18309
Miscellaneous	171487	420845	2992,7	2824,2	543,1	13302
Jewellery, gold and silver plate	22173	874,2	440,5	432	127,3	13742
Games and toys	24988	947,8	574,9	374,9	84,8	11610
Musical instruments	7928	415447	183,2	232,4	50,4	22957
Brush	23152	869,3	468,2	402,1	75,3	14115
Unspecified	17672	647,4	398	249,5	51,8	11187
Mineral water	3604	237,3	157,4	81	17,5	17619
Photography and film	7674	549,3	211,5	338,6	29,5	40279
Cleaning, garbage disposal	64296	1272,6	559	713,8	106,5	9445
Cement, pottery and glass	198652	8233,5	4060,5	4173,1	956	16195
Glass making	60257	2581,1	1309,9	1266,3	179,1	18043
Clay	63778	1728,6	672,4	1057,3	201,6	13417
Building materials	74617	3923,8	2078,2	1849,5	575,3	17077
Building and construction	1555390	44348,5	22618,7	21742,2	5047,5	10733
Gas, water, electricity	144956	11047,5	4428,7	6618,6	409,7	42833
Electricity	92022	7627,6	2794,3	4833,1	288,4	49387
Gas	30712	2460,7	1240,5	1220,3	88,3	36859
Water distribution, heating	22222	959,2	393,9	565,2	33	23949
TOTAL	7036257	348753	203061	145926	28169,9	16736

II. Summary results

	<i>Labour occupied</i>	<i>Gross output</i>	<i>Interm. inputs</i>	<i>Value added</i>	<i>Indirect taxes</i>	<i>Labour prod.</i>
	numbers	F million				F
Mining, fuels, minerals	336057	22535,8	10148,8	12418,1	4300,1	24157
Iron & steel	252574	17357,5	10415,9	6919,1	656,4	24796
Mechanical engineering	992343	49065,4	29187,2	19970,6	3796	16299
Shipbuilding	64018	2513,5	1344,4	1168,4	67	17205
Ships and aircrafts	528419	29388,6	18236	11157,8	1460,8	18351
Electrical engineering	466270	23080,6	13724,8	9372,2	1852,5	16127
Chemicals	437753	35838,2	20661,6	15221,5	4967,9	23423
Textiles	533772	24310,2	15537,5	8757,8	1757,8	13114
Dress-making	294865	8510,7	5033,4	3480,7	706,3	9409
Leather	163536	5670,6	3483,5	2190,4	489,6	10400
Food and drink	359588	33060,6	24492,1	7139,1	2175,9	13802
Wood and furniture	236077	8360,6	4793	3569,4	835,6	11580
Paper and printing	309664	16302,6	9270,7	7039,5	1268,9	18635
Miscellaneous	171487	420845	2992,7	2824,2	543,1	13302
Cement, pottery and glass	198652	8233,5	4060,5	4173,1	956	16195
Building and construction	1555390	44348,5	22618,7	21742,2	5047,5	10733
Gas, water, electricity	144956	11047,5	4428,7	6618,6	409,7	42833
Industry	7036257	348753	203061	145926	28169,9	16736

Source :