

*Challenges to the British Copper Smelting Industry in the World Market 1840-1860 **

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The period 1840-1860, particularly the years between 1845 and 1850, marks a radical change in the structure of copper production and smelting worldwide. During this period British leadership in copper production was lost to Chile and in copper smelting its leadership was seriously challenged by the resurgence of the Chilean copper smelting industry and by newly created smelting works in the U.S., Australia and continental Europe.¹ The study of the British copper smelting industry and its relation to the copper trade between Britain and other countries is of interest because the British copper ore² market exerted a powerful influence on copper production or smelting abroad and by the 1830's Britain was increasingly dependent on fo-

* Monopoly is used loosely in this article to mean total or majority control of the market either as sellers or buyers or both by a group of colluding copper smelting companies.

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¹ UK copper production fell from 143,000 tons of fine copper in the period 1831-40 to 116,000 tons in the 1860's (or from c. 60% to c. 13% of world production), while Chilean production increased from c. 48,000 tons to 388,000 tons in the same period (or from c. 20% to c.43% of the world production). Smelting in Britain increased from 61,000 tons in the 1830's to 258,000 tons in the 1850's, but while in the 1830's its production of smelted copper constituted c. 68% of the world production in the 1850's it only amounted to c. 48%. See below, table 1.

² Copper was exported in several forms of which the most important were a) copper ore ranging from c. 5 to 50% pure copper b) copper regulus, or copper ore submitted to a first firing and containing about 50% of pure copper c) smelted copper usually copper bars of around 95% copper content d) refined copper usually copper ingots of over 99% produce and e) manufactured copper.

reign ores to supply its copper works. This mutual dependence was, however, unequal; not only because most foreign producers of copper ore relied (up until c. 1845) almost exclusively on the British copper market, while Britain had access to several sources of copper ore including its own mining industry, but also because of the different capacities of the copper industries of Britain and foreign copper producers for manufacturing items of high added value. Thus, if we compare the main copper producers of the 1830's Chile exported a large part of its production in the form of ore and the rest in the form of smelted copper while Cuba exported all its copper in the form of ore. *Per contra* British exports of copper ore and regulus were virtually nil and all copper produced or imported into Britain was either consumed in the U.K. or exported as refined or manufactured copper.

During the 1840's and 1850's the British copper and refining industry was concentrated in a handful of firms based in South Wales and, given the hegemony of Great Britain over the world copper smelting industry, this provided the basis for the formation of a monopoly regulating the prices of both furnace stuff and refined copper. The period under study also witnessed the introduction of new duties in Britain which made the import of foreign ores

Table 1
ESTIMATED WORLD PRODUCTION OF COPPER
AND SMELTED COPPER 1831-1870
(in 000's tons) *

	Copper produced **			Total	Copper smelted ***	
	U.K.	Chile	Cuba		U.K.	Chile
1831-40	143	48	12	238	161	32
1841-50	138	101	52	356	243	56
1851-60	142	206	29	535	258	81
1861-70	116	388	12	912	n.a.	204

* Rounded to the nearest thousand.

** From N. BROWN and C.T. TURNBULL, *A Century of Copper*, (London 1899-1900), part I, p. 9 with the following modifications. Cuban production of copper does not appear in this source and it has been added to the total indicated by Brown and Turnbull. Chilean production for 1831-50 was underestimated by Brown and Turnbull and we have corrected it, adding the difference to the total. They included for the period 1851-70, the production of Bolivia and Peru with that of Chile which we have not; however we have left the original total. Cuban production has been estimated by considering the total Cuban ores imported into the United Kingdom and assuming a copper content of 16.7%, which was the average produce in the years 1843-47. (See 'Quantities of copper ore imported in the year... and charged with the duty' in *Parliamentary Papers* [hereafter *P.P.*], several years). Regulus imported into the United Kingdom was assumed to have a 50% copper content. The statistics of British imports of Cuban and other copper ores and regulus appear in "A Return of all Exports and Imports of Copper and Copper Ore and Regulus,... etc. for the year..." (hereafter 'Copper') in *P.P.*, several years. For Chilean production see VALENZUELA, op. cit., table 8.

*** Sources: Table 3 and VALENZUELA, loc. cit.

dearer for the smelters and therefore made them less competitive in the world market. Finally there were successful attempts to establish modern smelting works in the United States, Chile, Australia, which smelted nationally mined as well as imported copper ore, thus depriving the British smelter of cheap furnace stuff.

Contemporary observers and more recent scholarship ³ has argued with differing emphasis that the decline of the copper industry in Britain since the mid XIXth century was caused or at least hastened by the following factors: a) the monopolistic purchasing practices of the British Associated Smelters, b) British commercial policy during the 1840's which heavily taxed imports of furnace stuff and c) the economies of transport implicit in smelting copper ore close to the mines. Below we examine the first two factors and evaluate their effects on the British copper industry comparing them with the effects of the third factor.^{3bis}

1. The British Smelters' Monopoly

During the period 1841-1860, Britain smelted around 56% of the copper produced worldwide ⁴, 90% of its smelting capacity was concentrated in South Wales and for the rest of the century the supremacy of this region of the United Kingdom was never seriously challenged.⁵ Up to the 1830's its almost sole source of supply of copper ores were mined in the United Kingdom, especially Cornwall and Devon, but from the 1830's foreign and colo-

³ For contemporary views of the problem see for instance the answer of H.H. Vivian to the Royal Commission of Noxious Vapours in *PP*, 1878, XLIV, p. 426 and *The Mining Journal* (hereafter *MJ*) 1 Jan 1859 p. 2, col.1. Recent scholarship dealing with the issue includes D. OWEN EVANS 'The Non-Ferrous Metallurgical Industries of South Wales, and Welshmen's Share in their Development' in *Transactions of the Honourable Society of Cymmrodorion*, (Session 1929-30), pp. 21-22; R.O. ROBERTS, 'The Development and Decline of the Copper and other Non-Ferrous Metal Industries in South Wales' in *Transactions of the Honourable Society of Cymmrodorion*, (Session 1956), pp. 106-15; R.O. ROBERTS 'The Smelting of Non-Ferrous Metals since 1750' in GLANMOR WILLIAMS (General Editor) *Glamorgan County History*, vol. V, (Cardiff, 1980), pp. 81-3; R.R. TOOMEY, *Vivian and Sons, 1809-1924. A study of the Firm in the Copper and Related Industries*, (New York and London), 1985, pp. 63-74.

^{3bis} The third factor is analysed in detail in L. VALENZUELA, 'Monopolistic practices in the International Copper Market. British Smelters and Foreign Mines, 1840-1860', (Swansea 1988), unpublished manuscript.

⁴ See table 1.

⁵ J. SYMONS 'The Industrial Capacities of South Wales' in *The Cambrian Journal*, vol. I, p. 317; PYRITES, *The Copper Trade*. Swansea, 1860-1914, n.d., p. 14; T.C. BARKER and J.R. HARRIS *A Merseyside Town in the Industrial Revolution: St. Helens*, (Liverpool, 1954), p. 446.

nial ores provided an increasing proportion of the ores smelted in Great Britain, becoming its main source sometime in the 1850's.⁶

The emergence of South Wales, and especially the Swansea district, as a leading smelting centre was based on the abundance of rich coal deposits in the area. This resulted in savings in transport since it was cheaper to transport ores to the coal than vice versa.⁷ Its relative proximity to the Cornish mines and the existence of good ports and water communication with the main copper markets were also important factors. These favourable conditions in turn attracted skilled labour, capital and entrepreneurs into the area⁸ and in 1804 led to the establishment of an important copper ore market in Swansea.

Until the 1860's most of the British smelters' supplies were obtained in public ticketings or sales. During the XIXth century these took place regularly in Cornwall and Swansea, the former for the purchase of Cornish and Devonshire ores, and the latter for other United Kingdom ores and colonial and foreign ores. The system was similar in both cases — parcels of ore were sampled and assayed by prospective buyers and, at a time and place previously agreed between sellers and buyers, the latter produced their tickets (i.e. undisclosed offers) for each parcel. Every smelter was obliged to make an offer and the sellers were compelled to accept the highest bid offered for each parcel. Although the system was severely criticized by the miners who resented the fact that they could not withdraw their ores and that purchasers concluded before the ticketings to agree on maximum prices, it seems that given the monopoly of the smelters, this was the best alternative available.⁹

From the 1820's through to the 1860's production of smelted copper in the United Kingdom was highly concentrated in a few South Wales firms. Thus during the period of highest concentration, 1840-44, Williams, Foster and Company purchased 29.8% of the copper ores sold by public ticketings in Great Britain while the top four firms, which also included Vivian and Sons, Grenfell and Sons and the Llanelly Copper Company, purchased 74.7% of the ore. The period of lowest concentration during these decades was 1850-54 when Williams, Foster and Company purchased 17.9% of the

⁶ Production of copper ore in the UK reached its peak in 1856 with 24,257 tons of fine copper and decreased rapidly to 15,968 in 1860. *PP* 1890-91, LXXVII, p. 107. A very conservative estimate of the copper content of ores (12% and regulus 40%) imported into the UK in these years indicates a total of 11,850 tons of fine copper in 1856 and 16,123 in 1860. See 'Copper' in *PP*, several years.

⁷ During the XVIIIth Century three tons of coal were necessary to smelt one ton of copper ore, but by the mid XIXth Century the proportion had dropped to between two to one and a third tons of coal per ton of copper ore. See R.O. ROBERTS, *Smelting...*, op. cit. p. 49.

⁸ R.O. ROBERTS, *Smelting*, op. cit. pp. 49-52.

⁹ J. PERCY, *Metallurgy. The Art of Extracting Metals from their Ores, and Adapting them to Various Purposes of Manufacture* (London, 1861), pp. 301-4; PYRITES, op. cit., p. 22; *MJ* 17 June 1853, p. 368. See also note 25 below.

ores and the four largest purchasers 48.2%.¹⁰ Furthermore for most of that period the trade of copper and copper ore was tightly controlled by formal or informal associations of two or more leading copper smelters. They either agreed beforehand on the price to be paid at the ticketings for the copper ores or purchased on a private contract basis for the combination. Also agreements were reached to maintain or change selling prices of refined copper.¹¹ As we shall see below, this monopolistic structure provided the major smelters with large profits but also created resentment among miners and gave miners and other entrepreneurs the incentive to intrude into the smelting business; this weakened the monopoly.

a) The period 1831-1840

This period was one of concentration of the copper smelting business in Great Britain. The largest smelting firm, Williams, Foster and Co., increased its share in the purchase of copper ores from 15.4% to 29.8% and the four largest firms from 56.1% to 74.7% from 1825 to 1840-44. According to Toomey this was due to the advantage taken by the largest smelting firms of the foreign supply of ores which rapidly increased during the 1830's.¹² The concrete mechanism through which the process of concentration took place needs more investigation, but we would suggest that a close connection between the major smelters and the British mining companies operating abroad, together with their participation in the commercialization of copper ore, was at the root of this concentration.

Thus Charles Pascoe Grenfell of P. Grenfell and Sons was one of the four original proprietors of the Cobre mines rediscovered in the early 1830's. When a company was formed to exploit the mines in 1835 (the "Consolidated Copper Mines of Cobre Association" or Cobre Co.), he became a director and chairman of the company.¹³ Although he resigned from these posts in December 1839, probably over the question of the need for the Company to smelt their own ores,¹⁴ he remained an influential shareholder until the 1860's.¹⁵ From 1833 to 1840 Grenfell and Sons were consignees of the Cobre Co. and other miner's cargoes which they stored in the Swansea wharf and

¹⁰ TOOMEY, *op. cit.*, p. 347.

¹¹ TOOMEY, *op. cit.*, pp. 313-41.

¹² TOOMEY, *op. cit.*, pp. 329, 347.

¹³ D. TURNBULL, *Cuba. With Notes of Porto Rico and the Slave Trade* (London, 1840), pp. 10-2, *MJ* 7 Dec. 1839.

¹⁴ Cobre Co. meetings reported in *MJ* 2 Nov. 1839 and 21 Dec. 1839.

¹⁵ See letters by R.J. Nevill to P. Grenfell of 12 Jan. 1841 and 20 Jan. 1841. Nevill Records, VIII, National Library of Wales (hereafter NLW) and by John Conybeare to the shareholders of the company in *MJ* 26 Jan. 1856. For ownership of Cobre Co. shares by Grenfell and Sons see Grenfell Ledger, B31 and B32, University College of Swansea.

sold through public ticketings or private contracts.¹⁶ After 1840 they continued receiving smaller consignments of Chilean, Cuban and Australian copper ore at least until the early 1850's.¹⁷

Williams, Foster and Co. had also a close connection with a British Copper Co. operating in Cuba and they actively participated in the commercialization of copper ore. Michael Williams, its senior partner, was director and main agent in Swansea of the Royal Santiago Mining Company in the early 1840's.¹⁸ The Williams' wharf in Swansea received up to mid-1843 all the Santiago Co. copper ore apart from some Chilean and Irish ores. After that date the Santiago Co. consigned their ores to Richardson and Co., copper ore merchants, but the Williams' continued receiving consignments of Chilean, Irish and, later, Australian ores.¹⁹

The Llanelly Copper Co. was also involved in the importation of copper ores into Britain. In 1835 they signed a contract with John Bibby and Sons of Liverpool and Gemmell and Co. of Glasgow to buy copper ores in Chile and Peru to sell them in Britain, the Llanelly Co. 'being allowed the option of purchasing the ores on equal terms to what would be given for them at Swansea or by other smelting companies'.²⁰ Although the venture had been abandoned by 1837²¹ the company continued importing copper ore from Chile in association with John Bibby and Sons and a cargo arrived for them in 1840 being 'the first of a large importation which may be shortly expected'.²² The Company also had a good connection with the Cobre Co. through Alexander Druce, one of the partners and also shareholder and auditor of the Cobre Company from its inception.²³

¹⁶ A letter by R.H. Vivian to J.H. Vivian of 4 Aug. 1832, almost illegible, suggests the possibility of Grenfell and Sons, through its participation in the ownership of the Cobre mines, controlling the Cuban ores and thus having an advantage over the rest of the smelters. See A 1185, Vivian Papers, NLW.

¹⁷ See Grenfell Ledgers, B31, University College of Swansea and 'Copper ore for Sale', fortnightly reports in *The Cambrian* for these years.

¹⁸ Miners to Consul Clarke, Cuba Prison, 22 April 1843 and Clarke to Aberdeen, Santiago 13 Aug. 1843 in FO 72/634, Public Record Office, London (hereafter PRO).

¹⁹ 'Copper Ore for Sale', *The Cambrian*, 1839-52, passim. See also Intendente Malgarejo to the Chilean Minister of the Exchequer, 12 Oct. 1844, vol. 207, Archivo del Ministerio de Hacienda, Archivo Nacional de Chile, Santiago de Chile, which indicates that by May 1844, Williams Foster and Co. in association with Vivian and Sons were asking the Chilean Government to establish a warehouse and to build a pier in the north of Chile to ship copper ores, presumably to Swansea.

²⁰ Articles of Agreement, 20 June 1835 and 10 Aug. 1835. 126 and 127, Nevill Records, NLW.

²¹ R.J. Nevill to Joshua Vivian, 7 Sep. 1837, VIII, Nevill Records, NLW.

²² R.J. Nevill to Henry Bath Jr., 18 March 1840, see also same to J. Bibby and Co., 29 April 1840, VIII, Nevill Records, NLW.

²³ Company meetings reported in *MJ* 4 Nov. 1837, 22 Jan. 1842 and 17 Jan. 1846.

Although the connection established between the major smelting companies and mining companies and commercialization of foreign ores proves very little, this relationship, plus information on sales at public ticketings and copper ore imports and data for later periods, strongly suggest that these companies took advantage of these concessions to obtain cheaper and larger supplies of copper. During this period only 114,382 tons or 67.7% of the total amount of copper ores imported into Britain were sold in the Swansea ticketings and the rest, 54,553 tons, of which over 10,000 were imported from Cuba,²⁴ were sold by private contract. The latter system gave more scope to unfairly restricting the range of purchasers or, as in the 1835 Llanelly contract, by giving first option to buy to the company involved in the case of equal bids.²⁵

b) The Period 1840-1847

During these years the copper trade in Great Britain was severely disrupted by the entrance of an important new company into the smelting business. Prior to 1840 only a short-lived association of smelters operated during 1824-29. From 1829 until 1840 informal associations of two or more smelters influenced copper ore prices²⁶ and managed to maintain a substantial difference between the price of the copper ore and that of refined copper and therefore to obtain substantial profits. By 1840 this difference had reached a peak (see Table 2) and the Cornish miners bitterly complained of the fall in ore prices despite the increase in the price of smelted copper.²⁷ The Santiago and Cobre companies joined in the protests since they were equally affected, and they started to consider and / or to put into practice measures to improve their ore prices. Among these measures were the possibility of smelting their own ores, sending ores for sale to Liverpool instead of Swansea and negotiating

²⁴ Calculated from data from 'Sales at Swansea, from Foreign Mines' in the *Memoirs of the Geological Survey of Great Britain and of the Museum of Practical Geology*, (London). Vol 2, part 2, p. 717 for Swansea ticketings and 'Copper' in *PP*, several years for total imports.

²⁵ In the late 1840's the directors of the South Australian Mining Association, owners of the Burra-Burra Mines, were highly suspicious of sales of their ores other than in the Swansea ticketings by their agents. They thought that selling at the Swansea ticketings was the only means of stimulating competition for the ores considering the monopoly of the smelters. See M. DAVIES *The South Australian Mining Association and the Marketing of Copper and Copper Ores, 1845-1877*. M.A. Diss., University of Adelaide, 1977, pp. 62-65. During the 1830's Vivian and Sons seem to have been the largest purchaser of ores by private contract. See R. HUNT, *British Mining*, London 1884, p.895.

²⁶ TOOMEY, *op. cit.*, pp. 320-31.

²⁷ See for instance Editorial, *MJ* 7 Dec. 1839. British miners blamed the large imports of foreign ores for the low prices of copper ores.

with the smelters the right of the ore sellers to withdraw their ores from the ticketings if no reasonable price was offered.²⁸ In this heated atmosphere, inimical to the smelters, a call was made for the formation of a new copper smelting company noting 'more than a fair difference between the price of cake copper and the cost of ores'.²⁹ Soon the promoters of the company were making overtures to the Santiago and Cobre companies, which were received with much interest.³⁰ These overtures however did not prosper. It seems that intervention of the smelters, especially the Grenfells and the Llanelly Company, were decisive in this and that a common solution for the interests of the smelters and the importing companies was found in the petition to the Government for cancelling the bonds for imported copper ore, duty free, with manufactured copper as well as smelted copper.³¹

Despite this shortcoming the new company 'The Governor and Company of Copper Mines in England' (or English Copper Company), was formed in 1841 with a nominal capital of £ 1 million. It took over and expanded a variety of copper and other metal works and collieries and produced during its first year of activities, 1841-42, 1,800 tons of refined copper. The output of the company rapidly increased and in the year ending 13 April 1844 it had reached 4,000 tons.³² As can be seen by comparing this figure with the total for Great Britain shown in Table 3, this constituted a substantial share of British copper production (13.6%) and made them the third largest copper smelter in the country.³³ Up to mid-1844 the English Company smelted on com-

²⁸ Santiago and Cobre Companies' meetings reported in *MJ* 4 Feb. 1840, 11 July 1840 and 1 Aug. 1840.

²⁹ *The Cambrian*, 15 Feb. 1840.

³⁰ *MJ* 16 Feb. 1841.

³¹ On 4 October 1841 R.J. Nevill, partner in the Llanelly Co., wrote to J.H. Vivian that it was necessary for the smelting companies to assist the importers of ores and consumers of the metal with information and advice to negotiate with the Board of Trade 'At present it appears to me that we ought to do so for the copper trade of the Kingdom is really in our hands. Neither the importer of ore, the British miner or the consumer of the metal having the means or occasion of knowing as intimately as we do and as it must be for our interest that it should remain so I cannot but esteem it dangerous to allow the parties who ultimately tho' not exclusively suffer by the present state of things to get together without our intervention for to me it seems but too probable if they are allowed to act in this affair independently of us they will discuss other objects besides the immediate ones and such as may seriously compromise the interests of our establishment'. (VIII, Nevill Records, NLW).

In fact this 'information and advice' had already been provided to the importers of Cuban ores by January 1841 by R.J. Nevill and probably C.P. Grenfell. See R.J. Nevill to C.P. Grenfell, 12 Jan. 1841 and 20 Jan. 1841. VIII, Nevill Records, NLW.

³² R.O. ROBERTS, 'The Bank of England, the Company of Copper Miners, and the Cwamavon works, 1847-52' in *Welsh History Review* vol. 4, 1968-9, pp. 222-4; Company meetings reported in *The Swansea Journal* 3 May 1843 and 17 April 1844.

³³ According to the Smelters Association the production of the two years ending

mission and paid generously for ores waging a 'war to the knife' with the old established smelters.³⁴ The result was a deterioration of the prices of copper while at the same time ores retained their value, thus provoking a fall in the margin available to the smelters and their profits. The situation was so serious that most of the copper smelters opted for reducing their workers' wages in August 1843 by between 7% and 25%,³⁵ diversification into other branches of the metal trade³⁶ and some firms decided to cut down their purchases of ores.³⁷ However, the real solution for the smelters came via an agreement to establish a formal and comprehensive association of copper smelters in June 1844. By then the English Co. had suffered substantial losses and had changed its views in relation to the smelters' monopoly.³⁸ For the rest of the smelting companies the loss of profits must have acted as a powerful incentive to the formation of the association and Llanelly Company for one took active steps in its formation.³⁹

The Smelting Association was based on the strict allocation of quota purchases according to the average of purchases by each company in the two previous years. It originally consisted of seven out of the ten British smelting firms including all major ones.⁴⁰ The three companies excluded from the association were Ravenhead Co., admitted soon after 1844 with a quota of 950

in June 1844 was: Williams Foster and Co. 26.45% of the total British production, Vivian and Sons 21.5%, English Co. 14%, Grenfell and Sons 13.6%, the Llanelly Co. 11.75%, Freemans and Co. 8.7% and Mines Royal 4%. See TOOMEY, *op. cit.*, p. 332.

³⁴ 'The Copper Trade', article by J.P. Budd in *The Cambrian* 29 Dec. 1848. It is interesting to note that several of the original members of the English Co. had interests in copper and tin mines in Cornwall. See R.O. ROBERTS 'Bank of England...' *op. cit.*, p.223.

³⁵ This was followed by an unsuccessful strike which was almost welcomed by some of the smelters. See *The Cambrian* 5 Aug. 1843 and 9 Sept. 1843.

³⁶ Thus Vivian and Sons took up the manufacture of yellow metal, an alloy of copper and zinc in 1842, Williams, Foster and Co. also entered that branch of business by 20 Sept. 1843 and the Llanelly Company began to make the first experiments to separate silver from copper sometime in 1843. See TOOMEY, *op. cit.*, p. 17 and Meetings and accounts of the Llanelly Company, 20 Sept. 1843 and 20 Sept. 1844, XLVIII, Nevill Records, NLW.

³⁷ The Llanelly Co. decided to reduce stocks of copper ore on 17 March 1842. The Vivians decided to drastically cut down their ore purchases by 250 tons a week on 17 April 1844. See meetings and accounts of the Llanelly Com., 17 March 1842, XLVIII, Nevill Records, NLW and J.H. Vivian to H.H. Vivian 17 April 1844 and 18 April 1844, C. 5, Vivian Papers, NLW.

³⁸ See 'The Copper Trade' *op. cit.* Between 1841-48 the English Co. made losses of £ 350,000. See R.O. ROBERTS 'Bank of England...', *op. cit.*, p. 224.

³⁹ In 1846 the Llanelly Co. resolved to grant a gratuity of £ 300 to Alexander Druce, one of its partners 'in respect to his services in the formation and conduct of the Copper Association'. See 'Meetings and Accounts...' XLVIII, Nevill Records, NLW.

⁴⁰ See note 33 above.

tons of fine copper p.a. (3.65%), Newton Keates and Co., admitted in October 1846 with a quota of 800 tons p.a. (3%) and the small Anglesea firm Amlwch, probably admitted in 1846.⁴¹ From mid-1844 up until 1847, the Associated Smelters had very successful results in the internal market, managing to reduce the prices of ores and at the same time, due to increasing demand, to raise the price of copper (see Table 2). In a wider perspective however, the very success of the smelters created new challenges to their hegemony in the world market. As we have seen elsewhere,^{41bis} the low prices of copper ores in Swansea, together with the British duties, stimulated a process of reindustrialization of the copper business in Chile, smelting in other industrialized countries and a loss of markets for British smelted copper. The counterpart of this process was a decreasing supply of copper ores to Great Britain from the mid-1840's onwards (see Table 3) and even shortages of copper to supply the British manufacturers.⁴² The smelters' success also created interest among mining and other entrepreneurs to enter the smelting business in Britain.

c) *The Period 1847-1860*

During this period the number of copper smelting companies in Great Britain grew from ten at the beginning of 1847 to seventeen in mid-1861⁴³ while two others, founded during this period, failed to remain in business after around 1856 (the Low's Patent Co., and the Spitty Copper Co.). The challenge to the monopoly of the Associated Smelters started in 1847 with the operations of the Spitty Copper Co. and Mason and Elkington and continued through the early 1850's with the operations of the Low's Patent Co. (1848), F. Bankarts (1849), C. Lambert and Son (1852) and Sweetland Tuttle and Co. (1853). Another company, similar in its aims to the English Co., was planned and provisionally registered in 1848 by a group of people connected with mining in Cornwall,⁴⁴ but it was never formed.⁴⁵ Although none of the-

⁴¹ R.J. Nevill to Messrs Vivian and Sons 4 Feb. 1847 and same to Michael Williams 4 Feb. 1847, IX, Nevill Records, NLW.

^{41bis} VALENZUELA, op. cit.

⁴² R.J. Nevill to Messrs Vivian and Sons 4 Feb. 1847 and same to Michael Williams 4 Feb. 1847, IX, Nevill Records, NLW.

⁴³ The number of firms in 1861 is taken from the list in J. PERCY, op.cit., p. 307. For intermediate periods we have used the data collected in R.O. ROBERTS, 'Smelting...' op. cit., pp. 86-91 for Glamorgan; COL. GRANT-FRANCIS, *The Smelting of Copper in the Swansea District of South Wales*, (London 1881), pp. 100-41, passim for South Wales; T.C. BARKER and J.R. HARRIS, op. cit., pp. 240-5, 346-8 for St Helens and Liverpool; and the list of firms purchasing copper ore in Britain published in *MSUK*, 1853-60. Unless otherwise stated these are the sources for these paragraphs.

⁴⁴ *MJ* 8 July 1848, *The Cambrian* 1 Dec. 1848 and 'Provisional Registration' of the British Smelting Association in BT 41/103, company number 580, PRO.

⁴⁵ Probably because of the increase of the price of Cornish ores in the years 1848-50. See *MJ* 29 Jan. 1853.

Table 2
ANNUAL AVERAGE PRICES OF TOUGH COPPER
IN LONDON, AND OF COPPER ORE IN THE SWANSEA
TICKETINGS 1837-1864. (per ton in £) *

	(1) Average price of tough copper	(2) Average price of copper ores (per ton of fine copper)	(3) Difference (1) - (2)	(4) Difference (1) - (2) in- cluding the Smelters' surplus **
1837	91.40	85.60	5.80	13.11
1838	91.54	81.49	10.05	17.37
1839	92.69	81.96	10.73	18.15
1840	94.91	79.54	15.37	22.96
1841	98.63	84.67	13.96	21.85
1842	91.02	86.17	4.85	12.13
1843	82.42	81.64	0.78	7.37
1844	84.48	79.46	5.02	11.77
1845	87.04	73.44	13.60	20.56
1846	91.40	76.51	14.89	22.20
1847	96.49	76.34	20.15	27.86
1848	85.11	72.84	12.27	19.08
1849	83.26	67.06	16.20	22.86
1850	84.88	75.67	9.21	16.00
1851	85.01	79.91	5.10	11.90
1852	96.34	92.38	3.96	11.66
1853	116.31	104.81	11.49	20.80
1854	126.00	110.39	15.61	25.69
1855	126.00	110.44	15.56	25.64
1856	117.96	102.92	15.04	24.47
1857	123.86	109.15	14.71	24.61
1858	108.07	95.76	12.31	20.94
1859	109.19	97.14	12.05	20.78
1860	106.69	95.19	11.50	20.03
1861	99.60	91.18	8.42	13.38
1862	97.95	86.16	11.79	19.62
1863	93.51	81.89	11.62	19.10
1864	101.30	87.41	13.89	21.69

* Sources: Column (1) has been calculated from 'London Market', weekly prices published in *MJ* for 1837-1859 and from *Mineral Statistics of the United Kingdom* (hereafter *MSUK*) for 1860-64. Col (2) has been calculated from the data contained in *MJ* 29 Jan. 1853 for the period 1837-51; for 1852 from 'Swansea Ticketings', fortnightly information published in *MJ* and for 1853-1864 from *MSUK* for those years.

** Throughout our period the smelters were able to obtain more copper from the ore than that stated in the official assays and this difference was called surplus. This difference was due to two factors, a) to the inaccuracy of the Cornish assay used in Britain which underestimated the copper content of the ores by more than 1.5 per centiles of its real copper content, that is ore containing 10% copper was estimated to contain only 8.5% (see BROWN and TURNBULL, op. cit., part 2, p. 71); and b) several allowances to the smelters which increased the amount of ore delivered to the smelters by 9% (John PERCY, op. cit., p. 307 and R.J. Nevill to J. Treweek, 5 Jan. 1839, viii, Nevill Records, NLW). The surplus obtained by the smelters varied between 5% for the rich Chilean copper ore to 15% for the poor Cornish ores of 7-8% produce (A.P. Vivian's business notebook, D/DGB 1A, Vivian Collection, West Glamorgan Area Record Office, Swansea). As the annual average of the produce of the ores sold in Swansea during these years was between 13% and 18.5% (see note 60) we have conservatively estimated the surplus at 8% for each year. To obtain the values in column (4) we have multiplied the values in column (1) by 1.08 so as to obtain the estimated price at which the real amount of copper contained in a ton of copper in the shape of ore, as defined by the smelters (viz, including the surplus), was paid. Finally, from these values we have deducted the price paid for the ores (column (2)).

Table 3
 COPPER ORE AND REGULUS SOLD IN GREAT BRITAIN
 THROUGH PUBLIC TICKETINGS AND PRIVATE
 CONTRACTS, 1831-1860 (in tons of fine copper) *

	(1) Sold at the Cornish ticketings	(2) Sold at the Swansea ticketings	(3) Sold by Private Contract	(4) Total	(5) Estimated total in- cluding the surplus
1831-35	58,677	8,061	2,006	68,744	78,351
1836	11,647	3,849	535	16,031	17,929
1837	10,823	3,960	720	15,503	17,491
1838	11,527	5,906	662	18,095	20,349
1839	12,450	7,296	1,478	21,224	23,793
1840	11,037	8,473	2,643	22,153	24,698
1841	9,987	10,289	2,192	22,468	24,965
1842	9,896	9,378	3,471	22,745	25,257
1843	10,926	9,862	3,739	24,527	27,254
1844	11,246	11,107	4,108	26,361	29,365
1845	12,883	10,348	4,099	27,330	30,418
1846	11,850	9,788	3,902	25,540	28,413
1847	11,966	8,856	1,953	22,775	25,435
1848	12,869	8,644	1,577	23,090	25,838
1850	11,824	7,258	4,506	23,588	26,303
1851	12,199	6,162	4,001	22,362	25,005
1852	11,706	4,862	3,833	20,365	22,813
1853	11,839	4,559	5,861	22,259	24,868
1854	11,779	4,693	5,425	21,897	24,473
1855	12,242	5,962	7,238	25,406	28,295
1856	13,274	6,106	7,476	26,856	29,934
1857	13,088	5,266	10,673	29,029	32,265
1858	11,764	5,229	14,562	31,555	34,903
1859	11,888	5,697	15,189	32,774	36,228
1860	17,769	5,963	11,930	29,662	32,859

* Sources: For columns (1) and (3) ROBERT HUNT, *British Mining A Treatise on the History... and Future Prospects of Metaliferous Mines in the United Kingdom... With... Illustrations*, London 1884, pp. 892 and 895. For column (3) see *MJ*, 29 Jan. 1853 for years 1831-51 and *MSUK*, several years for 1853-60. Data for 1852 have been calculated from the weekly reports on ticketings published by *MJ*. Column (4) has been estimated by assuming a surplus of 15% in the case of ores sold in the Cornish ticketings and 8% for ores sold in the Swansea ticketings and by private contract (see note to table 2).

se companies had an impact on the British copper market comparable to the English Company's in the early 1840's, combined they had a sizable share of the copper ore market by the mid-1850's.⁴⁶ Moreover at different times du-

⁴⁶ In 1855 for instance Mason, Bankarts, Lambert and the Spitty Co. bought 13.8% of the total sold in the UK. See *MSUK* for that year.

ring the 1850's, members of the Association refused its terms and acted separately, although the Association seems always to have purchased over 70% of the copper ores sold in Britain. For instance in 1856, when the Grenfells were outside the association, the latter still purchased 71%.⁴⁷

The new smelters, acting independently of the Association, pushed up the price of copper ore through their demand and reduced the difference between the prices of copper and copper ore. In 1850, Captain Reynolds of the Cobre Company, noting the decrease of this difference to a third of the 1848 levels, asserted 'there is little doubt that the establishment of Mr. Bankart's works, and some others has had great influence in placing the comparative prices of the ores and metal on this fairer footing'.⁴⁸ The same company in 1853 withheld part of its ores from the market and smelted them on commission in the Bankart's works due to the disadvantageousness of the price of ores.⁴⁹ Other newcomers had similar arrangements with mining companies (for instance the Low's Patent Co.)⁵⁰ or had their own source of foreign ore, as in the case of Lambert and Son and the Spitty Copper Co.⁵¹

The effects of the competition exerted by the new smelters can be gauged by looking at table 2. From 1850 the prices of copper ore increased substantially and for the rest of the decade remained at levels well above the average of the previous decade (£ 77.6 per ton of fine copper) and especially above the average of the period 1845-1849 (£ 73.23). The difference between the price of metal and ore was very low at the beginning of the decade and only increased substantially in the mid-1850's when the price of copper was very high and therefore did not seriously affect the copper ore sellers. For the smelters the early 1850's must have been relatively difficult times, although not as bad as the early 1840's when the English Co. disrupted the trade. However, they were quickly compensated by the high prices of copper which ruled from the mid-1850's onwards and by the large increase in the foreign ore available from 1853 (see table 5). This assumption is borne out by the data presented in table 4, which shows the profit of one of the four major smelting companies. This table also suggests that the high profits of the smelters in the late 1840's stimulated an influx of newcomers into the trade.

The attitude of the Smelters' Association to the intruders was not welcoming and they used a number of tactics to try to prevent their participation in the trade, or at least to make them and other independent smelters follow their lead. Firstly the association prevented the purchase of idle copper works by new smelters. In 1851 it acquired the Forest works and paid a sleeping

⁴⁷ See list of independent smelters in *MJ* 29 Nov. 1856 and *MSUK* for 1856.

⁴⁸ Minutes of the Cobre Co. meeting in *MJ* 20 July 1850.

⁴⁹ *MJ* 26 Jan. 1856.

⁵⁰ *MJ* 22 Nov. 1850, 6 Dec. 1856 and 17 Jan 1857.

⁵¹ For Lambert and Son see VALENZUELA, op. cit., for the Spitty Co. see E. BUDD to Vivian, 28 Nov. 1851, A129a, Vivian Papers, NLW.

Table 4
CAPITAL AND PROFITS OF THE LLANELLY COPPER
COMPANY 1839-63 (in £ sterling)*

Capital (000's L)	Gross profits of the copper trade	As % of the total gross profits	Interest on capital (%)	Divided profits as % of capital	
1839	163	16,599	67.4	5	4.4
1840	150	27,633	80.8	5	10.0
1841	150	35,603	87.3	5	10.0
1842	140	15,750	85.2	5	0.0
1843	140	13,594	77.8	5	0.0
1844	145	15,179	65.4	5	0.0
1845	145	34,950	75.3	5	0.0
1846	159	37,605	70.1	5	10.0
1847	171	49,518	81.1	5	20.0
1848	181	45,978	81.4	5	15.0
1849	185	41,234	71.2	5	10.0
1850	191	30,336	70.4	5	7.5
1851	195	23,253	60.1	(5)	(8.4)
1852	201	23,227	57.0	(5)	(9.0)
1853	202	20,267	42.1	(5)	(12.6)
1854	222	25,349	50.9	(5)	(11.8)
1855	232	40,812	63.1	(5)	(17.4)
1856	241	32,223	87.1	(5)	(4.3)
1857	245	21,481	47.6	(5)	(8.3)
1858	248	31,743	64.3	(5)	(9.8)
1859	254	21,337	50.3	(5)	(6.7)
1860	258	31,715	77.8	(5)	(5.9)
1861	259	21,603	56.1	5	5.0
1862	264	15,198	39.5	5	5.0
1863	311	32,695	52.9	4.8	6.4

* Years ended 30th June.

Source: Reports of meetings and accounts of the Llanelly Copper Company, XLVIII, Nevill Records, NLW for 1837-50 and in West Glamorgan Area Record Office, Swansea, D/D xav1 for 1861-72, which also contains the information for 1851-60 presented here. For the latter period we have estimated the divided profits by deducting £ 12,600 (the expenditure for 1861) from the total gross profits of each year. That sum has been divided by the capital of the company in each year and multiplied by 100 to obtain the net returns of the firm as a percentage of the capital. That percentage has been divided into 5% of interest on capital as was the custom in the firm and the rest as estimated divided profits.

rent of £ 1,500 p.a. to stop Charles Lambert intruding into the British smelting business⁵² forcing him to build new works in Port Tennant instead. Similarly in 1857 the Spitty copper works were bought by Vivian and Sons and

⁵² *MJ* 22 May 1852 and 1 Sept. 1859.

Table 5
COPPER ORE AND REGULUS IMPORTED INTO
THE UNITED KINGDOM,
1830-1860 (in tons) *

	From Chile	From Cuba	From Australia	From other Sources	Total
1831-34	2,608	4,616	—	12,363	19,587
1835-39	42,682	39,125	—	26,804	108,611
1840	10,819	26,288	—	4,843	41,950
1841	10,886	32,659	—	5,052	48,597
1842	12,643	32,270	—	6,229	49,856
1843	19,829	31,683	42	4,166	55,720
1844	19,566	34,764	134	3,941	58,405
1845	10,823	41,341	1,109	3,424	51,697
1846	13,565	31,766	4,022	2,270	51,623
1847	9,222	23,835	6,267	2,166	41,490
1848	4,628	30,679	12,016	2,854	50,177
1849	4,030	24,765	16,697	1,941	47,433
1850	5,563	25,231	7,927	7,443	46,161
1851	8,051	20,825	7,019	6,231	42,126
1852	9,254	17,661	9,913	6,215	43,043
1853	17,535	14,606	3,402	14,850	50,393
1854	19,937	21,433	669	15,252	57,291
1855	18,885	22,425	893	24,396	66,599
1856	33,226	19,836	8,430	21,310	82,802
1857	39,495	16,352	8,307	30,940	95,094
1858	48,329	14,728	8,833	25,209	97,099
1859	32,499	16,405	7,556	28,095	84,555
1860	48,000	16,605	8,545	24,167	97,317

* Source: 'Copper' in *PP* Several years. Copper regulus only started to be recorded separately in this source in 1848. From 1848 to 1860 Great Britain imported 121,486 tons of regulus of which 100,444 tons came from Chile and 8,861 tons from Australia.

Williams, Foster and Co. and its furnaces were destroyed, apparently to stop its purchase by the Devon Consols Co., a large copper ore producer.⁵³ Secondly it seems that the Associated Smelters commanded some degree of power in the Cornish ticketings to prevent, albeit temporarily, newcomers purchasing copper ore. For instance difficulties were experienced in attempting to enter this market by Mason and Elkington, Bankarts and Lambert in the early 1850's and by the Neath Copper Co. in 1862.⁵⁴ Furthermore, once accepted as bidders in these ticketings, the manipulation of prices by the Associated Smelters made it very difficult for the newcomers to obtain Cornish ores

⁵³ *MJ* 28 Jan 1858, p. 28 and 1 Jan 1859, GRANT-FRANCIS, *op. cit.* p. 136.

⁵⁴ *MJ* 27 Dec. 1851. *The Cambrian*, 8 Aug. 1862, also *MJ* 6 Aug. 1853, p. 476.

Table 6
 PERFORMANCE OF THE BRITISH COPPER
 MINING COMPANIES OPERATING IN CUBA.
 CAPITAL, DIVIDENDS AND IMPACT OF THE
 BRITISH COPPER DUTIES AND MONOPOLY PRICES
 ON THEIR PROFITS 1839-1847

	Santiago Company (Paid Capital £ 70,000)			Cobre Company (Paid Capital £ 480,000)		
	(1)	(2)	(3)	(1)	(2)	(3)
1839	25.0	—	—	10.0	—	—
1840	42.0	—	—	7.5	—	—
1841	45.0	—	—	25.0	—	—
1842	92.3	na	na	10.0	na	na
1843	26.8	11.0	2.9	2.5	2.9	0.8
1844	50.5	9.9	6.5	5.0	3.7	2.4
1845	15.0	8.7	17.3	2.5	3.7	7.2
1846	0.0	4.6	6.8	2.5	2.0	3.1
1847	na	1.1	1.5	0.0	2.3	3.3

(1) Dividends as a % of paid capital.

(2) Estimated duty paid each year as a % of the paid capital.

(3) Money lost to the company due to the fall in prices from the average 1835-1841 (£82 19s. 0d. per ton of copper in the ore) as a % of the paid capital.

* Sources: Column (1) calculated from *MJ*, 13 Oct. 1849 for the Cobre Co. and from the company's half yearly meetings reported in *MJ* for the Santiago Co. Column (2) estimated by comparing the total amount of ore sold at the Swansea ticketings by each company with the total copper ore imported into the United Kingdom in each year. The proportion thus obtained has been assumed to apply equally to the amount charged for the Cuban ores in payment of the copper duty. The sums thus obtained have then been divided by the capital and multiplied by 100. Column (3) has been obtained by multiplying the number of tons of ore sold by each company in each year by the average copper content of the Cuban ores imported into the UK. The estimated fine copper sold by each company in each year has then been multiplied by the difference between the average price of fine copper in the years 1835-41 and the actual price in each year. The sum thus obtained has been divided by the capital of each company and multiplied by 100. See 'Quantities of copper ore imported in the year... and charged with the duty' in *P.P.* several years. And *Memoirs of the Geological Survey of Great Britain...* op. cit. vol. 2, part 2, p. 717.

which they needed to mix with foreign ores.⁵⁵ Thirdly, the Association effectively controlled the price of smelted copper in Great Britain until the late 1850's and independent smelters were compelled to follow their lead for fear of reprisals in the form of dumping practices. This control over prices permitted the Association to buy foreign copper at low prices and to sell that

⁵⁵ Letter of Charles Low (of Low's Patent Co.) to *MJ* 1 Jan. 1859 and *MJ* 1 Jan. 1859, p.2. On 28 Nov. 1851 E. Budd of Vivian and Sons gave as one reason to advance the price of copper ore by the Associated Smelters '... the encroachments.. of Mason and Elkington... (in the Cornish ticketings and).. the circumstance that Bankart enters that market next week and the strong disposition evinced by all the outside houses to increase the proportion of their purchases in Cornwall...' E. Budd to J.H. Vivian, A129sa, Vivian Papers, NLW.

copper, or their own copper, at higher prices.⁵⁶ Finally during this period the Association had arranged contracts with furnace stuff importers for the exclusive supply of the Association. Thus by 1850 the Association had contracted with the Gibbs House for the purchase of at least 3,000 tons of fine copper p.a. in furnace stuff from Chilean sources and this contract provided Britain with c.14% of its total supplies during the period 1853-60.⁵⁷ Similarly in 1851 the Association was negotiating with Mr Schneider of the Spitty Copper works for the purchase of all the Burra-Burra ore not smelted by them in Australia.⁵⁸

The previous analysis shows that the monopoly practices of the Associated Smelters had an important impact on their level of profits as well as on the foreign copper ore supplies. The ups and downs of the smelters' monopoly can be best examined by looking at the difference between the price of smelted (tough) copper and the price of copper ore per ton of metal (table 2) in order to establish that which, a) permitted the smelters to cover the smelting costs and b) that which permitted 'normal profits'; that is profits within the branch which were not affected by monopolistic practices or by hard competition.

The cost of smelting was estimated by Le Play in 1848 at £ 15 per ton of copper when using 10% copper ore and £ 5.85 when using ore of 22.1% copper content.⁵⁹ As the annual average produce of the ores sold at Swansea varied between 13% and 18.5% during our period,⁶⁰ and the smelting costs increased proportionally according to that quantity of ore necessary to obtain a ton of copper, the average smelting costs for these ores must have been in the order of £10 to £11 per ton of metal produced. In table 2, col. 4 we have calculated the differences between the price of tough copper and the real price of copper ore, that is including the surplus. Only in one year (1843) was the difference in prices under £11 and this certainly produced losses for the smelter, while in the years 1842, 1844 and 1851 the difference was between £11 and £13. This was probably unprofitable for the smelters since transport, commission, etc. are not considered in our estimate. On the other hand the difference in prices for the years 1840-41, 1845-49 and 1853-60 must have produced considerable profits for the smelters and this is confirmed by table 4 and other data.⁶¹

⁵⁶ *MJ* 16 July 1853, 13 July 1857 and 13 Dec. 1857. On 7 Aug. 1852 E. Budd wrote to J.H. Vivian 'the delay in the arrival of our Russian cargo of smelted copper is unaccountable and very inconvenient. The moment they arrive you shall have the copper raised.' A 1304a, Vivian Papers, NLW. see also TOOMEY, op. cit., p. 336.

⁵⁷ See VALENZUELA, op. cit.

⁵⁸ E. Budd to J.H. Vivian a 129sa, Vivian Papers, NLW.

⁵⁹ M.F. LE PLAY, *Description des procédés métallurgiques employés dans le pays de Galles pour la fabrication du cuivre...* (Paris 1848), pp. 369-421.

⁶⁰ See *MJ* 29 Jan. 1853 for the years 1840-51 and *MSUK* for the years 1853-60.

⁶¹ E 19, Vivian Papers, LNW and TOOMEY, op. cit., p. 219.

Establishing the 'normal' difference in the price of tough copper and copper ore, that is the price which produced 'normal' profits for the smelters, is a much more complex task, since figures for rates of profits for the copper trade as well as for other trades for this period are scarce. Toomey has overcome this problem by considering the years 1856-1862 as a period of 'normal profits', noting that this period was one of stability of the trade with the number of firms operating in the smelting business remaining constant.⁶² The average difference in the prices of tough and copper ore was £12.26 during these years (table 2, col. 3) and if this 'normal' difference is compared with the differences in each year, the impact of monopoly agreements and the competition exerted by the English Co., initially, and, later, by other independent smelters will become clear. During the years 1842-44 the average difference fell to £3.55, that is well below the 'normal' difference, and, if the surplus is considered, it fell to just around the smelting costs (£10.09). The formation of the Smelters Association in June 1844 created a very favourable situation for the smelters and in the period 1845-49 the difference in the prices of tough copper and ore was £15.42 on average, or over £3 above the 'normal' difference. The intrusion of newcomers into the trade and the competition thus generated reduced this difference in the early 1850's. Finally the high prices of smelted copper during the mid-1850's produced general prosperity for the trade, which permitted the smelters to pay good prices for ore but also meant that they obtained a substantial difference between the price of tough copper and ore.

2. The British Copper Duties

a) The 1842 duties

British duties on foreign copper in all its forms were extremely high up to 1848. From 1812 to 1842 foreign copper ores were charged duties between £12 and £21 per ton at different times, but foreign ores imported in bond, that is to be re-exported after smelting, attracted no duties from 1828. From 9 July 1842 to 1848 the duty on foreign copper ore was reduced to £3 3s. 0d. per ton of fine copper for ores of 15% or less copper content, £4 14s. 6d per ton for fine copper ore of more than 15% but less than 20%, and £6 6s. 0d for those with more than 20% pure copper. At the same time the exemption from duties of those ores to be smelted in bond was revoked. In 1848 this duty was reduced to 1s. per ton of ore whatever its quality and it was totally abolished in 1853. Until 1842 unwrought copper attracted import duties ranging from £27 to £43 per ton. They were reduced to £10.5 in 1842 and 2s.

⁶² TOOMEY, *op. cit.*, p. 69. It is necessary to note that the period 1856-62 was still marked by the leadership of the Associated Smelters.

6d. in 1848. Finally, partly wrought copper attracted duty of between £35 and £75.6 per ton which was reduced to £10 5s. 0d. in 1842 and to 2s. 6d. in 1848.⁶³

Thus until 1842 the fiscal policy on copper was to protect the British market from foreign competition to the almost total exclusion of foreign copper,⁶⁴ but to leave the ore market open as long as the copper smelted from it was re-exported. The reforms introduced in 1842 began to open the British copper market to foreign competition; this was finally achieved in 1848 with the reduction of duties to nominal levels for all types of copper. Here we will analyse the genesis of these changes, the different interests affected by them (namely British owners of foreign and British copper mines, the copper smelters and the copper manufacturers), and the struggles fought by these sectors through the press, lobbying the government and in Parliament, in the context of the concrete results of these measures and the general policies of the state at the time.

An Act of Parliament of 1828 allowed the introduction of foreign ores to be smelted in bond duty-free. This was, from very early on, unpopular with the Cornish miners who supplied the vast majority of the copper ore sold in Britain (see Table 3). Already in 1830 a delegation of Cornish miners asked the Government for a total prohibition on the importation of foreign ores. In this they were supported by the Swansea smelters who feared 'that rival smelters at Liverpool, supplied with the rich foreign ores, would ruin them'.⁶⁵ As the foreign copper ore imports increased during the 1830's, the major South Wales smelting firms took advantage of this trade and increased their share of the total copper ore purchased. Mine owners, however, remained dissatisfied and the resentment against foreign ores was particularly strong when the prices of copper ores fell.⁶⁶

In 1840 both British and foreign ores had reached their lowest price in the British market since 1833. This created resentment among both British mines and copper ore importers in view of the increasing price of smelted copper.⁶⁷ While the Cornish miners found at least a temporary solution in the forma-

⁶³ *PP* 1847, LIX, p. 46, 1854-55, L, p. 405; *MJ* 23 Sept. 1848, p. 48.

⁶⁴ The duties on copper ores during the 1830's amounted to 100% of the price of the ores sold in Swansea. In the same period the price of tough copper varied from £ 82 to £ 111 and therefore the duty on this article was well in excess of 20% of its value. (Copper ore prices calculated from *MJ* 29 Jan. 1853, prices of tough copper in *PP*, 1845, XLVI, p. 71 and *MJ* 23 April 1842, p. 133).

⁶⁵ *MJ* 16 Sept. 1848.

⁶⁶ In 1833, for instance, a deputation from Cornwall asked the government, without success, to levy a duty of £ 12 per ton on copper smelted in bond. See *MJ* 7 Oct. 1837 and also *MJ* 23 Sept. 1837 and 31 Aug. 1839.

⁶⁷ For prices of refined copper and copper ores sold in Swansea see table 2. For Cornish ores the average price in 1836-1839 was £78 18s. 9d. (Calculated from the data provided by *MJ* 29 Jan. 1853, p. 59).

tion of the English Co., the major British copper mining companies operating overseas took a different type of action. The Santiago Co. and the Cobre Co., under the influence of the smelters, dismissed the overtures of the English Co. and instead they lobbied the Government to extend the facilities of smelting in bond duty-free to manufacturing in bond (that is to re-export in either form the copper ore imported). This measure would have enlarged the British market for smelted copper obtained from foreign ores and would have benefited all sectors involved in the trade with the exception of the British miners. Copper smelters would have had the possibility of selling more smelted copper in the British market where the price was around 10% higher than in France and Holland. Copper ore importers would have had the possibility of enlarging or maintaining the volume of their imports into Britain and maintaining or increasing the sale price obtained for their ores. Finally British copper manufacturers, which included at least some large copper smelters, would have been able to reduce the difference in the price they paid for smelted copper and that paid in France and Holland, thus becoming more competitive. Only the British miners would have suffered losses via larger imports of foreign copper ore.⁶⁸

By the beginning of 1842, the Government had decided to make changes in relation to copper ore duties, either by allowing copper manufacturers to export in bond, or by the reduction of the import duties.⁶⁹ Soon afterwards the Government chose the second course and included reduced duties for copper ores in the 1842 tariff. The threat of these changes mobilized the 'mining interest of Cornwall' which according to the *Mining Journal* was 'up and stirring'.⁷⁰ In the following months the mining interest held several meetings, sent delegations to lobby the Government and put to work a number of Cornish MPs to defend the interests of the Duchy. They claimed that the increase of foreign copper ore imports damaged mining in Cornwall. Fifty six thousand people were employed in mining compared with no more than 2,500 employed by the copper smelters. They also claimed high costs of pro-

⁶⁸ This view is implicit in the following sources: R.J. Nevill to C.P. Grenfell, 1 Jan 1841, same to Messrs Bibby and Sons, 29 June 1841, VIII, Nevill Records, NLW; meetings of the Cobre and Santiago Companies reported in *MJ* 9 Jan. 1841, 16 Jan. 1841 and 22 Jan. 1842; and *MJ* 7 Dec. 1839.

⁶⁹ Cobre Co. meeting reported in *MJ* 22 Jan. 1842.

⁷⁰ *MJ* 26 March 1842. The 'Mining Interest of Cornwall' included adventurers and others immediately connected with the mining business in Cornwall and the UK. Very closely connected with it were several Cornish MPs. Of these the majority 'were more or less engaged or interested in mining pursuits and many of them were proprietors of mineral lands'. (*MJ* 9 Sept. 1848). Also connected with the mining interest was *The Mining Journal* whose proprietor and editor Mr Henry English had mining interests in Ireland (and Cornwall?). See *MJ* 16 April 1842, p. 124, 11 Jan. 1845. p. 10 and 15 Feb. 1845. p. 52.

duction, £1.2 million p.a. in wages, compared with the low cost of labour employed abroad and 'comprised principally of slaves'; that large investments had been made recently in the Cornish mines, ports and railways for the benefit of copper production, etc.⁷¹ The Government defended its proposals with two main arguments: firstly that the previous legislation (i.e. the import of copper ore in bond) made British copper cheaper for the foreign consumer by around £10 in comparison with its price in Britain and, secondly, that if the duty on foreign copper ore was too high 'it would have the effect of driving the smelting of copper ore to other countries' and putting a check on the arrival of ore in Great Britain.⁷²

The terms of the discussion on copper ore duties varied a great deal from the time the new tariff was announced to the time the new duty was definitely fixed. This was due to the constant pressure on the Government applied by the mining interests of Cornwall and those parties interested in the import of copper ore. The original Government proposal fixed a duty of 5% on the value of the copper ore imported.⁷³ As the average value of the copper contained in the ores at Swansea in 1841 was £84 6s. 7d., the duty amounted to £4 2s. 8d. per ton of fine copper. In the amended tariff printed on the 11 April 1842, the duty stood at £5 per ton of copper contained in those ores with over 14% copper content and £2.10 for those below 14%.⁷⁴ The change in the first rate was urged by the mining interest in view of the fact that the price of (smelted) copper in Britain was around £100.⁷⁵ The change in the second rate was probably due to the exertions of the importers of Cuban ores who had large stocks of poor ores in Cuba.⁷⁶ By the time the House of Commons divided on the question of the copper ore duties, the Government proposal had evolved into a sliding scale with differential duties. These ranged from £1.10, 15%, 20%, 25% and more than 25% copper. This scale was probably proposed to accommodate the views of a variety of interests involved. Thus the mining interest had struggled first to retain the old copper ore duty system⁷⁷ and latter to impose a duty of £8 or £10 per ton of copper contained in *all* ores. They especially resented the importation of poor ores

⁷¹ See, for instance, the resolution of a meeting of adventurers connected with mining interests of Great Britain in *MJ*, 23 April 1842.

⁷² Mr Gladstone in the Commons, 25 May 1842, *Hansard*, vol. LXIII, col. 758.

⁷³ *PP*, 1842, XL, p. 1.

⁷⁴ *PP*, 1842, XL, p. 47. See also *MJ* 16 April 1842.

⁷⁵ *The Cambrian* 23 April 1842.

⁷⁶ *The Mining Journal* (16 April 1842) put the blame on Alderman Thompson, MP, large proprietor in the Santiago Co. However, a letter by R.J. Nevill to J.H. Vivian indicates that the Cobre Co. was the only importing company interested in a lower differential duty for poor ores. (28 May 1842, VIII, Nevill Records, NLW). For stocks of poor ores in Cuba see Cobre Co. meetings reported in *MJ* 22 Jan. 1842 and *MJ* 23 April 1842, p. 132.

⁷⁷ *MJ* 26 March 1842.

which would compete with the Cornish ores which averaged 7% to 8%.⁷⁸ As noted above, the importers of Cuban ores urged a low rate of duty especially for poorer ores. Finally, the smelters wished to have a low duty of no more than £5 per ton of copper and were especially interested in not having a higher duty on the rich ores so as to prevent their smelting abroad.⁷⁹

The final outcome was a differential duty of £3 3s. od., £4 14s. 6d. and £6 6s. per ton of copper contained in ores below 15%, between 15% and 20% and over 20% produce respectively, which was a compromise between the different interests involved. The changes thus attained fitted well with the fiscal policy of Sir Robert Peel and the chairman of the Board of Trade, Mr Gladstone, who started to dismantle the protective system in 1842. Thus the tariff of that year eliminated prohibitions and reduced duties on over 750 dutiable articles. The revenue, of paramount importance for Gladstone,⁸⁰ began to receive a very small but significant contribution from the copper ore duties. Copper revenue jumped from £21,010 in 1840 to £64,445 and £75,201 in 1843 and 1844 respectively although it began to diminish in 1845, reaching only £40,864 in 1847.⁸¹

b) Objective results of the 1842 duty and its reduction.

As can be seen in table 5 the trend of increasing importation of foreign copper ore continued for a few years after the new duty was imposed but started to decrease from 1845, despite the growing importation of Australian ores. It was only in 1848, after the duties had been reduced to a nominal rate, that imports of copper ore started to recover, although they did not reach the 1844 level until the 1850's. Despite the allegations, by interested parties, that the new copper duties were almost the sole cause of this decrease, there were other factors operating which influenced the amount of copper ore imported: a) the price of copper ore in Britain and b) the local conditions experienced by exporters in each country.

During the period in which the new duty was levied the average price of copper ores sold in Swansea fell from £ 86 3s. in 1842 to a minimum of

⁷⁸ *MJ* 2 April 1842, p. 108, 30 April 1842, p. 141, *The Cambrian*, 23 April 1842 and 30 April 1842, p. 4.

⁷⁹ R.J. Nevill to R.H. Vivian 28 May 1842, VIII, Nevill Records, NLW. This view however, was not universally accepted by the smelters. For instance, Michael Williams, senior partner of the largest smelting company, supported the Cornish miners in their demands. See *MJ*, 2 April 1842, pp. 108 and 109.

⁸⁰ J.D. CHAMBERS, *The Workshop of the World. British Economic History from 1820 to 1880*, (Oxford, 1968), pp. 70-3. See also *Dictionary of National Biography*, 'Sir Robert Peel'.

⁸¹ *PP*, 1842, XL, p. 7 and 'Quantities of Copper Ore Imported in the Year... and the Quantities charged with Duty in the same Period...' in *PP*, several years.

£73 8s.10d. in 1845.⁸² As the average price of copper ores during 1835-1841 was £82 19s. the losses for the importers as compared with the average prices of 1835-41 were not significant during 1843 and 1844 (1.5% and 4.2% respectively) but they became serious in 1845 when they reached 11.4%, and they remained high in the following two years (7.8% and 8% respectively). The losses due to the new duty were, on the same basis (i.e. the average price for 1835-41), 7.6%, 5.7% and 3.8% varying according to the richness of an imported ore.⁸³ The losses due to the new duty and to the fall of the price of copper ores were cumulative. Thus, in 1845 the loss suffered by the importers, when compared with the period 1835-41, was between 15.2% and 19% and between 11.6% and 15.6% in the following two years. Thus we can assert that both factors, especially the fall of prices in the Swansea market, had a significant impact on the declining amount of ore available in Great Britain.

Economic factors relevant to the trade differed substantially in the main copper ore exporting countries. In Chile, freight rates became relatively inexpensive during 1843 and 1844, rising above the average 1838-1842 (£4 9s. 0d. per ton) only in 1845.⁸⁴ For ores of 25% fine copper, the most common type exported from Chile at the time, this represented, in 1843 and the first quarters of 1844, a saving of around £3.7 per ton of fine copper as compared with the average 1835-42. This, to a large extent, compensated for the impact of the new duty of £6.6 per ton of fine copper for that type ore. In 1845, however, freight charges were raised to £5 3s. 11d. on average and this, on top of the diminished price of copper ore in Swansea, produced a drastic fall in the price of copper ore in Chile. As we have seen elsewhere^{84bis} this stimulated both a vigorous process of industrialization of the copper business in Chile and an important export of copper ore to countries other than Great Britain; this limited the purchasing capacity of British copper merchants.

Contrary to the case of Chile, where copper miners depended almost exclusively on the British merchants for the export of copper ore, the bulk of the Cuban copper ore was sold in Swansea by the copper mining companies

⁸² See table 2 above for all the data in this paragraph.

⁸³ On average importers paid £5 9s. 4d. per ton of fine copper during the period 1843-1847 or 6.6% of the average price in 1835-1841. See sources in note (81).

⁸⁴ For all this paragraph we have used the data contained in 'Memorandum in Connection with return of Agricultural Produce at Valparaiso, during the quarter..' by the British consul in Vaparaiso, William Rouse in FO 16/39-94, *passim*, PRO. To obtain the average freight charges for each year we have averaged the quotations for freight of copper ore or heavy freight from Valparaiso to Liverpool for the last day of each quarter of that year and the last day of the previous year. The averages were £3 12s. 2d. for 1843 and £4 0s. 5d., £5 3s. 11d., £4 12s. 5d. for the following years. The average for the first nine months of 1844 was £3 13s. 0d. Freight to Swansea were usually £0 5s. 0d. higher but data are not available for the 1830's.

^{84bis} VALENZUELA, *op. cit.*

themselves. As Cobre Co. and the Santiago Co. imported over 85% of the Cuban copper ores sold in Britain between 1839-1847⁸⁵ it is sufficient to analyse the performance of these companies to obtain a clear picture of the effects of the duties on the supply of Cuban ores in Britain. As can be seen in table 6, both companies had an excellent performance in the early 1840's, but from 1845 profits substantially decreased and/or turned into losses.⁸⁶ From 1845 to 1847 the new duties had an important impact on the level of profits, but even more significant to the decrease of the level of profits were the losses relating to the fall in price levels from 1845 onwards. Yet these two factors, important as they were, do not exhaust the explanation of the poor performance of the companies, especially in the case of the Santiago Co. from 1845. Other factors to be considered include the imposition of a 5% export duty *ad valorem* in Cuba from c.1843,⁸⁷ and the long litigation between the two companies for the 'Sanctuary' ground lying between the properties of the companies.⁸⁸ Finally the Santiago Co. seems to have stopped investing by the end of 1846 and did not resume investing until 1849.⁸⁹ This was clearly reflected in the sales at Swansea.

Conditions in Australia during the mid 1840's were particularly suited to the transformation of the colony into a major copper exporter, and to the partial replacement of the decreasing imports of Cuban and Chilean copper ores into Britain. Important discoveries of copper deposits occurred in 1842 (Kapunda mines) and 1845 (Burra Burra mines) and their ores were of a high copper content.⁹⁰ As no successful smelting in the colony occurred until 1848

⁸⁵ In the Swansea ticketings during these years these companies sold 226,469 tons of 21 cwts (of which 166,377 was sold by the Cobre Co.) while the total imported from Cuba in the same period was 271,910 tons of 20 cwts. See *Memoirs of the geological Survey of Great Britain...*, op. cit. p. 717 and 'Copper', *PP*, several years.

⁸⁶ For instance, in the half year ended 31 Aug. 1845 the £ 1,213 losses of the Santiago Co. were covered by a reserve fund. See Santiago Co. meeting reported in *The Cambrian*, 16 Jan. 1846.

⁸⁷ During the half year ended 31 Aug. 1843 the Santiago Co. paid £ 2,791 for 5,700 tons ore sold at Swansea at £49,656 or 5.6% of the value of the ores. Our estimate for the import duty paid on the same quantity of ores is £6,814 or almost two and a half times more. See Company meeting reported in *MJ* 3 Feb. 1844. The Cobre Co. seems to have obtained special concessions in relation to this duty, but figures are not available. See Company meeting reported in *MJ*, 16 July 1842.

⁸⁸ This litigation lasted from 1842 to 1850. An indication of the expenditure involved is that the Santiago Co. put aside a lawsuit reserve fund of £8,000 in 1845. See Santiago Co. meetings reported in *MJ* 16 Sept. 1842, 5 Jan. 1850 and 12 July 1845.

⁸⁹ See Santiago Company meetings reported in *MJ* 9 Feb. 1847, 6 Jan. 1849 and 14 July 1849. In the mines of the Cobre Co. however, investments and arrangements to increase productivity continued during the difficult years, 1845-1847. See Cobre Co. meetings reported in *MJ* 11 Jan. 1845, 26 July 1845, 17 Jan. 1846, 25 July 1846 and 31 July 1847.

⁹⁰ Davies calculated the average produce of the copper ores raised in the Burra-

the only possibility of realizing a profit was to ship the ore to Great Britain.⁹¹ In this the Australian ores had an enormous advantages over the Cuban and Chilean ores. Firstly, as with all colonial copper ores, Australian ores attracted a preferential duty of only £1 1s. 0d. per ton, whatever its copper content.⁹² Secondly, the cost of extraction of copper ore in Burra-Burra mines, which provided almost the totality of Australian copper ore production was very low compared with the price realized by these ores; thus, 'by September 1848 dividends of 800% had been paid to the shareholders'.⁹³ Finally, Australian copper ore had at the time a freight rate cheaper than Chilean ores and a higher copper content than Cuban ores. Thus for the period 1845-1848 copper ore had a freight charge of c. £4 4s. per ton from Port Adelaide to Swansea and around £3 3s. to Liverpool.⁹⁴ This compares favourably with the average freight rate for Chilean ores which was on average for the same period £ 5 7s. 6d. to Liverpool.⁹⁵ Cuban ores had a freight charge of around £3,⁹⁶ but the high copper content of the Australian ores compensated for this.⁹⁷

The dissatisfaction with and the exertions against the new duty started very soon after it was imposed in July 1842. Already in July 1843 Lord Sandon, MP for Liverpool, was asking the President of the Board of Trade, Mr Gladstone, to reduce the duties of behalf of the copper ore importers. Gladstone refused the petition arguing that the inconvenience experienced in the copper ore trade was peculiar to the trade in Liverpool and did not affect the rest of Great Britain.⁹⁸ In this he was only partially correct since, although only the Liverpool merchants had been seriously affected and the South Wales smelters remained uncommitted, the importers of Cuban ores supplying the Swansea market were beginning to feel the effects of the duties and

Burra mines from 1849-1869 as between 22% and 23.9% produce. The Kapunda mines shipped to Britain in 1846-1847 ores yielding fro 20% to 50% produce. See DAVIES, op cit., appendix 21 and A.S. PIGGOT, *The Chemistry and Metallurgy of Copper*, (Philadelphia, 1858), p. 279.

⁹¹ DAVIES, op. cit., pp. 117-25.

⁹² *PP*, 1847, LIX, p. 46.

⁹³ DAVIES, op. cit., pp. 32, 35-6.

⁹⁴ DAVIES, op. cit., Appendix 28.

⁹⁵ Calculated from the source referred to in note (84).

⁹⁶ In 1844 the US Vice Consul at Nuevitas, Cuba estimated the freight charges of ores from (Santiago de) Cuba to Swansea as between £2.10 and £3.0. Other patchy data for this period and the 1850's suggest that freight charges fell within the range £2.10 - 3.15. See *PP* 1847, LIX, p. 75 and also J. PERCY, op. cit., p. 497, *The Shipping and Mercantile Gazette*, 30 Oct. 1855 and 2 March 1858 and *MJ* 16 July 1842, p. 225, col 3.

⁹⁷ In 1847 for instance, the average produce of Cuban ores was 16% while the average for Australian ores was 24.3%. Thus the freight rate per ton of copper contained in the ores becomes £17 5s. 8d. for the Australian ores and £17 3s. 9d. for the Cuban ores. See *PP*, 1847-1848, LVIII, p. 321.

the Santiago Co. for one joined in the petition.⁹⁹ The reasons for the dissatisfaction of the Liverpool merchants went beyond the losses directly produced by the duties. They were heavily engaged in the importation of copper ore and regulus from Valparaiso, Chile¹⁰⁰ and the export of a variety of commodities to Valparaiso which were then distributed to the rest of Chile and other countries in the Pacific. The basis of this trade was the balance between the value of imports and exports. Deficits on the export side were covered by exports of specie, but any serious increase in the export of the latter put a heavy premium on specie and resulted in severe losses for the merchants. This happened in 1843 and 1844 and continued until 1848.¹⁰¹

By the end of 1844 the discontent with the 1842 duty had spread. By this time the copper smelters regarded with apprehension the future of the copper trade in Britain which was threatened by the revival of copper smelting in Chile and by the growth of the latter's exports of smelted copper to markets traditionally supplied by Britain. It was also threatened by the beginnings of the growth of copper smelting in other countries such as the US and France. They therefore sided with the Liverpool merchants and the importers of Cuban ores and promoted the signing by all the parties concerned of a petition addressed to the Lords of the Committee of the Privy Council for Trade

⁹⁸ *The Times*, 11 July 1843. See also H. Walpole, British consul general to Chile to Lord Aberdeen, Santiago de Chile, 14 July 1845. FO16/55, PRO.

⁹⁹ Santiago Co. meeting reported in *MJ* 15 July 1843. The smelters although sympathizing with the petition seem to have declined to make any exertions at this stage to reduce the duty. See R.J. Nevill to Bibby and Sons, 16 May 1843, IX, Nevill Records, NLW.

¹⁰⁰ Of the 17 British merchant Houses operating in Chile with branches in Britain, 9 had partners in Liverpool only and 4 in Liverpool and London. They were all general and commission merchants. See list of British merchantile houses established in Chile on the 1 Jan. 1849 in FO16/64, PRO. Most of these houses received large consignments of copper ore and regulus at Liverpool during the 1840's. See 'Particulars of Cargoes' in the *Liverpool Commercial Gazette* for these years.

¹⁰¹ J. GARREAU, 'La formacion de un mercado de transito. Valparaiso: 1817-1848' in *Nueva Historia*, Londres, vol. 3, 11, pp. 180-5. She does not mention copper ore exports and refers generally to the lack of export commodities. The British merchants, however, supported by other copper importers and smelters, blamed the lack of exports of copper ore for this imbalance:

'When... any large portion of the ores are diverted into other channels (not Britain), returns for goods must be made principally in silver, the value of which being thereby unduly increased, will entail a serious loss upon merchants engaged in the trade. This was exemplified in February 1844, when under a temporary suspension of shipments of copper ore, the premium on silver rose to 13 per cent' *MJ* 12 April 1845, p. 138, document No. 50. See also documents No. 14 and 49 and letter from Joshua Waddington, British merchant, dated Valparaiso, 23 Jan. 1845 in *PP* 1847, LIX, p. 89.

asking for the abolition of the copper-ore duty.¹⁰² This petition, together with over 50 documents showing the advances of copper smelting in Chile and the 'impolicy' of the copper-ore duty, were published early in 1845.¹⁰³ As the documents did not include the returns of ore imports for 1845 which began to show the decrease of imports, the mining interest of Cornwall and other supporters of the duty had plenty of arguments to weaken those of the anti-duty party.¹⁰⁴ Their position was also weakened by a division in the ranks of the large smelters with the defection of Mr Michael Williams, senior partner of Williams Foster and Co., the largest copper smelting firm. He sided with the Cornish miners and advocated a higher duty for foreign ores and signed a petition against the abolition of the duty.¹⁰⁵ The reason for his attitude were probably connected with his involvement in copper mining.¹⁰⁶ 'One interested in copper smelting' was probably referring to him when he asserted that 'a great many of the poor Cornish mines at present number among their principal adventurers gentlemen connected with the smelting establishment at Swansea who are interested in throwing round the poor mines a protection sufficient to keep them afloat, sacrificing a little of their smelting capital to give increased value to their mining stock...'¹⁰⁷

Although the anti-duty party gained nothing for its efforts in 1845, it soon gained another ally, the copper manufacturers of Birmingham, Wolverhampton and Sheffield. The manufacturers enlisted their MPs and merchants who were connected with the trade in these cities to fight the duty in early 1846, and addressed Parliament and the Government through a number

¹⁰² R.J. Nevill to Charles Brownell, 6 Dec. 1844 and 18 Feb. 1845; same to P.S.L. Grenfell 9 Jan. 1845 and 22 Jan. 1845, IX, Nevill Records, NLW.

¹⁰³ The petition was published in *MJ* 15 Feb. 1845 and the documents in *MJ* 12 April 1845. They also appeared in *PP*, 1847, LIX, pp. 68-70 and 70-83. Apart from the Liverpool merchants, the importers of Cuban ores and all major smelters, with the exception of Williams Foster and Co., the petition was also signed by Liverpool ship-owners engaged in the Chilean trade and by the British Copiapo Mining Co. operating in Chile.

¹⁰⁴ See for instance the long editorials of *MJ* on 12 April 1845 and 19 April 1845 and the letter of Sir Charles Lemmon to the R.H. the Earl of Clarendon in *MJ* 26 June 1847, p. 295.

¹⁰⁵ R.J. Nevill to Charles Brownell, 25 Feb. 1845, IX, Nevill Records, NLW, *MJ* 15 Feb. 1845.

¹⁰⁶ By 1842 Mr Williams had investments of £ 400,000 in mining and £ 500,000 in smelting. In 1851 he saved from destruction and abandonment the United (Copper) Mines which made *MJ* comment on its editorial page '(Mr Williams is) a gentleman who has resided and devoted all his life as a miner among them'. See R.O. ROBERTS, 'Enterprise and Capital for Non-ferrous Metal Smelting in Glamorgan, 1694-1924' in *Morgannwg*, vol. 23 (1979), p. 65 and *MJ* 11 Oct. 1851.

¹⁰⁷ *MJ* 24 May 1845.

of petitions and interviews.¹⁰⁸ The nature and strength of the enlarged combination of interests against the duty is best described by analysing the deputation 'of gentlemen interested in the copper trade who had the interview with Sir Robert Peel on (21 March 1846). It consisted of the two Liverpool MPs (Lord Sandon and Sir H. Douglas), one MP for Sheffield (Mr Parker), one MP for Wolverhampton (Mr Thornely), one MP for London (Mr Masterman), several Liverpool merchants (Messrs. Brownell, Gibbs, Hegan, Rowe and Armstrong), a Liverpool shipowner (Mr Muir), and representatives of the Copper Smelting Co.'s (Messrs Druce, Keates, Gibbs and W.R. Lloyd). More significantly the delegation also included H.H. Vivian of Vivian and Sons and MP for Swansea, and G.F. Muntz, MP for Birmingham, and a leading copper manufacturer.¹⁰⁹ The latter led the opposition to the duty in the House of Commons and on the 22 June 1847 he moved 'that the House resolve itself into a Committee of Customs to consider the duties upon the importation of copper (and copper ores) with a view to their reduction or abolition'. The motion was defeated by 59 Noes against 19 Ayes.¹¹⁰

The sudden emergence of the copper manufacturers as a leading section of the anti-duty party seems to have been rooted mainly in the rise of the price of copper in Britain at the time, but also in the danger that the continuation of the duty on copper ores would mean cheaper supplies to the copper manufacturers abroad, while at the same time duties on the importation of copper and brass manufactures had been reduced.¹¹¹ The availability of cheaper copper abroad and especially what was believed to be the cause of it, namely the smelting and exporting of copper from Chile and the exports of Chilean copper ores to countries other than Britain, was the main issue discussed by both the anti-duty party and the 'Mining Interest' during 1846-7.¹¹² The govern-

¹⁰⁸ The petitions appeared in *PP*, 1847, LIX, pp. 59-97, passim and 1847-1848, XXXIX, pp. 327-34, passim.

¹⁰⁹ *MJ* 28 March 1846, 'Muntz, George Frederick (1794-1857)' in the *National Dictionary of Biography; Hansard*, Ser. 3, LXXXIX, 1847, pp. ix-xvi. See also sources in note 108.

¹¹⁰ See reports in *MJ* 26 June 1847 and *The Cambrian* 25 June 1847, also *MJ* 14 Feb. 1846 and *PP*, 1847-1848, XXXIX, p. 334.

¹¹¹ See for instance 'The Petition of the Merchants and Manufacturers of Birmingham' and the arguments put forward by the delegation who presented it to Sir R. Peel in *MJ* 28 March 1846, p. 133, col. 3, also *MJ* 27 Feb. 1847, p. 92. The price of tough copper had increased from £ 84 per ton in the first two quarters of 1845 to £ 93 by the end of the year, it declined to £ 88.10 in September 1846 but increased to £ 98 per ton in March 1847 and remained at that level until January 1848. The import duty on brass and copper manufactures was reduced from 15.75% to 10% on 19 March 1846. See weekly prices of copper in the London market published by *MJ* for the period and *PP* 1847, LIX, p. 46.

¹¹² See for instance 'Facts as to Foreign Copper Ores' sheet printed and distributed before Mr Muntz presented the motion to abolish the duty in the House of Commons on 22 June 1847, Yorkshire Imperial Metals Mss, A22, University College

ment for its part used as the only argument to maintain the duty, the need to retain a small but indispensable source of revenue.¹¹³

By the beginning of 1848 the government was convinced that the copper ore duties should be reduced¹¹⁴ and on 18 April 1848 'the Chancellor of the Exchequer moved the order of the day for a committee on the copper and lead duties'.¹¹⁵ Although the bill was not passed until 5 Sept. 1848, the commitment of the Government to the reduction of the duty was demonstrated by the fact that as early as June the Board of Customs was admitting foreign ores according to the new duties proposed.¹¹⁶ The months preceding the enactment of the bill were marked by a rehearsal of the old arguments for and against the 1842 duty, the Government now taking up the arguments of the anti-duty party and the pro-duty party emphasizing the monopolistic character of the smelting industry in Great Britain.¹¹⁷ The major change in the months leading to the reduction of the copper duty, apart from the Government position, was the deterioration of the position of the mining interest. They lost the support of several Cornwall and Devonshire MPs and only one of these voted against the motion in the third reading. There are also indications that by that time a significant number of British mine owners viewed the reduction of the duty as favourable to their interest, or at worst unavoidable.¹¹⁸

The preceding analysis indicates that the changes in the duties on foreign copper ores had important but not dramatic consequences for the British interests involved. However, if we consider its effects in conjunction with the price of copper ore, which was strictly controlled by the Smelters' Association from mid-1844 to the late 1840's, the result was indeed drastic. It provoked, as we have shown elsewhere,¹¹⁸ the reindustrialization of the copper

of Swansea, also printed in *PP*, 1847-1848, XXXIX, p. 334. Of the 23 facts mentioned, 14 were related to Chile, 7 were of a general nature and 2 were connected with copper smelting in the US. For the views of the 'mining interest' see *MJ* 26 June 1847, p. 295, cols. 1-3, 3 July 1847, p. 307 and 10 July 1847, p. 318.

¹¹³ Debate on the motion of Mr Muntz to abolish or reduce the duty on copper on 22 June 1847, reported in *MJ* 26 June 1847. Mr Spooner noted in the debate that the duty had decreased from £ 75,000 in 1844 to £ 54,000 in 1846.

¹¹⁴ *MJ* 19 Feb. 1848, p. 87.

¹¹⁵ *MJ* 22 April 1848.

¹¹⁶ *MJ* 24 June 1848, p. 299.

¹¹⁷ See for instance *MJ* 22 April 1848; p. 190, col. 3, 29 July 1848, pp. 354-5.

¹¹⁸ *MJ* 9 Sept. 1848. E. Turner, MP for Truro, who opposed the reduction of copper duties up until 1847, did not vote on 1 Sept. 1848 but asserted on 27 Aug. 1848 in Parliament that he was prepared to support the bill and that '... he believed that the great mining interest of Cornwall was in favour of the proposition of the government'. See *MJ* 2 Sept. 1848, p. 411, col. 2. The editorial page of *MJ* itself had changed its unrestricted defence of the duties up until 1846 to a moderate support of the reduction of the duty. Compare for instance the editorials of 19 April 1845, 5 June 1847 and 9 Sept. 1848.

business in Chile and accelerated the birth and growth of copper smelting in the US and France. The British sectors reacted as soon as their direct interests were affected, mobilizing MPs and putting pressure on the Government. The latter, convinced by massive evidence of the danger of the continuation of high duties on copper ore, facing a dwindling revenue from the duty and advocating free trade, reduced the duty to a nominal rate in 1848.

3. Conclusions

Elsewhere¹¹⁹ we have established that during the period of take-off of the modern smelting industry in Chile (1845-1847), the impact of British monopoly prices and British copper ore duty outweighed that of the economies derived by copper miners from smelting in Chile. The costs were 24 cents of *peso* per *quintal* of 25% grade ore (monopoly prices), 35 cents (British duty) compared with savings of 48 cents (the economies derived from smelting in Chile).

As the freight rate from Chile to the smelting centres in Britain was the highest among the major copper ore exporters (see above, part 2,b) and this was the major determinant of the economies derived from smelting *in situ* we can conclude that in Australia and Cuba, too, the main stimulus to smelt *in situ* was the combination of the effects of British fiscal policy and the drastic monopoly prices applied by the smelters. In fact, no copper smelting occurred in Cuba until 1862 when the mines were virtually exhausted and even in this case it was limited to an insignificant quantity of regulus. Australia on the contrary did establish a smelting capacity comparable to Chile's in the late 1840's but in this case the economies derived from smelting *in situ* played no part.¹²⁰ The fact that during the period 1845-1847 Chile started to export large quantities of copper ore to be smelted in the United States, France and Germany¹²¹ confirms this assumption. To put it another way, had the British duty on copper and the monopoly prices not been applied during the mid 1840's, the beginning of smelting in the US, continental Europe and Australia and the transformation of the Chilean copper smelting industry into a modern one would have been postponed and the dominant position of the British smelters would have been secured for a longer period despite the theoretical advantages of smelting *in situ*.

¹¹⁹ VALENZUELA 1988, op. cit.

¹²⁰ MEL DEVIS, op. cit. appendix 18, demonstrates that during the period 1850-1870 it was cheaper to send ores to be smelted in Swansea than to smelt them *in situ*, and suggests that this uneconomical choice was forced on the main copper ore producers in Australia by the fear of monopoly prices being applied by the Swansea smelters and to a certain extent by a sense of national pride.

¹²¹ During 1845-1847, 1,259 tons of copper ore (or 6.1% of Chilean exports) was sent to the US, Germany and France, while in 1844 only 35 tons were sent to those countries (or 0.4% of Chilean exports). See *Estadística Comercial de la República de Chile*, several years.