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*"Seeking out and building monopolies,
Rothschild strategies in non ferrous metals
international markets (1830-1940)*

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Department of Economics

“Seeking out and building monopolies, Rothschild strategies in non ferrous metals international markets (1830-1940)”

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ABSTRACT

The aim of this article is to analyse the strategies employed by the Rothschilds until 1940 to limit competition in the non ferrous international market. We will study how they opted for rigid demand products of highly concentrated supply which were favourable to market control (mercury, nickel, lead and copper and sulphur) by assuming administrative monopolies (mercury from Spanish Almadén Mines) or through control of the leading businesses of the respective markets (Le Nickel, Peñarroya and Rio Tinto). We will also analyse how the family was able to gain worldwide monopolies, or if not, how they promoted collusive oligopolies with the competition in any number of forms in their quest to maintain profitability and to flee from any competition.

Introduction

The establishment of long lasting supply monopolies is the dream of any businessman, albeit an almost always unreachable one. Its achievement, when legislation allows for such, is restricted to businesses that enjoy undisputed power on the market, be it due to costs, size, patents, administrative concessions or natural monopoly. In the world of raw industrial materials, and in particular mining products, it is rare indeed for a single supplier to be in a position to maintain any long term monopolistic structure for the simple reason that there are very few minerals that are to be found in just one deposit in the world. In fact, experience has taught us that in the case of deposits which might offer a monopoly, high prices and the extraordinary profits of the companies involved commonly lead to more mines being opened and to the appearance of competition, unless there is a substantial difference in extraction costs between one and another. In short, the monopoly is finally diluted away and the businesses are left with little option but to negotiate oligopolies if they are to continue to control the market. As regards the demand for such raw materials, these are often highly inflexible, and in the absence of substitutes they will grant the supply a lot of market power, although it is equally true that technological advances in industrial uses do on occasions constrain this domination.

In the 1940s there was wealth of literature on monopolies and cartels following Roosevelt's antimonopoly policies and the persecution of institutionalized cartels in Germany from the beginnings of its industrialization. The studies of Hexner¹ are classical, as are those compiled by the United Nations² and the British Board Of Trade³, which focus mainly on the interim war period. However, Chandler⁴ had already insisted on the importance of these strategies in the United States in response to the fall in prices at the end of C19. Apart from this noteworthy exception, outside the sphere of economic theory⁵ cartelization received little attention for decades. The same could not be said of mergers and acquisitions, which unleashed a wealth of research. In recent years though, there

¹ Hexner, E., *International Cartels* (London, 1946)

² United Nations, Department of Economic Affairs, *International Cartels. A League of Nations Memorandum* (New York, 1947).

³ Great Britain Board of Trade, *Survey of International Cartels and internal cartels. 1944-1946* (London, 1976).

⁴ Chandler, A., *The Visible Hand. The Managerial Revolution in American Business* (Cambridge, Mass, 1977), chapter 10.

⁵ Casson, M. insists in this in «Multinational monopolies and international cartels», in Buckley and Casson, *The Economic Theory of the Multinational Enterprise* (London, 1984).

has been a proliferation of studies of cartels in business history⁶. Yet there is a lack of illustrative examples of the behaviour of the markets in such an extremely strategic sector like non ferrous metals, even though it has been recognized as the sphere in which there was the highest level of international concentration during the first half of the twentieth century⁷. Indeed, in the conference on *International Cartels in Business History*, professors Kudo and Hara discarded the mineral raw materials cases on the grounds that they were less suitable in explaining cartelization than the manufacturing sectors⁸. Schmitz would take the same stance in his works on copper, insisting that both the technological elements and the vertical integration processes were fundamental to the understanding of the development of the great mining businesses⁹. Our research, in contrast, rebuffs both approaches insofar as we understand that the market agreements do indeed seem to have been a crucial element in the profitability of the large non ferrous metal businesses as opposed to their vertical integration, mergers or technological advances, which only become a viable alternative if other initiatives have failed.

This article aims to offer a wide range of examples of monopolistic practices and colusive agreements exercised by a single developer for a good part of the contemporary history of the non ferrous metals sectors. In particular, we characterize and analyse the strategies followed by the Rothschilds to control, directly or indirectly, the international markets of four different products: mercury, lead, nickel and pyrites and copper together with the different responses offered to meet the variations occurring in the markets over more than a century. The novelty of our study lies in the idea that the search for agreements or the establishment of pure monopolies was a premeditated condition for the Rothschilds to be present in these markets. In other words, the intervention of prices through different means was the norm; competition, the exception. So the Rothschilds would have developed a very clear search strategy for extraordinary long term profits determined by the choice itself of the sectors they were involved in, i.e. products with a rigid demand, a highly concentrated supply and which offered a large control of the market.

⁶ Nussbaum, H. "International Cartels and Multinational Enterprises." In A. Teichova, M. Levy-Leboyer, and H. Nussbaum (eds.), *Multinational Enterprise in Historical Perspective*, (Cambridge, 1986) 131-144; Akira Kudo and T. Hara, eds., *International Cartels in Business History*. (Tokyo, 1992), Dominique Barjot, ed., *International Cartels Revisited (1880-1980)* (Caen, 1994) or the recent studies by Jeffrey Fear "Cartels" in Geoffrey Jones and Jonathan Zeitlin, (Eds), *The Oxford Handbook of Business History*. (Oxford, 2007) and Margaret C. Levenstein and Valerie Y. Suslow "What determines cartel success?", *Journal of Economic Literature*, March 2006, PP. 43-95. To mention but a few.

⁷ An exception would be the study of the chrome cartel by Phimister, "The chrome trust: the creation of an international cartel, 1908-38." *Business History*, Vol. 38 (1996), 77-89.

⁸ Akira Kudo and T. Hara, eds., *International Cartels in Business History*. (Tokyo, 1992), Introduction.

⁹ Schmitz, C, "The rise of Big Business in the World copper Industry 1870-1930", *The Economic History Review*, 2nd series. Vol.XXXIX, n°3, 2006., 392.

Why the Rothschilds should have involved themselves precisely in these sectors is a question which has to be answered from the historical record of the company itself. Its origins were in the early decades of the nineteenth century and were linked to public loans and the issue of international loans. The Rothschild banking network then became interested solely in international buying and selling of gold and the mercury business, as we explain below. The family had proven experience dating from the Napoleonic Wars in exporting and arbitrage of precious metals, and they did not hesitate to expand on this following the discovery of the gold deposits of California in a 1848. As of that year the House of Rothschild in London, N.M. Rothschild & Sons, took steps to gain the majority of the new gold consignments, thus consolidating their position in the City and in their relations with the Bank of England. In 1852 they would win the contract for the Royal Mint. As a consequence, their import operations and their sales to central banks would boom¹⁰, in coordination with their network of foundries and the mints of their French cousins¹¹.

With the consolidation of this business, which the Rothschilds held uninterrupted until 2004¹², the family carried out occasional exchanges on the international copper and lead markets, which they then left aside with their huge entry into the railway market. At the end of the 1870s, though, the third generation of the family would incline towards a change of course in their business strategy, recuperating their interest in the aforesaid markets and acting, this time through mining, in their clear vocation to control the respective markets¹³. Strategic decisions were taken then which led to the Rothschilds setting up *Société Minière et Métallurgique Peñarroya*, in 1881, la *Compagnie de Boleo*, in 1885 and their taking control of *Le Nickel*, in 1883 and the *Rio Tinto Company*, in 1888, all businesses that were unquestionable world leaders in the production of lead, copper and nickel in the subsequent decades.

The portfolio of the French branch of the Rothschilds in 1906, summarized in Appendix 1, bears witness to this philosophy. Note that along with these shares, which in turn are combined with the other traditional ones held by the family, like railways, gold and public debt, there are others in sectors whose characteristics are the same as those we have underlined: temporal or permanent barely competitive markets characterized by the small number of suppliers or a highly inflexible demand in which they could exercise a strong influence on the prices, as was the case of the De Beers business and its jewels, the oil companies Shell, Royal Dutch and Bnito, or that of strictly monopolistic business, such as the Suez

¹⁰ Sales of the Bank of England reached 15.3 million de pounds that year. Ferguson *The World's Banker. The History of the House of Rothschild*. (London, 1998), 578-579.

¹¹ Flandreau, M.. *L'or du Monde. La France et la stabilité du système monétaire international. 1848-1873*. (Paris, 1995). 105 and 212-216).

¹² From 1919 until May of that year the official price of the London bullion market was fixed in the main offices of N.M. Rothschild & Sons.

¹³ This initiative was followed by a large number of old firms of bank traders as is studied by Jones. Jones, G., *Merchants to Multinationals: British Trading Companies in the Nineteenth and Twentieth Centuries* (Oxford, 2000).

Canal To these we must add the mining businesses, the shares held by N.M. Rothschild & Sons, which controlled 100% of the mercury business, and another 24,419 shares in Rio Tinto in 1906¹⁴. It was a portfolio that was to grow in the following year even faster than that of the French branch.

It is important to underline that none of these investments was made blindly. For mining issues the House of Rothschild Frères contracted the services of Jules Aron in the 1870s. He was a very capable mining engineer whose mission would be to advise his new bosses on the most advantageous investments to make, while coordinating and supervising the industrial and commercial policies of the businesses they controlled. Aron was made managing engineer at Peñarroya and Le Nickel, a post he occupied until 1917. He would be substituted by Theodore Weill, who held the post during the 1920s and 30s. In London, the functions were performed by Hamilton Smith, director of Exploration Co., a filial of the house of Rothschild in London, which had been set up to sponsor mining enterprises and which had initiated a rare growth programme, starting with a small capital of 10,000 pounds in 1886, which had amassed 300,000 pounds by October 1889 and 1.2 million by the end of the same year. Exploration Co. was held at that time to be the largest company in the world in its class¹⁵.

In short, we will layout the instruments which allowed the Rothschilds to take control of the markets in each of the abovementioned markets, either through assuming administrative monopolies or the control of the leading businesses of the respective markets.. From there, we will analyse the strategies used directly by the Rothschilds and their companies to obtain the highest possible profits from their positions of power in the markets, obtained either by themselves or in conjunction with other businesses.

Seeking out monopolies

Mercury.

Mercury was the first of the markets in question to be controlled by the Rothschilds. Mercury has traditionally been marked by its scarcity and its

¹⁴ Rothschild Records London (hereinafter ARL), Stock Ledgers, 1/12/0-22.

¹⁵ McKay "The house of Rothschild (Paris) as a multinational Enterprise in historical perspective, 1875-1914" In A. Teichova, M. Levy-Leboyer, and H. Nussbaum (eds.), *Multinational Enterprise in Historical Perspective*, (Cambridge, 1986); Ferguson, N. *The World's Banker. The History of the House of Rothschild* (London, 1998) 876; and Turrel and Van Helten, "The investment Group: the mining link in British overseas expansion before 1914", *Economic History Review*, 1987, 2nd series, XL, 2, 267-274. *Revista Minera*, 1-4-1889, p. 104. and Bencibengo, Yann: "Les réseaux d'influence de la banque Rothschild: l'exemple de la société Le Nickel en Nouvelle-Calédonie (1880-1914) », in Hubert Bonin, Catherine Hodeir & Jean-François Klein (dir.), *L'esprit économique impérial (1830-1970). Groupes de pression & réseaux du patronat colonial en France & dans l'empire*, (Paris, 2007).

surprising properties, which make it widely applicable in industry. That the Rothschilds gained the highest levels of world intervention is indisputable.

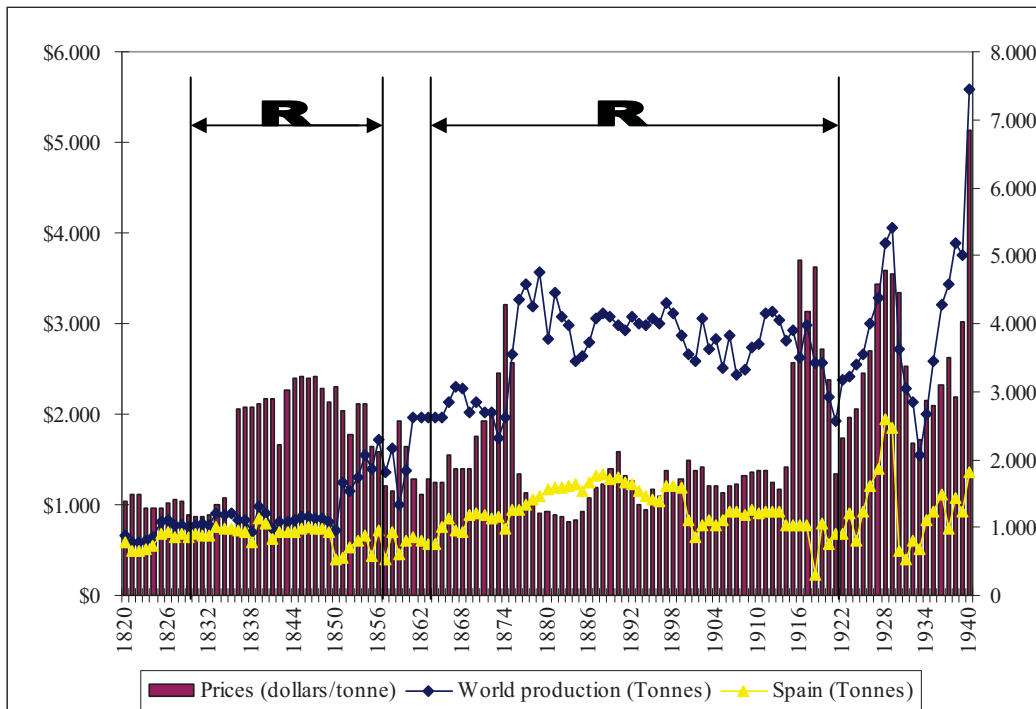
Since ancient times mercury had been associated with paint (vermilion), cosmetics and medicine, but it really came to the fore in the mid sixteenth century when it began to be used in the extraction of silver by amalgamation from the huge deposits in Peru and Mexico. Up to the end of the nineteenth century mercury was employed intensively in the Mexican silver mines and its demand was to grow still more when it was discovered that it could also be used in industry for gold-plating, the manufacturing of physical instruments, paints and mirrors, turbine manufacture which used its vapours, or as fulminating powder, and so it gradually ceased to be used as an amalgam.

The second feature of the mercury market lay in its scarce supply: the cinnabar from which it is extracted is rarely found in nature and is concentrated in very few exploitations around the planet, exploitations which provided the producers with a solid argument for imposing worldwide prices.

The largest and oldest deposits are in Almadén, and so it was not difficult for the Spanish crown, the exclusive owner of the deposits from 1523, to take advantage of its monopoly and to fix an exclusive income on the product. The only opposition to Almadén on the world market for the next three centuries came from the mines of Idria, located in present day Slovenia. However, the sovereignty of the Austrian monarchs over the deposits made it easy to reach an agreement for the exclusive sale of surpluses to the Spanish crown¹⁶. So it was that barring a few isolated years of the eighteenth century, the mercury from Idria did not compete with Spain.

Graph 1: Evolution of mercury prices and world production, 1820-1940

¹⁶ Sánchez Molero, L., *Memoria sobre mercurios* (Madrid, 1856), 21.



Source: Schmitz, C. J., *World non-ferrous metal production and prices, 1700-1976*. (London, 1979).

Note: From 1820 to 1849 the prices in dollars are calculated at a fixed exchange rate of 0.30 dollars/mark.

R = Period of Rothschild activity in the market.

This balance of power, an effective duopoly, finished in 1847 with the discovery of the Nueva Almadén seam, which would be followed in the ensuing years by others, such as New Idria (1854), Redington (1861) and Sulphur Bank (1873), all in California, and some other lesser ones in the state of Colorado. For well over a decade the USA easily outstripped Spain as leading world producer and, even though most of the production was for domestic consumption, the presence of the Californian mercury upset the market and led to drastic falls in prices. Later, with the opening of Monte Amiata (1897), Italy appeared on the international stage and became a point a reference. Along with this, there was the Idria production, which formed part of the Italian production from 1919 until 1945, when it became part of former Yugoslavia. Yet Spain with Almadén would be the only one to maintain leading status throughout the period and it did so to the point that even today all dealers adhere to the Spanish measurement of production based on the traditional containers –flask of 34.507 kg. of mercury. By extension, control of the Almadén sales allowed, one way or another, control of the world market.

As graph 1 shows, the appearance of new products did not initially cause prices to drop, nor did the monopoly prior to the discovery of the new North American deposits mean that prices were necessarily high. In fact, at the beginning of the nineteenth century Spain was unable recover the rate of

production and sales of its colonial times and so impose prices. Hence, faced with the bad economic situation, the government opted to publicly auction the whole Almadén production.

The Rothschilds, who had tried unsuccessfully to gain the business in 1820, offering their intermediation in the trade of Almadén mercury with México¹⁷, were in on the auction and with the added incentive that Solomon Rothschild had, before 1830, acquired control of the Idria mines in Vienna¹⁸. So the moment to bank on a union of the productions from both establishments seemed to have arrived. This would mean that the rigidity of the mercury demand on the final markets would be put to the test.

Yet the Rothschilds were not about to support the Fernando VII Government because of the decision of the monarch to relinquish the public debt issued in London under the previous, liberal, government. The Rothschilds were at that time the main intermediaries in the London and Paris stock markets and this put them in a clear position of conflict of interests, and so they did not personally take part in the bidding for the Spanish mercury. However, they lost little time in reaching an agreement with Iñigo Ezpeleta, the Spanish dealer who bought the Almadén 1830 contract for 745 reales/hundredweight¹⁹ (approx. US 745.55 dollars/tonne), for which they would first be given a part of the business, with the rest being handed over as of 1832 in exchange for a commission of 2.5% on sales²⁰. The Rothschilds took little time to buy up all the stocks on the market, so pushing up the prices, which started to rise significantly as of that date until sitting nearly 60% higher just one year on.

On the death of Fernando VII, in 1833, and with the definitive consolidation of the liberal governments in Spain, the Rothschilds took the decision to handling the contract directly, so taking advantages of the financial difficulties the civil war (the First Carlist War 1833-1840) was causing the new government. In fact, all the contracts to do with Almadén which were signed by the Rothschilds during that century would be marked by the same incapacity of the Spanish Public Treasury to manage its own financing.

In order to assure themselves the contract, the Rothschilds made a first loan of 15 million francs to the Spanish government, which included a bank exclusivity clause. However, they did not succeed in including any guarantee as regards Almadén²¹. Indeed, the situation twisted against them when there was a

¹⁷ Record of 12-7-1820, Archivo Histórico Nacional, Sección Estado, dossier 97.

¹⁸ Gille, B. *Histoire de Maison Rothschild*. (Ginebra - París. 1965), p. 414

¹⁹ Martín, V. 1980: Los Rothschild y las minas de Almadén. (Madrid, 1980) pp. 187-190. Castilian hundredweight (46 Kg, approximately) should not be confused with the British (50,8 Kg). "Reales" means always in this paper Spanish "reales de vellón".

²⁰ Rothschild London Records (hereinafter ARL), XI/38/3-5 and Ferguson, N. *The World's Banker* (London, 1998), 379.

²¹ This point had not been accepted by Miraflores, *Memorias del reinado de Isabel II*, (Madrid, 1964) 36, 39, 63-65 y 223-225.

sudden change in government which brought the Conde de Toreno to Chancellor of the Exchequer (June 1834), who would suspend the agreement²². The Rothschilds were quick to find a solution to the situation and Nathan Rothschild sent his son Lionel²³ to Madrid, where after six months he was not only successful in having the loan repaid but also gained the support of the Chancellor in winning the Almadén contract, which the Rothschilds took in February 1835 for 812 reales the hundredweight, in an auction that was full of irregularities²⁴, following the barefaced bribery of the politician and also the Queen Regent herself²⁵.

The scandals surrounding the 1835 auction forced Weisweiller, the Madrid agent for the Rothschilds, to develop a complex strategy to ensure successive renewals, even to the extent of an explicit threat that if the contract were annulled, the House of Rothschild would apply for the legal confiscation of all the Almadén products abroad and the declaration of a stock market war in London and Paris against Spanish debt²⁶. The threat had no effect and so Weisweiller had to continue to fund the Government, forwarding in total some 53 million reales, all in limited partnership with a powerful ally, the Intendant of the Royal House, Antonio Gaviria, who was totally committed to the Rothschild in the negotiations to renew the agreement²⁷. The Rothschilds even went so far as to offer as to offer a purchase option for the mines at 380 million reales (approx. US 17.14 million dollars), which it turned out to be unnecessary to negotiate since there was a default on one of the outstanding loans with them, and Weisweiller took advantage of the occasion to demand the mortgage on the mine was paid off or that the contract was renewed. The contract, signed on 20-9-1838, did not release them from the obligation to grant a loan of 50 million reales and to equal the offer made by the Parisian banker Alejandro Aguado, of 1,200 reales the hundredweight if they were to conserve the mercury trading rights for a further five years²⁸.

After the Carlist War, the renewal of the subsequent contracts was to become more and more complicated for the Rothschilds. In 1843, in spite of the Rothschilds' efforts to avoid it, the struggle returned in the form of an auction which was won by the Spanish businessman José Salamanca, who paid 1,630 reales the hundredweight. Two days later he transferred his rights to the

²² Martín, V. *Los Rothschild y las minas de Almadén*, 167-169 and Fontana, J., *La Revolución Liberal. Política y hacienda en 1833-1845*. (Madrid, 1977), 44-58 and 64-70.

²³ and Ferguson, *The World's Banker*, 297-298 y 383, note 46.

²⁴ Otazu, A., *The Rothschilds y sus socios españoles (1820-1850)*. (Madrid, 1987), 37.

²⁵ Specifically, 4,962,100 reales to Toreno and a donation to the Queen's civil list of between 2 and 6 million reales. Gille, B., *Histoire de Maison Rothschild*, 251. Fontana, J., *La Revolución Liberal*, 80, and Corti, C., *The Rise of the House of Rothschild.*, (London, 1928) 127.

²⁶ Letters from Latour Manbourg to Molé of 20-10-1837, Records of the French Ministry for Foreign Affairs, Commercial Correspondence, Madrid, Vol. 44.

²⁷ Otazu, *The Rothschilds y sus socios españoles*, 43.

²⁸ Martín, *Los Rothschild y Almadén*, 205. There is no copy of this contract in any of the records we have consulted.

Rothschilds, who thus retained the contract, albeit at a substantially higher cost – 35.8% higher than the previous contract.

What followed would not favour the Rothschilds either. Along with the many political problems in Mexico which were holding up the silver production, there was the arrival of new methods for gold-plating and silver extraction, as well as the discovery of the New Almadén mines in California in 1846. The London market began to show signs of saturation, which forced the Rothschilds to hold back 34,915 hundredweight of mercury so as not to affect the price dynamics²⁹.

In such conditions the Rothschilds refused to keep on cutting their margins and to continue giving loans to Spain. Indeed, they were not even present at the auction of June 1847, which was won by the Banco de Fomento, for a period of five years and at 1,731 reales per hundredweight³⁰.

The Banco de Fomento operation was a foregone failure. The House of Rothschild had considered selling off its mercury reserves in the face of any new intermediary and it lost little time in floating its prices on the cheap in London so, through its agents, keeping its customers on tenterhooks. And the prices plummeted in the British capital. In a mere six months they fell from the 2,250 reales which held steady for all of 1847 to just 1,750 reales by June 1848, even though they held at between 2,400 and 2,800 reales during the same period in Mexico³¹. During all this time the Banco de Fomento was incapable of selling a single vial in London, and so the government cancelled the contract and passed it on to the Banco de San Fernando, whose efforts proved just as fruitless as had their predecessors³². Indeed, their position was even worse, as the situation of the Spanish government had worsened and it had begun to accept advances from the Rothschilds and the house of Baring in London in exchange for mercury³³, which meant that the Banco de San Fernando was hard pushed to sell any more consignments³⁴.

²⁹ Martín, *Los Rothschild y Almadén*, 223 and 244 and Sánchez Molero, *Memoria sobre mercurios*, 18

³⁰ Martín, *Los Rothschild y Almadén*, 228-236

³¹ Randall, *Real del Monte*, 187 and 191.

³² Bank of Spain Records, Secretary's Office, dossiers 1200 and 1201.

³³ In total, the Rothschilds and Baring lent 414,994 pounds from December 1848 to December 1849 under various contracts, in exchange for 44,896 hundredweight of mercury. Roldán "Los intereses de los banqueros británicos en España: la Banca Baring y su pugna con los Rothschild por el control del mercurio de Almadén" *Hispania*, LXIII/1, 213, pp. 255-293.

³⁴ Mildred Goyeneche often wrote to the bank about the difficulties of placing its vials of mercury, confronted by the Rothschilds, who systematically reduced their prices and offered no end of payment terms, Letters of 26-12-1848, 19-1-1849 and 20-2-1849, Bank of Spain Records, Secretary's Office, dossier 1200.

Encouraged by the reports on new silver deposits discovered in Chile and Peru³⁵ that they received from their agent, Davidson, in Mexico, the Rothschilds finally signed an agreement with the Spanish government on January 5, 1850 in which they took over the 33,585 hundredweight that had not been sold in exchange for limiting production from the mine to 12,000 hundredweight/year³⁶. All of which left the Rothschilds with a business that they had never really lost for another two years.

The Rothschilds sought to profit from the situation right away and reached an agreement with the owners of Nuevo Almadén to share out the Mexican market and the rest of the world. Yet the agreement was only to last a year, leading to a fall in prices in just a few months from 2,200 reales to barely 900 reales³⁷. In spite of a loss of margins, the House of Rothschild and the Spanish Government decided to go on with their operations in 1852, in the form of three-monthly renewable agreements to sell on a commission basis, at the best price, with a minimum of 800 reales per hundredweight, everywhere in the world except Spain and Mexico³⁸. In March 1854 the minimum would have to be reduced to 659 reales the hundredweight. No great calculation is required to see that these prices are less than a quarter of those paid prior to 1847. The lack of interest in the business on the part of the Rothschilds is easy to understand and in 1855 they signed the last contract to sell on a commission basis before the Spanish Government recovered the Almadén sales in 1857³⁹.

At first, the Rothschild agents in Spain did not show much faith in the Government's capacity to sell its mercury, understanding that the asking price (10% in London above the price adjudicated in Seville) and the amount shipped was excessive for a sales system which no longer enjoyed a real monopoly⁴⁰. But the Treasury continued to make profits from its sales in London and Paris, although they were not as spectacular as those made by the Rothschilds in earlier decades⁴¹.

The situation could only be maintained until 1866, when financial problems returned to the Spanish treasury, which once more was forced to resort to Rothschild loans. One of these, that granted on 22-09-1866, led to the

³⁵ Ferguson, *The World's Banker*, 497. According to Martín (*Los Rothschild y Almadén*, 226-227 and 243-244) the fact that the bankers had cashed in their surpluses under the previous contract was also of influence.

³⁶ Roldán, opus cit, Ziegler, P. 1988. *The 6th Power. The Barings*. Collins, London, pp. 169-170 and Martín, *Los Rothschild y Almadén*, 243.

³⁷ Sánchez Molero, *Memoria sobre mercurios*, 18-19 and Martín, *Los Rothschild y Almadén*, 226-227.

³⁸ Sales commission was 1% plus costs. Copy of the base contract for the sales by commission for the Rothschilds of the Almadén mercury from March 3, 1852. ARL, XI/38/245.

³⁹ Martín *Los Rothschild y Almadén*, 247-251 and 254-259.

⁴⁰ Letter of 31-5-1858, Rothschild Paris Records (hereinafter ARP), 132AQ 6152

⁴¹ The State sold a total of 268,216 vials of mercury from 1858 to 1866, at an average of 1051,08 reales the hundredweight. Zarraluqui, J. *Los almadenes de mercurio*. (Madrid, 1932), vol. 2, 713.

recuperation of the Almadén mercury contracts since this and subsequent loans were repaid with the profits from the sales of the Almadén mercury by the Rothschilds in London⁴².

The owners of Nueva Almadén reacted by contacting the Spanish government in October 1867 and requesting a long term lease of Almadén with the idea of pushing the Rothschilds out of the market and imposing a world monopoly of mercury themselves⁴³. But the government did not take up the offer, although the option of a long term lease, not a purchase of the mine, was exactly what the Rothschilds took up just three years later, when minister Figuerola began to put pressure on them to increase their loans on Almadén. Faced with the Rothschilds' resistance to lend more money, in January 1870, Figuerola stepped up the process to put through a law including the sale of the Rio Tinto and Almadén mines⁴⁴.

From then on the Rothschilds were obliged to analyse the advantages of buying the mine or to continue with their loans, at the risk of a third party getting in ahead of them. But given that Parliament had discarded the option of selling the mines they opted for a long term sales contract of 30 years with a fixed 2% rate of commission plus 20% of net profits, expensed deducted, in exchange for loan of 42 million pesetas (approx. US 9.6 million dollars), at 8% for the same period⁴⁵.

In spite of heavy criticism, the contract was renewed in 1900, although under more favourable conditions for Spain: the term was reduced to ten years and the Rothschild's commission dropped to 1.25%, while their 20% of net profits was due only as of 8 pounds, 2 shillings and 6 pence, a figure which would drop to 10% if the price went above 9 pounds, 2 shillings and 7 pence⁴⁶; additionally, the contract was not proffered in any financial operation and so the whole amount of liquid obtained, after expenses and commissions, would find its way into the State coffers.

Spain improved yet more on these conditions in the next contract by again imposing an auction, in spite of the Rothschild's manoeuvres which included increasing sales so as to be more positively placed in the negotiations⁴⁷. Three other bids were put in at the auction, including that of the Banco de Vizcaya, which was clearly set on winning the contract. The Rothschilds were then forced

⁴² ARL, Various dossiers from series XI/109.

⁴³ Weisweiller sent the Rothschilds a copy of the proposed contract of James Eldredge, director of Nueva Almadén, to the Spanish Government, of 26-10-1867, ARL XI/110/6.

⁴⁴ At the time the government valued its jewel at 50 million pesetas (aprox. US 9 million dollars), Rio Tinto at 30 and so on to a total of 300 million pesetas of real estate properties belonging to the State which could be cashed in short term. Letter from Weisweiller and Bauer of 19-1-1870, ARL XI/101.

⁴⁵ Letters from Weisweiller and Bauer de 11 and 9-1-1870 and 18, 19, 22 and 27-3-1870 and 5-4-1870, ARL XI/ 109/101.

⁴⁶ Martín, *Los Rothschild y Almadén*. 418-421.

⁴⁷ Letters from the London Rothschilds to Bauer 30-5-1910 and 19-12-1910, ARL XI/111/75.

to seriously reduce their demands, offering a commission of just 0.75% and accepting that participation above 8 pounds and two shillings would be a mere 5%⁴⁸. Following this offer, which was considered to be the best, they were awarded the tender and the sales agreement for a further ten years, as of January 1 next⁴⁹.

It was the last of the concessions because although in 1921 the Rothschilds were all for renewing, the nationalist minister, Cambó, did not even bother to consider an auction or to renegotiate the contract, but directly transferred the rights of organization and sales to the Board of Directors of the Minas de Almadén y Arrayanes, a public body that has managed the deposits to the present day.

Nickel

Nickel had been mined until the mid nineteenth century in very small quantities in specific areas of Norway and the United States. The metallurgy was complicated and only a handful of smelters were able to work the minerals from which the metal was extracted. The metal was still not used for its typical applications like alloys, batteries and minting.

However, in 1864 the French mining engineers Jules Garnier discovered the nickel silicate deposits in New Caledonia, which were not particularly rich but they were abundant and much easier to work. Nevertheless, the mining and metallurgy would take about ten years to become operational. Two companies which would double world production as of 1877 were involved. The first belonged to Australian John Higginson, who built a foundry on the islands (Pointe Chaleix) and the other was run by Garnier himself and Henry Marbeau, in the south of France (Bouches-du-Rhône), which imported the mineral. In May 1880, the three men decided to go into partnership and set up the company Le Nickel, with a capital of 6,250,000 French francs.

From the beginning, the new company had many problems raising capital and already by August 1881 it was signing an agreement with the House of Rothschild Frères for it to take charge of the commercialization of all of the company's production and to provide a credit line of one million francs⁵⁰. Higginson continued individually to request new loans from the Rothschilds, which he was not able to pay back on time. So by 1883 the Rothschilds had already received 36% of Le Nickel shares as surety, which was more than enough to control the company and to place Alphonse Rothschild's protégé, Ernest Denormandie, in the chair. The board began to fill up with family and partners

⁴⁸ Martín, *The Rothschilds y Almadén*, 422-423.

⁴⁹ Letter from Bauer to the British Rothschilds of 28-9-1911 ARL XI/111/75. Martín, *los Rothschild y Almadén*, 422-423.

⁵⁰ ARP, 132 AQ 354.

(Maurice Epfhrusi and Emmanuel Léonino), under the supervision of their employees, the lawyer Charles Tambour and the already mentioned Jules Aron, who would be in charge of technical supervision⁵¹.

The company then began to buy up the few nickel foundries in Europe, which were located in France (Le Havre), Scotland (Kirkintilloch) and Germany (Iserlohn, in Westphalia), the idea being to build up a world monopoly⁵². They even set off a controlled reduction of the prices, which they took down to 50% in order to make the use of the metal popular in industry. This was more than compensated by the extraordinary increase in the supply, which rose sevenfold in one decade.

In 1891, the situation improved yet more when it became known that the French smelter Sneider Le Creusot was going to start making reinforced steel sheets containing 2.5-3% nickel⁵³. From then on the powerful iron and steel industry would be the number one customer of the monopoly.

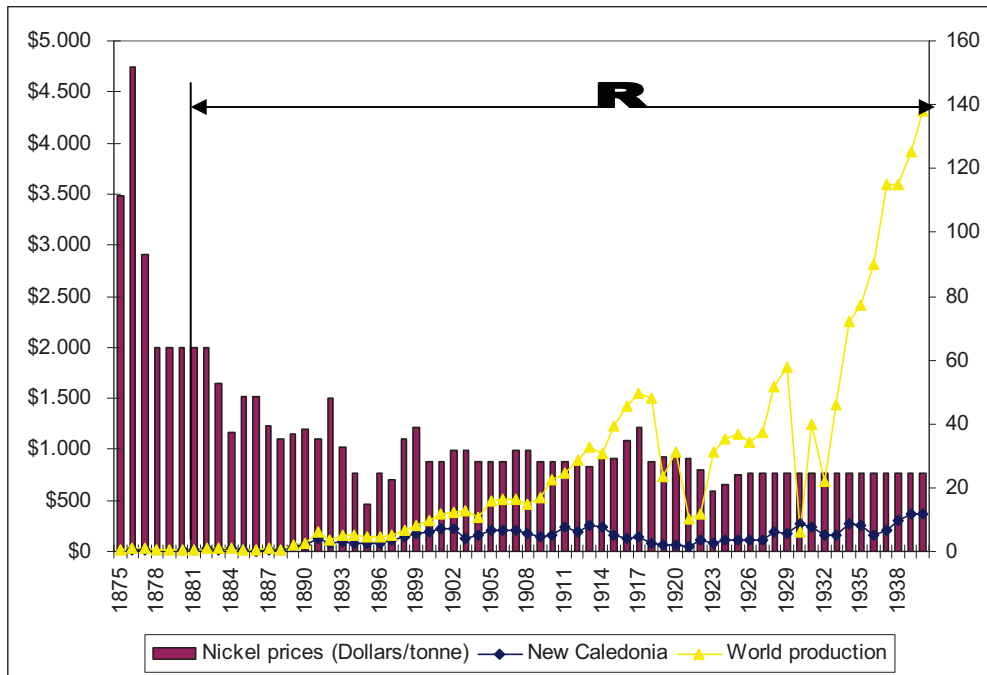
It was now that the Sudbury deposits were discovered in Ontario. They had been located first by the Canadian Copper Company as part of a copper ore in 1886, but when remitted for smelting to the Orford Copper Company plant in New Jersey, an important nickel content was detected. The joint venture of the two companies, which merged in 1902 together with American Nickel Works to set up the International Nickel Company, Ltd. (now INCO), with their headquarters in Camden, New Jersey, led them straight to the top position in the world ranking of producers. The monopoly enjoyed by Le Nickel fell apart and international prices plummeted.

⁵¹ Bencibengo, Yann: "Les réseaux d'influence de la banque Rothschild".

⁵² Mcaky, "The House of Rothschild", 113.

⁵³ Bouvier, *Les Rothschild*, 257

Graph 2: Evolution of nickel prices and world production (thousands of tonnes), 1875-1940.



Source: Schmitz, C. J., *World non-ferrous metal production and prices*.

The increase in industrial demand had a lot to do with the increases in production. Both companies increase their efforts and were joined by another two - Mond Nickel Company, registered in London in 1900 but operating in Sudbury, and Caledonia, founded in 1909 by a man from Bordeaux, Ballande, in New Caledonia. It did not have the strength of Le Nickel, but nevertheless had an important foundry in the port of Doniambo. Both were taken over by INCO and Le Nickel, respectively, during the slump in sales following the 1929 crisis. Mond decided on a friendly merger with INCO in 1929. Le Nickel did not wish to see itself dragged down by its new partner's debt and decided to set up a business with it, each with a 50% holding and which would be a filial of both countries. Its name was Caledonickel, and it took over the industrial assets of both the companies. The new company operated successfully between 1931 and 1937, when the Le Nickel board opted to include it definitively among its own assets.

Lead

The Rothschilds' dealings with lead go back to the 1840s when they began to sign a series of contracts to export the argentiferous leads of south-east Spain, under the management of their agent Hilarion Roux. They would handle 11,641

tonnes of lead in 1860⁵⁴, which at the time represented about 22% of exports of this metal from Spain, which was the world leader in production at the time.

This was to be the zenith of a cycle though. The price war set off by the British producers would lead to falls. The Rothschilds responded with a deep reform of its activities. The refinery they owned in Le Havre was completely modernized and agreements for long term supply were sought, so as to cope with a larger scale of production⁵⁵. Contracts were signed to this effect in 1877 with the two Spanish foundries Jorquera & Walker and Escombreras-Bleyberg, who committed themselves to supplying them over the next five years with a minimum of 500 tonnes a month of melted lead, with considerable silver content⁵⁶. In this manner by the early 1880s the banking family was almost the only rival of the Figueroa for Spanish lead exports to France.

But the big leap forward on the lead market came in 1881 with the participation in the founding of the Société Minière et Metallurgique Peñarroya. This company had somewhat modest beginnings as it was conceived as a simple secondary project of the large railway companies, whose interests coincided at the time with the inland mines. The most important of these was the powerful MZA, whose major shareholder was the House of Rothschild Frères, and on the other hand the Cía. de Ferrocarriles de Ciudad Real a Badajoz, whose original promoters, the construction company Parent & Schaken and the Credit Industriel et Commercial, had in 1865 set up the Compagnie Houillère et Métallurgique de Bélmez. This company, which was soon under the control of the Mirabaud, Paccard, Puerari et Cie. Bank, ceded in 1881 all its lead assets, including rented and owned mines and the foundry it had in the town of Peñarroya, to a new entity with a 50% Rothschild share, a social capital of 5 million francs, which came from the leases of the entrepreneur Huelin, and which the Rothschilds had recently received following default on a mortgage loan. The Rothschilds, moreover, demanded exclusivity for the sales of the new business, half the seats on the board and an assistant directorship for Jules Aron⁵⁷.

From the founding of Peñarroya until 1889 the successive technical improvements allowed its first foundry to experience massive gains in performance, which rose from an initial refined lead production of 3,070 to 12,180 tonnes. In 1889 the factory could not cope with all the minerals it was receiving, and so the first of a series of enlargements was undertaken with the aim of being able to process more minerals from its field of influence. The growth was such that the directors of Peñarroya and la Hullera, half of whom were the same, came to the conclusion in 1893 that it would be more operative to merge the two

⁵⁴ Gille, *Historie de la Maison Rothschild*, 548-551 and Otazu, *Los Rothschild y sus socios españoles*. 145-146.

⁵⁵ Mckay, "The House of Rothschild as a multinacional", 109-110.

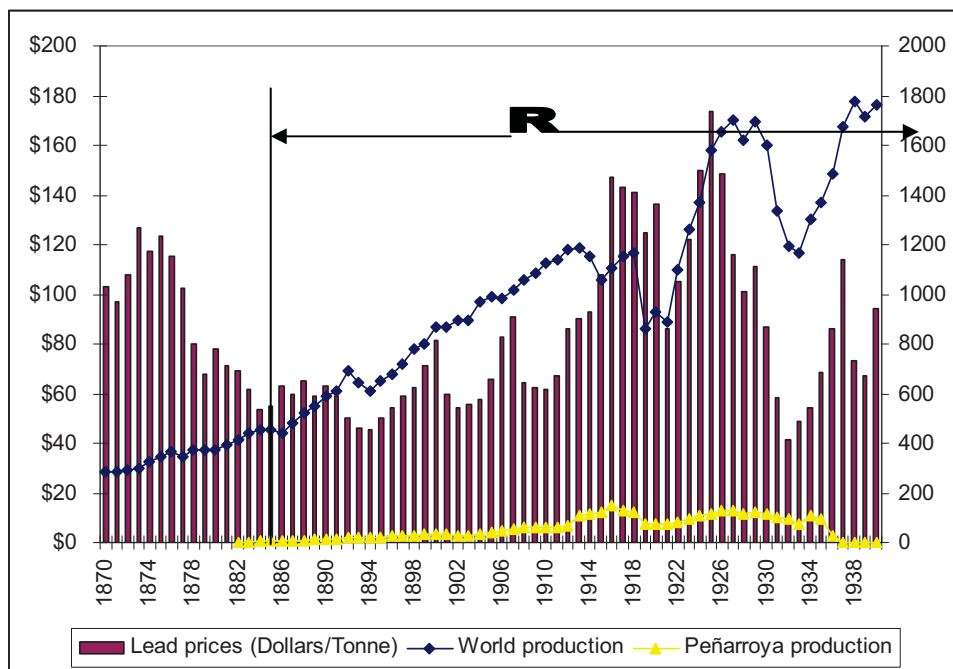
⁵⁶ The contract with Jorquera was later extended to 1883 and that with Roux to 1885, ARP 132AQ116 and Letters from Weil (Rothschild agent in Madrid) of 2-1-1879 and 14-11-1879, ARP 132AQ6208.

⁵⁷ López-Morell, M., "Peñarroya: un modelo expansivo de corporación minero-industrial, 1881-1936". *Revista de Historia Industrial*, num. 23 (2003), pp. 95-135.

companies and so strengthen the metal facet. This was carried out by a kind of takeover in which there was recognition for the superiority of the Peñarroya assets over those of la Hullera at a ratio of 2/3 to 1/3 in the new capital of 10 million francs.

The new company was able to throw itself into increasing its refining capacity through an ambitious expansion policy based on the purchase of deposits and supply contracts from bordering mines, and was able to double its refining capacity before the century was out. The growth had an even greater value in that it occurred during a period of continuous falls in prices and with ever stiffer competition on the international market from the North American lead producers. However, the really huge growth of the company came about with the takeover of the two major lead businesses of Spain in 1912 and 1913 the Compagnie Française de Mines et Usines d'Escombrera-Bleyberg and the Sociedad Figueroa, and also the Sté. des Produits Chimiques de Marseille l'Estaque. Peñarroya thus took over a further six foundries as well as other chemical and processing plants in Spain, France and Belgium, which made it the leading world producer of refined lead on the eve of the First World War (118,017 tonnes in 1914), and the leading Spanish producer of coal, with a production of 828,825 tonnes in 1916. All these takeovers finished with increases in the capital of Peñarroya, which handed over its own shares to the annexed companies in exchange for their contributions. After the exchange of shares and some small extraordinary issues to collect funds, the social capital of the business stood at 24,375,000 francs, which tripled in 1917, after an increase in capital and an updating of the balance sheets.

Graph 3: Evolution of prices and world production of lead, (thousands of tonnes), 1870-1940



Source: Schmitz, C. J., *World non-ferrous metal production and prices*.

At this point a new period began for Peñarroya, which was now a real transnational company. The firm would repeat the same pattern of continually increasing its assets in order to increase its processing capacity and assure itself sufficient supply. The company would put emphasis on the creation of subsidiaries as opposed to mergers, both in Spain, where numerous companies would seek their shelter in the crisis riddled 1920s, and in the rest of the Mediterranean arc. The list of companies set up or taken over by Peñarroya in those years stretched to 48, of note were the Sté. des Fonderies de Megrine (1915), la Sté des Anciens Établissements Sopwith (1917), Société des Mines de Malfidano (1919), Società di Pertusola, with its filial Genmamari e Ingurtosu (1920), la Société Rehama (Morocco) (1926), the Sociedad Minero-Metalúrgica Zapata-Portmán. (1930) and, finally, the historic Compagnie Française des Mines de Laurium (Greece and Turkey) (1932)⁵⁸. Together they made Peñarroya the leading industrial company in Spain in terms of assets by the beginning of the thirties⁵⁹ and one of the most important multinationals of the Mediterranean.

Copper and pyrites

Around the 1870s the possibilities of any serious participation in the Spanish copper market were seriously compromised due to technical problems and lack of investment in the sector. This was specially noticeable in Rio Tinto, without doubt the largest most accessible copper pyrites deposits in the world at the time – a real “Crown Jewel” with an estimated 200 to 400 million tonnes of mineral – and which neither its owners, Spain, nor any of its lessees, had been capable of profitably exploiting since its reopening in 1725.

Pyrite is a complex mineral, containing variable percentages of copper (1.5 – 3.5%), about 48% of sulphur and a somewhat lesser percentage of iron. Such contents guaranteed its financial success. On the one hand, its relatively low copper content in itself ensured at least 50% profit. It should be remembered that at the end of C19 this metal had become a fundamental element all over the world since cabling and other electrical materials, like alternators had come into general use, not forgetting its traditional uses in military industry, bronze, coin, etc. On the other hand, its high percentage of sulphur meant that it was a basic element of sulphuric acid, today an unwanted derivate in oil refineries, but a key chemical reagent during the second industrial revolution, with direct applications in the textile, glass, soap, fertilizer industries and others.

In spite of their fleeting participation in Tharsis in 1854, the mine which would later give Rio Tinto no respite in the fight to be number one in the pyrites

⁵⁸ López-Morell, M., “Peñarroya: un modelo expansivo de corporación minero-industrial”.

⁵⁹ Carreras and Tafunell, “La gran empresa en España (1917-1974)”. Revista de Historia Industrial, num. 3, 137

market⁶⁰, the Rothschilds never showed any real interest to get involved in Rio Tinto despite some proposals to that effect by their Madrid Agency⁶¹. In 1872, however, the Spanish government put the mine up for sale for 104,357,769 pesetas. There were no takers for the mine, which until then had been barely profitable⁶², so the government cut the price by 10% (to 92,756,592 pesetas) and called a new auction in January 1873, after first making an offer at a lower price to the Rothschilds, who were willing to pay 60 million pesetas for the mine⁶³.

Just when everything seemed to be settled, an international consortium set up and headed by a British financier, Hugo Matheson, stated it was willing to come up with the 92.7 million pesetas. From this operation was born the Rio Tinto Company Limited⁶⁴. There is no written record of any relation with the Rothschilds in the setting up of this company.

The idea of Matheson and his partners to turn Rio Tinto into a great copper and sulphur mining business turned out to be a great problem. To start with, in spite of the intense propaganda and the solvency of the entrepreneurs, the issue of shares was disastrous: the few shares put up for sale were exchanged for barely 30% of their nominal value. Public distrust crossed borders, since when Matheson tried to put the shares on the Paris market, Crédit Lyonnais declared that the business was incapable of meeting its debt. The result of this unfortunate start was that the new company had to borrow large amounts of money so that it could meet its financial obligations⁶⁵.

On top of these problems there were those caused by the market. The entry by Rio Tinto upset the pyrites market, which until then had been shared by the Tharsis and Mason & Barry, located in Portugal, but near the border. The three firms signed an agreement in 1878 when the price of sulphur sank by 30%. Under this agreement the price recovered half its loss and the market was shared out among the three companies: Rio Tinto got all of Europe and 40% of Great Britain; Tharsis had 33.33% of the British market, and Mason & Barry the remaining 26.66%. The agreement was for three years and renewable⁶⁶, yet it was scarcely

⁶⁰ The House of Rothschild lent 500,000 francs to the Duke of Glücksberg, but the French experience in Tharsis failed and the business was transferred to a Scottish group directed by Tennant, in 1866. Checkland, *The mines of Tharsis. Roman, French and British enterprise in Spain*, (London, 1967).

⁶¹ Letter from Weisweiller and Bauer of 12-7-1867, ARL XI/109/92.

⁶² Including Bauer, who wrote to the Rothschilds: "...under such risible conditions, naturally nobody will pay that price". Letter of 30-4-1872, ARL XI/109/108.

⁶³ Letters from Weisweiller and Bauer from 18-11-1872 to 2-12-1872, ARL, XI/109/110 and 111.

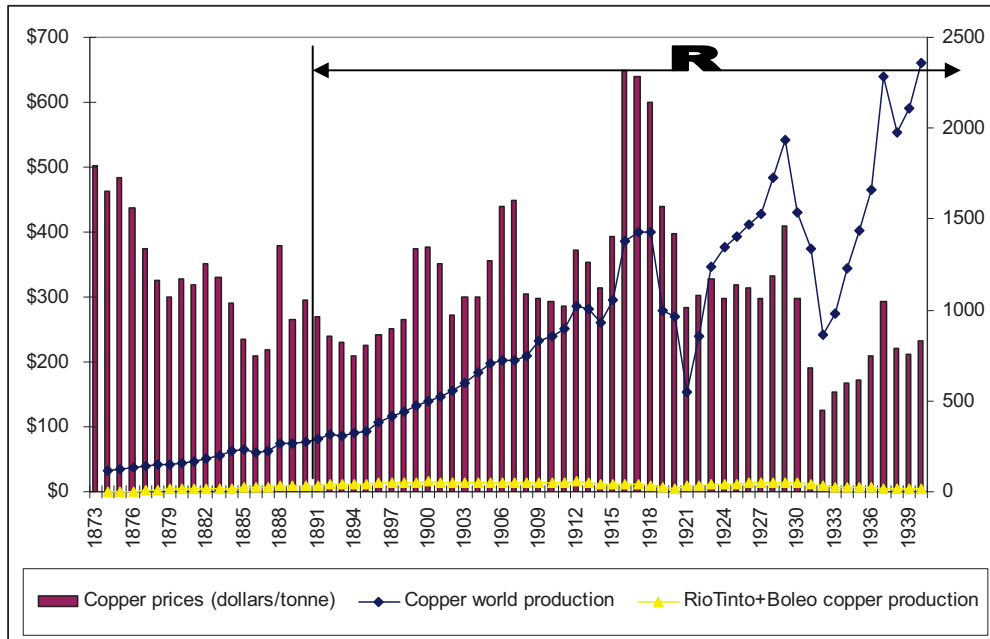
⁶⁴ Avery, D., *Not on Queen Victoria's birthday. Story of the Rio Tinto Mines*. (London, 1974). The consortium was made up of the British firm Clark, Punchard & Co, the Deusthe National Bank de Bremen, the London insurance group Smith, Payne y Smith, the industrial bank Arthur Heywood, Sons & Co, of Liverpool, and Sundhein and Doesth.

⁶⁵ Avery, D., *Not on Queen Victoria's birthday*, chapter 8 and Broder, A.: *Le rôle des intérêts étrangers dans la croissance économique de l'Espagne: 1815 -1913..* (Paris, 1979), 1471 and 1474.

⁶⁶ Harvey, C., *The Rio Tinto Co.*, 56-57 y Checkland, S.G. *The mines of Tharsis*, 144.

able to ward off North American competition from the Montana copper. The agreements finished in 1885 and the situation became so desperate that a proposal was sent to the Rio Tinto shareholders to merge with the other two companies and create a single business with a capital of 15 million pounds which would be able to deal with the competition once and for all and make investments profitable⁶⁷.

Graph 4: Evolution of copper prices and world production (thousands of tonnes), 1870-1940



Source: Schmitz, C. J., *World non-ferrous metal production and prices*, Harvey, *The Rio Tinto Company, The Mineral Industry and Canudas Sandoval, Las venas de plata en la historia de México* (Tabasco, 2005), vol. 1, 593.

Against this backdrop of events it is easier to understand why the Rothschild family decided against investing in Rio Tinto during its first 15 years, and opted instead for safer investments in copper mining, like the Compagnie du Boleo⁶⁸, which supposed a new association with the Mirabauds. Boleo was a medium sized Mexican mine which produced some 10,000 tonnes/year of copper up to the thirties. Its initial capital was 12 million francs, of which the Rothschilds put up 37.5%, enough to assure themselves the control of the company.

At the end of the 1880s, the sudden arrival of the Rothschilds as Rio Tinto shareholders occurred. It all began when then famous banking family seized the opportunity following the upheaval, caused by the failed world copper monopoly, instigated by Hycenthin Secretan between late 1887 and early 1889, to buy up a

⁶⁷ The price of the Tharsis, Mason & Barry and Rio Tinto shares had dropped to just 5.5 million pounds in 1887 from the 18 million pounds in 1882, Harvey *The Rio Tinto Co.*, 71.

⁶⁸ ARP 132AQ 107 y 335.

large number of Rio Tinto shares and gain a dominant position in the shareholders assembly, a position they would hang on to for more than 80 years⁶⁹.

In spite of this event, the Rothschilds showed no hurry to take control of Rio Tinto. They had the patience to wait as the founder directors, Matheson was the first, slowly left the board and to put their own pawns on the Board. From there, they imposed important decisions aimed at increasing profitability.

The first of these decisions were financial, with three fundamental operations. First, there was the issue of 3,600,000 pounds in bonds, aimed at reducing the company's debt, which was zero by May 1895, probably because of the confidence the Rothschilds' presence inspired in the issue. All the outstanding bonds were paid off and annual interest payments were cut from 200,000 to just 74,000 pounds per year. A few months later the Rothschilds included a second measure which divided the shares into ordinary and preferential. This rewarded shareholders and consolidated their own control of the company by excluding the more conservative shareholders. Finally there was an increase of capital in 1905, which served to pay off all the company's old debts and left it free of all financial burdens until the thirties.

The Rothschilds succeeded in imposing gradual reforms at a technical level through Charles Fielding, one of the directors of their London office, who became a director of Rio Tinto in 1900 and chairman in 1905. Fielding was a driving force behind the modernization of existing technologies in the mining production processes, for example, the modern natural cementation processes used for some time by Tharsis that allowed copper to be recovered from poor pyrites without calcination of the mineral, which led to a new product – washed pyrite, which had no copper but which had all its sulphur, which could be sold directly to the German and North American chemical industries. Rio Tinto was able to raise its production of this sub-product to 977,812 tonnes in 1912. Thanks to its good price it was a spectacular success on the market as is shown by the fact that in 1905 80% of American produced sulphuric acid came from the Rio Tinto pyrites.

The outcome of all these changes was that profitability rocketed and Rio Tinto went through the period of huge profits that was to make it famous. From 1897 its annual profits did not fall below one million pounds and the record year came in 1906, when the company made a pre-tax profit of 2,420,996 pounds. The effect on the dividend for the ordinary shares was spectacular. Between 1897 and 1913 they received a mean annual dividend of 69.05% of the capital⁷⁰. As a result

⁶⁹ The Rothschilds lent Secretan 37,114,943 francs during the last months of the monopoly and received 30,783 tonnes of copper against the debt. ARP, 132AQ 117 and Revista Minera, 24-3-1889, 96. In spite of widely held opinion, the involvement of the Rothschilds in the Secretan copper union affair was never proved.

⁷⁰ López-Morell, M., *La Casa Rothschild en España* (Madrid, 2005), chap. 8 and Harvey, C. *The Rio Tinto Co.*

of this success and the level of confidence that Rio Tinto inspired on the financial market, in 1912 the company was considered as the thirteenth industrial enterprise in the world in terms of capitalization⁷¹.

Building monopolies

In short, now we have seen how the Rothschilds established themselves over a period of time in the various markets by gaining control of a leading business or by means of a trade monopoly, we will move on to outline the specific strategies they employed in order to manage the market. There are three clearly distinct stages here. The first covered the period up to the First World War. The second, which ran through that war, allowed the family to strengthen its control of the market, thanks now to the importance given to their businesses by the allied governments involved in the war. Finally there was the interim period of the World Wars in which the Rothschilds abandoned the mercury market and gradually lost their influence in other markets, although this did not prevent them continuing to give priority to establishing agreements with the competition that would safeguard the profitability of their businesses.

Before 1914

In the case of the mercury business, the Rothschilds enjoyed a pure world monopoly during the 12 years they controlled the Almadén output (17 years if we include the Hezpeleta years). They were able to apply a clear profit seeking strategy thanks to their privileged position with the Spanish Administration. In short, the price they obtained in the 1835 contract meant a huge net difference of 112% on the maximum price reached that year in Mexico. The figure, however, must only be considered as a minimum insofar as the Rothschilds, with their monopoly were in a position to vary prices according to their customers' ability to pay. The Real del Monte mining company, as did others, tried to wriggle out of the Rothschild monopoly as of the thirties by buying directly from London, but all that they achieved was to reduce their bill by the percentage charged by Mexican intermediaries, a saving of around 25%⁷². In order to avoid losing even this margin and so increase their own margins, the Rothschild entrusted the mercury sales in Mexico to the house of Drusina, William & Co. in 1838, and the mercury began to be distributed through a series of sub branches in San Luis Potosí, Zacatecas, Guanajuato and Tampico (there along with Lameyer & Co.), while always seeking to maintain prices at a level which would not affect Rothschild sales in Europe⁷³. Lionel Davidson joined them in 1843, sent as a fully empowered agent from the House of Rothschild in Mexico. He was to work from

⁷¹ Schmitz, "The world's largest Industrial Companies of 1912". Business History, vol.37, num. 4 pp. 85-96.

⁷² Randall, *Real Del Monte: una empresa británica en México*. (México,1977) 188-189

⁷³ ARL, XI/38/88

Zacatecas, Guadalajara and Guanajuato⁷⁴. In his hands, prices rose even more and peaked at over 3,000 reales the hundredweight, even alongside a substantial increase in production, something which would not save some of the emblematic businesses from ruin, as was the case of Real del Monte.

In the years that the 1870 contract and its renewals were in effect, the strategy of the Rothschilds can be basically summed up as maintaining the status quo with the Americans and avoiding falls in price. Up to the First World War, the Rothschilds had an agreement of permanent collusion with the American producers, who made no attempt to sell surpluses in Europe⁷⁵. The Rothschilds had given up their Mexican network decades before, but now European industries were demanding increasing amounts of mercury for new applications. Here the key issue was to keep the prices high by holding back stocks when the demand waned. Up to two whole annual productions were retained at times. When the price was right the Rothschilds sold to the main brokers in the City, headed by Alexander Pickering and J. Berk or to Leghorn Trading Mitsubishi, when not delivering directly to manufacturers like Chemisque Frabik or Mafra, both in Hamburg.

These commercial contacts which the Rothschilds had built up over their many years in the markets were the best guarantee to safeguard prices. Indeed, the Rothschilds did not shirk from threatening the Spanish government on various occasions that they would ruin the market with a low pricing policy were they to lose the contact. In 1836 they had sent a warning in writing to the minister Mendizábal, and they would do the same in 1897 when the House of Howley, in London, tried to win the contract and with a loan to finance the Cuban War. And they did so again when the contract was renewed for the last time in 1911⁷⁶. In any case, these agreements suited Spain nicely as it was able to enjoy the large part of the sales profits from the monopoly, although this did not stop Spain reducing the Rothschilds' commissions again and again. In fact, when Spain directly took over control of sales in 1921, it made a carbon copy of the Rothschilds' system through the Sociedad Española del Mercurio and the later cartel with the Italian producers⁷⁷.

⁷⁴ Ferguson, opus cit, p. 394. In 1854 Lionel's brother Nathaniel would join in the agency, and would be representative between 1854 and 1875. ARL, XI/38/78-80

⁷⁵ In fact, Nueva Almadén had already lost its dominant position, since the first seam saw its spectacular returns of on average 36% disappear in 1850, and the mean share values fell to 19% in 1862, 11% in 1865 and 5.35% in 1870. The decline was only compensated in 1871, with the drilling of very deep wells and with important technological changes. Sánchez Molero, *Memoria de Azogues*, and Samuel Purnell, "Remarks on Quicksilver", an article which appeared in the *Iron Newspaper* on 4-11-1876, collected in ARL XI/ 109/123.

⁷⁶ Letter from Gustavo Bauer to the Rothschilds of 11-3-1911 ARL XI/111/75 and Letter from the French Embassy in Madrid to the French Minister for Foreign Affairs, Hanotaux, of 20-11-1897, Records of the French Ministry of Economy and Finance, B-31.186.

⁷⁷ López-Morell, Miguel, A. "La comercialización del Mercurio de Almadén durante el Siglo XIX y el primer tercio del S. XIX". *Boletín Geológico y Minero*, nº 119 (3), 2008, pp. 309-330 and Segreto, L., Monte Amiata. *Il mercury italiano. Strategie internazionali e vincoli extraeconomici*. (Milán, 1991)

In the case of Nickel, the rupture of the world monopoly with the arrival of the North American producers was resolved through an agreement with the Canadians in 1896 instigated by Metallgesellschaft⁷⁸. The 1896 agreement is not in the Rothschild records. Backed by Metallgesellschaft it spelled the end of the Le Nickel monopoly and initiated a clear international duopoly, in agreement with the Canadians. It would allow a significant recovery in prices and maintain them surprisingly stable until the Second World War, in spite a significant increase in production as of the first decade of the twentieth century, which would be redoubled in 1935. However, all the other agreements closed as of 1904 are in the records. Specifically, the one signed December 31, 1904 served to renew the expiring one of 16-7-1901⁷⁹. Its promoters were Mond Nickel and Metallgesellschaft, but it also bound Le Nickel and the International Company, Canadian Copper and Orford Copper, who were already working as one company prior to their merger. The basic aim was to avoid the Mond production upsetting the market, and so it was granted 15% of the world market, estimated at 7,000 tonnes per year (the mean of the last years). Were the market to surpass that figure, Mond would be able to increase its sales up to 22.5% in the next tax year. The rest of the market was shared out between Le Nickel and the future INCO, who each respected the other's sales areas - Europe for Le Nickel and America for the Canadians. In any case, Metallgesellschaft would be the preferred seller, on commission, at the price fixed by the cartel. The agreement would remain in effect until the end of 1910.

In the following years the spectacular growth in demand rendered any explicit agreement useless and there functioned a clear separation of markets at stable prices, with Le Nickel and Mond selling exclusively in Europe and INCO in the United States. The increase in demand was such that the Canadian country did not even bother to refine its minerals but delivered them directly matte to the American iron and steel producers.

In Peñarroya the strategy to approach Metallgesellschaft in order to control the market was a little late and required prior negotiation. The Rothschilds had reserved for themselves the exclusivity for the sales of all the Peñarroya products in 1881 through a contract that was renewed in 1890, 1891, 1898 and 1904⁸⁰, through to the end of 1909. That year the German company initiated a series of meetings to set up a cartel of lead producers, which took place in the Peñarroya headquarters. The aim was not to restrict production but to establish sales areas and manipulate the market so that the price of lead would rise in Europe. After two months of talks, the proposal became an agreement which was signed by

⁷⁸ Bouvier, *les Rothschild*, 257. This German consortium held a wide network of subsidiary firms all over the world which were devoted to extraction, profit and trading of copper. It also had as a member Henry Merton, the most influential of brokers on the London Metal Exchange, while in America it had American Metal Co. as a filial.

⁷⁹ Copy of the market agreement of 31-12-1904, ARP 132AQ91.

⁸⁰ ARP, 132 AQ 354.

Metallgesellschaft and Henry Merton, but also by the companies in the chart below, who together made up more than 40% of the world's production.

Chart 1: Participants in the negotiations to organize the lead cartel of 1909 and their productions for the European market.

Producer	Annual lead production
G. & J. Figueroa	28.000 tonnes
Société des Anciens Etablissements Sopwith	24 à 28.000 tonnes**
Société LA CRUZ	2 à 3.000 tonnes
Minière & Métallurgique de Peñarroya	53 à 58.000 tonnes
American Smelting & Refining C°	60 à 72.000 tonnes
American Metal C° Ltd*	25.000 tonnes
Broken Hill Proprietary C° Ltd	55 à 70.000 tonnes
Usine de Desargentation, Sté Anonyme, Hoboken*	60.000 tonnes
Sté Anonyme G. Dudmont & Frères*	18.000 tonnes
Bleihuetten Call*	22.000 tonnes
Compagnie Metallurgique de Mazarrón***	20.000 tonnes

Source: ARP, 132 AQ 103.

*Companies controlled by Metallgesellschaft ** Argentiferous lead not included.

*** Pulled out of the final agreement.

However, at the moment of signing the Rothschilds declared that they were only willing to cede 20% of their rights to the Peñarroya lead, since they did not wish to fail in their commitments to a long list of long-standing customers of their House, which forced the company to refuse to sign the agreement. Yet before the year was out it was shown that the cartel was selling at an average 11 francs higher than the Rothschilds, which led the bankers to terminate the contract voluntarily and new talks began with Metallgesellschaft to sell them all the lead production of 1910 and, possibly, that of 1911. And so Peñarroya formed part of the lead cartel to all effects⁸¹. From that moment, Metallgesellschaft began to buy all the production and to redistribute its leads on the German, British, Italian, French and Russian markets and to send the silver to the Rothschilds of London and to various French and Russian purchasers⁸² in exchange for a commission, which would increase in direct relation to the official market price. The agreement would be prolonged until the end of 1912 and it supposed an important boost for Peñarroya, thanks to an increase in the prices of lead, which rose from 12 pounds and 8 shillings in 1910 to 18 pounds and 15 shillings in 1913⁸³. In that year the contract had to be reformed to bring it into line with the new capacity acquired from the Figueroa and Escombreras properties⁸⁴.

In Rio Tinto, a large part of their financial success was built, as could hardly be otherwise, on a commercial reorganization in which the hand of the Rothschilds was clear to see after the fracas of the Secretan monopoly. Unlike

⁸¹ ARP, 132 AQ 103, dossier "Peñarroya 1909" and Archive Metaleurop PYA-Juridique. Num. 258. P.V.S.C.A., Book 5, sessions of 23-12-1909 y 26-5-1910.

⁸² Report of the French Consulate in Cartagena (1913), Archives du Ministère Français de Economie et Finances, B-31193.

⁸³ Gibson-Jarvie, R., *The London Metal Exchange. A commodity market*. (Cambridge, 1989), 174

⁸⁴ Archive Metaleurop, PYA-Juridique. N° 258. P.V.S.C.A., Book 6, session of 29-5-1913.

Almadén and nickel though, there was not a sufficient quota to dominate the market and so the strategy was seek oligopolistic agreements with other national and international producers and so, directly or indirectly, control the markets.

The first moves, after taking control in 1889 were aimed at liquidating the huge stocks in circulation on the market since the fall of the Secretan monopoly. The Rothschild did not hesitate to take part in an increase in capital of the other great world producer of copper, Anaconda, and so gain control of and run a new union of producers led by Secretan and Rio Tinto. In the meantime, Exploration Co., the filial of the London House of Rothschild, put pressure on the other American producers to lower their production⁸⁵. The cartel was in operation for six years and served to greatly alleviate the situation of the large copper companies, which were able to cash in their excess stocks.

Rio Tinto would lose its decisive role in the markets to the American producers with the creation of Amalgamated Copper Co. in 1898, which would bring together all the Montana copper producers. But by then the demand of the war industry and the definitive spread of electricity had given way to the age of copper and had pushed prices up. Rio Tinto took a comfortable back seat, as did Metallgesellschaft. Other specific agreements for the European market with other pyrite producers were signed in 1905 to mark out the selling areas. These would settle the European market and they would be renewed in 1911 and 1916, through to the end of 1921⁸⁶.

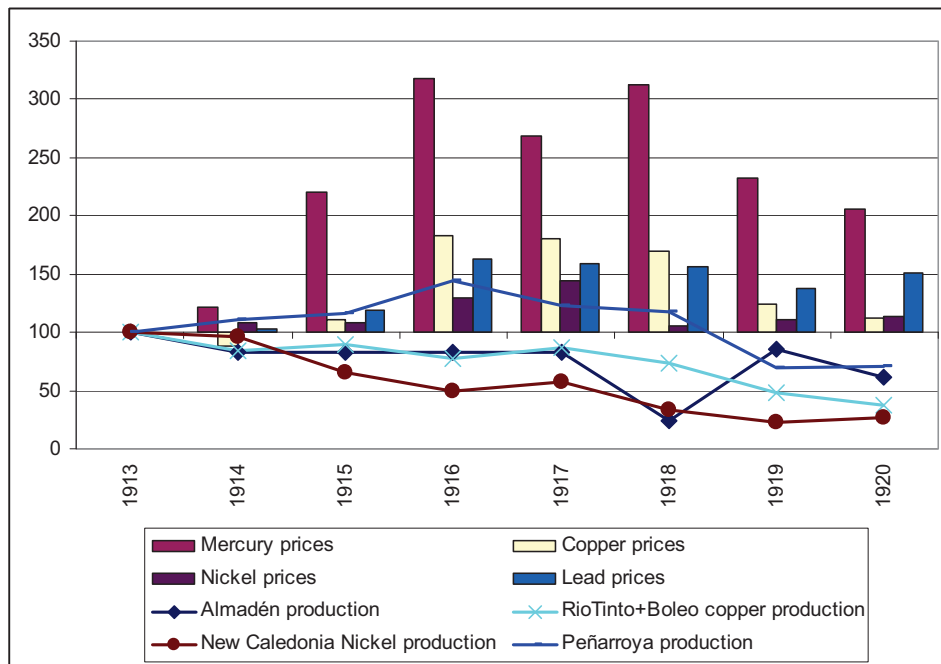
The First World War

With the outbreak of the Great War, lead, zinc, mercury, sulphur and copper assumed huge importance as the war industries boomed. Yet not all the mining sector was to reap the benefits on account of the problems arising from the underwater blockade and the interruption of international transfers. This did not affect the Rothschilds' businesses as they were able to strengthen their position as market managers and reaped extraordinary compensation from slump in productions and the general increase in prices. The exception was Peñarroya, which even enlarged its refining capacity thanks to new mergers and the increase of supplies in Spain.

Graph 5: Copper, nickel, lead and mercury prices and production evolution (1913=100).

⁸⁵ Report on the copper industry in Montana (9-12-1894). ARP 132AQ 117. file 2. and Turrel, R. and Van Helten, "The Rothschild, the Exploration Company and Mining Finance", 194.

⁸⁶ Harvey, C., *The Rio Tinto Co.*, 171 and Checkland, *The Mines of Tharsis*, 192-196.



Source: Graphs 1-4.

As regards mercury, the House of Rothschild substantially reduced its loss of margins of the 1911 contract with Spain, keeping a stable net profit which it received from its participation. This was mainly achieved by the entente between the British Government, the Rothschilds and the Spanish and Italian Governments, who placed their mercury in London during the war at a ratio of one Italian vial per two Spanish flasks, and at a considerably inflated price, which rose from 6 pounds in 1914 to 24 pounds in 1918. This kept the exporters happy and did not upset the British War Ministry too much⁸⁷. This more than compensated the loss of the German market, which prior to the war had become the biggest importer of mercury in the world (around 30,000 flasks/year).

But what the war really showed up was the need for the Spanish and Italian Governments to come to an agreement so as to assure the profit levels of the product. This was in everybody's mind, especially since Italy had just incorporated Idria into its territory and the United States had lost a lot of its international role through the reduction of its annual production to a bare 6,000 flasks⁸⁸.

The need for agreement became yet more apparent when the prices began to fall from 1920, in spite of a reduction in world production to barely 75,500 flask, driven mainly by strong competition from Italy in London, with the country

⁸⁷ Letter from the British to the French Rothschilds of 23-2-1920, ARL, XI-111-151.

⁸⁸ The first to be interested in the cartel were the Rothschilds, for whom the business "under the present terms is not so profitable, but having sold mercury to the Spanish Government for so long, we would like to continue to do so were this possible". Letter from the Rothschilds to Alfredo Bauer, of 15-7-1921. ARL, XI-111-151.

putting its mercury on the market below the official prices⁸⁹. Umberto Savoia, director of Monte Amiata, had a meeting with Anthony Rothschild in an attempt to calm tempers and with an interest in knowing what strategies the Rothschilds intended to follow. He especially wanted to ascertain if they were going to try to get back Idria. Anthony denied any interest on their part but did show himself to be in favour of a possible agreement with the Italian mines regarding the renewal of its contact⁹⁰, which did not materialize.

So it can be seen how over the decades that Rothschild interests were related to the mercury market, thanks to their ownership rights of Spanish mines, which they had gained by the various mechanisms we have described earlier, they were able to hold on to their initial position of a practical monopoly, until the new American deposits were consolidated and so control access to the London market by competitors. During this first phase, as well as forcing prices up way above their costs, they discriminated prices so as to get hold of purchasers' surpluses. Once the market had switched to an oligopoly, the Rothschilds maintained a situation of sharing out international markets with their competitors and they started to invest in improving mining technology and in increasing the performance of the Spanish mineral. Finally, during the First World War, they positioned themselves so as to supply the British Government by means of a collusive oligopoly with the Italian deposits. This led to further agreements until the loss of the mining rights by the Spanish Government.

Rio Tinto, for its part, was able to more than make up for the poor results of 1914 and 1915. Whether it was to avoid excessive dependence on the North American producers or because Rio Tinto was still the most prestigious mining company, the British Government gave the latter a leading position in the new share out of the market. Indeed, it was the only representative of the mining industry (and one of the most active it was too) on the British Metal Committee along with numerous metal stockbrokers and politicians⁹¹.

Rio Tinto offset the difficulties of sending pyrites to Central Europe by applying for subsidies from the Ministry of Ammunition, so easing the overpriced shipping to the United States. Their argument was that these were fundamental to the American war industry production and to containing prices. The company thus increased its exports to the extent that it had to build a new plant in Deschelter, Philadelphia to process 100,000 tonnes of mineral a year (which could grow to 500,000) and to produce 3,000 tonnes of copper⁹².

Likewise, when the price of copper shot up to double, far surpassing the 130 pounds/tonne of standard copper, as an effect scarce entries, the allied governments negotiated to buy up all the Rio Tinto copper at a price of 115

⁸⁹ Letter from the Rothschilds to Alfredo Bauer, of 15-7-1921. ARL, XI-111-151

⁹⁰ Report of the meeting of 19-4-1920. ARL, XI-111-151.

⁹¹ Archives Nationales, Paris, F-12-7680.

⁹² Report on Rio Tinto, 1916, ARP, 132AQ 105, file 2 and Harvey (1981: 168).

pounds/tonne⁹³, so as to avoid speculation ruining the plans of the British Government. This provided an argument for the distributable profits to continue at pre-war levels. J.P. Morgan was insistent in seeking shares for its clients from the Rothschilds⁹⁴.

Peñarroya would on its own also take effective control of sales and the initiative to drive the market. The moment was indeed ripe, not only because of its effect on the control of the enemy's contraband but also because it offered a solution to the strong shake ups that were affecting the domestic markets. Lead traded on the London Stock Exchange at a fixed rate of £30 by government decision. But on the free Paris market it was selling at 1,900 francs (£70). Peñarroya was for establishing a measure to ensure a minimum of £40, which would be an incentive to the miners without stirring up the industry and the war ministries. In the face of an absence of proposals, Peñarroya offered a plan to the French Ministries of War and Commerce which would give some order to the mess in imports towards the Allies. It followed the steps used by Metallgesellschaft to intervene in the market, i.e. to form a large corporation of producers that would cover all the non ferrous metal production and would share it out amongst all at a fixed price. The corporation would be called *Minerais & Metaux* and would be open to any producer of any friendly nation, although Peñarroya included a list of companies that would support the initiative.

Chart 2: List of subscribers to the French group of the *Sociedad Minerais & Metaux* (September 1916):

Ain Arko (Société des Mines de Zinc d')	La Cruz (Société)
Association Minière Spassky Copper Mines	Laurium Française (Cié. Française des Mines du)
Balla-Karaidin (Société Ottomane des Mines de)	Malfidano (Ste. Anonyme des Mines de)
Boleo (Compagnie de)	Mokta (Société des Mines d)
Bor (Compagnie Française des Mines de)	Mirabaud & Cie. (Paris)
Cahen d'Anvers & c ^o (Paris)	Naltagua (Société des Mines de Cuivre de)
Catemon (Societe des Mines de Cuivre de)	Ouasta Mesloulou (Cie des Mines d')
Charanal (Chile) (Societe des Mines et Usines de Cuivre de)	Parzan (Compagnie des Mines de)
Compagnie Industrielle du Platine	Peñarroya (Ste. Minière & Métallurgique de)
Comptoir Lyon Allemand	Pontgibaud (Ste. Anonyme des Mines et Fondaires de)
Corocoro (United Copper Mines Ltd.)	Pyrites de Huelva (Ste Française des)
Cuivres & Pirites	de Rothschild Frères (Paris)
Demachi & Cie. (Paris)	Saint-gobain, Chauny & Cirey (Manufactures des Glaces &
Djebel Ressas (Société des Mines du)	Produits Chimiques de)
Fedj el Adoum (Société des Mines de)	Societe d'Afrinage (México)
Guergour (Société des Mines de Zinc du Huaron)	Sopwith (Ste. des Ancients Establishments)
Kanguet (Tunez) (Société des Mines de)	

Source: Archives Nationales, Paris, f-12-7679 and 7680.

The French put forward the Peñarroya project to the British, who gratefully accepted it, and all agreed to a new meeting to deal exclusively with lead, tin and zinc, which took place on the August 1st and 2nd 1917. Important decisions were taken regarding the future of the lead market⁹⁵: As of December 31 lead would be bought in Spain at the fixed price of 750 pesetas the tonne, and would then be shared out amongst the allies; all the countries committed

⁹³ Report on Rio Tinto, 1916, ARP, 132AQ 105, file 2.

⁹⁴ ARP 132AQ 104, file 3.

⁹⁵ Archives Nationales, Paris, f-12-7679 and 7680

themselves reduce their lead consumption and to restrict its use exclusively to those cases in which no substitute existed; there was to be a single buyer in each country who would fix the domestic price. Of course, Minerais & was awarded the exclusivity for sales in France and, as producer of the majority of the Spanish production, it would supply the rest of the allies.

The interwar problems

As predicted, the end of the war brought with it a drop in demand from the weapons industry and prices would not take long to fall. It also meant a serious problem of excess *stock* which the British Government sought to soften so that the market would not be over affected⁹⁶. The time had come to reach agreements with the competition, at the risk of a generalized slump causing the indefinite halt of some productions.

Once the war was over, Peñarroya inherited a large part of the commercial structure which it had itself generated during the conflict the moment that Minerais et Metaux, even though it lost its position as sole buyer on the French market, offered to organize the sales of Peñarroya. In Spain, Italy, Portugal and Argentina, G. y A. Figueroa would continue to organize the sales of the company as it had been doing for many years, and it agreed to collaborate with Minerais et Metaux in the sales in other countries⁹⁷. There was also, of course, the national actions of the Consorcio del Plomo, supported by the Primo de Rivera government which, despite the complaints from Peñarroya, increased domestic lead prices by 50%⁹⁸.

Other agreements affected the rest of the company's production in Spain, such as superphosphates and zinc. Some combinations flew in the face of the competition, like the agreement signed by Peñarroya in 1925 along with A. G. Figueroa with the Asturiana de Minas, under which the first two companies would refrain from building zinc lamination installations in Spain in exchange for a part of the Belgian company's sales profits of these products in Spain⁹⁹. All this in spite of the fact that Peñarroya had already amassed important blende productions in Spain and Italy.

From 1925 the lead market suffered from an excess in production, causing the drop in prices which we have referred to. The delicate situation of the majority of the producers led to a meeting in London, in 1927, called by the Consolidated Mining & Smelting of Canada¹⁰⁰. No useful agreement seems to have come out of

⁹⁶ The British Government held back its huge copper reserves and sold them off little by little and with a lot of publicity, so avoiding speculation.

⁹⁷ Archive Metaleurop, PYA Juridique num. 247.

⁹⁸ The Mineral Industry, 1934, p. 383.

⁹⁹ Agreement of 2-6-1925, Archive Metaleurop, PYA-Juridique. N° 247.

¹⁰⁰ Archive Metaleurop, PYA-Juridique, 259, Book 8, session of 28-7-1927

it either at the time or during the following four years. Moreover, the convention of April 1931 held to set up the Lead Producers' Reporting Association, which aimed to reduce productions and finance stocks on a common basis, was not able to slow down the fall in prices, and it would only last a year¹⁰¹.

Zinc production was similarly situated. The first cartel, which functioned between 1928 and 1929, was barely able to halt the fall in prices, since it could not stop the new producers in Australia, Canada and Mexico, who had carried out a massive introduction of the new electrolytic systems. A new agreement was reached for the following two years in Ostend in July 1931 among the major non American producers¹⁰². Peñarroya, for its own part, had unsuccessfully tried to defend a contingent for its new electrolytic factory in Crotona and was obliged to reduce its annual production to a level below the total of the best three months of the previous years. But Peñarroya accepted a proposal from ASARCO to join the Metal Traders, under the form of a share or increase in the capital of that company, which would be formed on the one side by ASARCO and Mining Trust, the main shareholder of Mount Isa, and on the other by Asturiana de Minas and Peñarroya, in a half share with *Minerais et Metaux*¹⁰³. In total, a 55% reduction in world production was achieved along with a significant containing of prices, at least for the duration of the agreements. However, all these agreements were tremendously distorted when it was confirmed that the pound, the fundamental market reference, was abandoning the gold standard, and its subsequent depreciation and by the adoption of massive protectionist measures by the majority of European countries and their colonies¹⁰⁴.

Far from being solved, the problems of the international market would heighten zing of silver sales by the American government, which was one of the most important customers of Peñarroya. The zinc and lead producers had further meetings in Brussels and London, respectively, in 1932 in an attempt to pull the markets out of their lethargy, but their virtual failure only encouraged the board of directors to approve an agreement with other French producers under which they sought the introduction of customs duties from the French authorities to safeguard the company's interests¹⁰⁵.

Le Nickel, whose production had until then been mixed up with that of the New Caledonia (Le Nickel did not use to publish its metal production figures) stagnated and was surpassed in the island by Caledonia. Its problems were to grow yet more due to a very hefty outstanding debt of *Metallgesellschaft* and Germany, and no dividends were paid out between 1920 and 1924. In 1923 there

¹⁰¹ Gibson-Jarvie, R., *The London Metal Exchange*. (Cambridge, 1989), 179.

¹⁰² Gibson-Jarvie, R., *The London Metal Exchange*. (Cambridge, 1989), 177-179.

¹⁰³ Archive Metaleurop, PYA-Juridique. N° 259, Book 8, sessions of 30-7-1930 and 30-10-1930

¹⁰⁴ Gibson-Jarvie, R., *The London Metal Exchange*. (Cambridge, 1989), 177- 179.

¹⁰⁵ Archive Metaleurop, PYA-Juridique, 259. P.V.S.C.A., Book 8, sessions of 26-5-1932 and 29-6-1933. The *Revista Minera* (1935, p. 278), confirms the adoption of protectionist measures for zinc and lead in France.

was a historic slump in prices to below 600 dollars the tonne, in spite of the fall in production to nineteenth century levels, which encouraged a return to the pre-war agreements. The purpose of a cartel made up of the three traditional stalwarts of the market (INCO, Mond and Le Nickel) was to assure a fixed world price for the sale of nickel, although INCO would keep for itself all the US sales. The remaining markets, in particular Europe, would be shared out at 41% for Inco, 41% for Mond and 18% for Le Nickel. London broker Henry Garner came in on the agreement as a future intermediary for a large number of the contracts¹⁰⁶.

The aims regarding the level of prices of the cartel were met, and in three years the official nickel prices had become stable and pre-war production levels were surpassed. Le Nickel started to modernize its installations. There was a new electrolytic plant in Yate, in New Caledonia, and so the firm started to employ the same arms as its local rival, Caledonia, which despite the temporary upturn of the markets and the strength of its Doniambo factory, was incapable of meeting its financial obligations¹⁰⁷. This led to the pact with Le Nickel to set up Caledonikel on a 50% basis. INCO supported the agreement unreservedly, fearful that the interest of the Unión Carnegie to take over Caledonia might materialize and suppose a threat to its own private US market. Indeed, not only did it accept Caledonikel in the cartel, but also allowed it a higher market share than its 1,000 tonne production capacity, which if it did not cover (as happened) would be met by INCO who would pay the French company for the sales. It even agreed to compensate Caledonikel for any future reduction in the sales price that might have to be imposed, something which came to pass in the next four years, since although the official market prices were artificially stable, the cartel would reduce them from 1931 to 1934 at a rate of 10% per year. All of which meant that Caledonikel enjoyed extraordinary incomes and was able to continue paying its shareholders even in times of crisis¹⁰⁸.

The situation of Rio Tinto and of the pyrite sector in general was the most delicate. Before the war Spanish pyrites had dominated the market against Sicilian and North American native sulphur, which was hardly competitive. The difficulties caused by the block on European exports during the war though led to a scarcity of pyrites, and so the North American chemical industry began to draw on its own sulphur, and to such an extent that the native sulphur obtained by the Frash process, used to obtain sulphuric acid, rose in the U.S.A. from 3% in 1914 to 48% in 1919. All this to the detriment of pyrites, which at the beginning of the war had been used in 74% of the acid produced in that country¹⁰⁹.

¹⁰⁶ Agreement to create a Nickel world cartel in October 1923 and the dossier of the prior negotiations (September/October 1923). ARP, 132AQ 92.

¹⁰⁷ Caledonia had a debt of 50 million francs in bad debts in 1930, 37 of which were with the Société Générale. Report by Weill of 30-4-1930, ARP 132 AQ 93.

¹⁰⁸ In the tax year 1934-1935, for example, Caledonikel and its owner partners received 12 million francs from INCO. Report by Weill of 23-2-1935, ARP 132 AQ 94

¹⁰⁹ Revista Minera. 1-1-1924. p.9.

Tharsis had few exchanges with North America and barely suffered any losses in this market. The majority of its customers were in Great Britain, where the industrial network did not experience the destructive consequences of the war, unlike in Germany or France, where the Rio Tinto pyrite customers were in the main. This meant that Tharsis could face up to the new panorama with much better guarantees. On the other hand, the Scottish company concentrated on an intelligent project to improve its deposits. This included improving its industrial installations and purchasing neighbouring lands. The aim was to focus on making the best use of the sulphurs and iron, leaving copper production a secondary role¹¹⁰.

The area of copper was analogous to that of sulphur. During the course of the Great War the U.S.A. went from being traditional importers of metals to accounting for 66% of world exports. The situation changed even more if we take into account that the large North American multinationals controlled most of the Chilean deposits and those in the rest of South America, and also most of the growing Congo production¹¹¹. Not to mention that by 1921 the three large North American groups controlled 74% of the world's copper refining¹¹².

Given all the above, the concern of the directors of the large pyrite companies comes as little surprise. From the early 1920s they saw the need to sit down and negotiate the unavoidable need to find some recipe together before the markets became totally free, which was not in any of their interests, when the market agreement expired in 1921. The Norwegian mining company Orka, which at the time was the number three pyrites producer in Europe, was in on the talks from the beginning with Rio Tinto and Tharsis.

However, after a year and a half of continuous beating about the bush, by the summer of 1921 the negotiations had ground to a standstill. All involved could see the advantages of an agreement, but no one was willing to bear the brunt of the cutbacks. The directors of Rio Tinto considered that Tharsis and Orkla still demanded too many concessions of Rio Tinto. On the other hand, Rutherford, the chairman of Tharsis, wanted at all costs to set a minimum market price rather than talk about sales areas and he rejected the proposal by Rio Tinto to extend the old contract by another 5 years¹¹³. He was well aware of the serious production problems that had beset his rivals during six months of uninterrupted strikes in their mine, and these together with the well known market problems had prevented them paying out dividends in the two previous years.

But the Rio Tinto Co. knew it was superior and it was not about to let its arm be twisted. So Steel-Maitland, Rio Tinto board member-delegate and negotiator, presented the board with a commercial policy project based on a

¹¹⁰ Checkland, S.G., *The mines of Tharsis*, 195.

¹¹¹ Gibson-Jarvie, R., *The London Metal Exchange. A commodity market*. (Cambridge, 1989), 140.

¹¹² Schmitz, C., "The Rise of big business in the World Copper Industry 1870-1930", 395.

¹¹³ Chekland, S.G., *The Mines of Tharis*, 198-199.

systematic lowering of prices in order to regain ground in sulphur and to put Tharsis up against the ropes. Using the excuse of negotiating would gain time to build a huge acid and superphosphates plant in Great Britain and, once the agreement had expired, the company would be able to multiply production and gain 46% of the pyrites market (as opposed to the 36% in 1913), The company would even be able to sell in Great Britain, the traditional Tharsis sanctuary. It sought to cover itself and requested technical reports from the Rothschilds on French customers, like Saint Cobain or the Azote company¹¹⁴, in preparation for the highly probable approaching war.

But suddenly an unforeseen possibility was on the table, a three-way merger of the companies¹¹⁵. At first sight the hypothetical merger had quite a lot going for it as it would allow concentration of production, which could be exported to the most advantageous destinations, reaching a price, on the basis of the current rates (70 pounds/tonne of copper), of around 25 shillings per tonne of pyrite¹¹⁶. Furthermore, there was the option of jointly building a huge mineral processing factory, which could lead to huge profits from the metals, in particular the iron content, something that individually was not feasible¹¹⁷. According to Walleberg, the financier owner of Orkla, the operation could suppose an increase in dividends in the region of 80%¹¹⁸.

The real truth though was that the Rothschilds and the Rio Tinto board had a lot of respect for the possibility that Tharsis and Orkla might seek an agreement on their own account and this would condition their goodwill towards the merger¹¹⁹. So even though they knew very well that Rio Tinto shares were significantly undervalued, that Tharsis shares were too high and that some of the information afforded by Orkla as regards the negotiation was not entirely credible, Steel prepared an offer which accepted all the figures provided as valid and that the shares of Tharsis were worth about 1/6 of the Rio Tinto ones¹²⁰. Yet one month from the end of the agreement, when the merger seemed inevitable, Orkla and Tharsis backed out, although they did not unite against Rio Tinto. With it disappeared the fears of the Rothschilds of an alliance between the competition¹²¹.

¹¹⁴ Harvey, C., *The Rio Tinto Co.*.171-172 and Letter from Steel Maitland to Weill of 22-10-1921. ARP, 132AQ 105, file 2

¹¹⁵ Letter from Anthony de Rothschild to the Paris House dated 28-10-1921. ARP 132AQ 106, file 1.

¹¹⁶ Remember that in April 1921 Rio Tinto was selling at just 12 shillings the tonne Report on Rio Tinto of 12-11-1921. ARP, 132AQ 104, dossier 3.

¹¹⁷ Report by Steel Maitland of 28-10-1921. ARP 132AQ 106, file 1

¹¹⁸ Letter from Lionel to Edouard de Rothschild of 10-11-1921. ARP 132AQ 104, file 3.

¹¹⁹ Letter from Anthony de Rothschild to the House of Paris of 28-10-1921. ARP 132AQ 106, file 1.

¹²⁰ Memorandum by Steel Maitland of 11-11-1921; ARP 132AQ 104, file 3.

¹²¹ Orkla insisted in its offer of a merger with Tharsis, but Rutherford was opposed to it, appealing to the need to maintain the identity of the Checkland company, S.G.-opus cit, p. 199.

The old agreement expired on January 1, 1922, and hostilities began. Normally, Rio Tinto should have been able to defeat its separated rivals, but things turned out quite differently. Tharsis reacted by drastically pulling down its prices, so taking on Rio Tinto at its own game. It took many continental customers from them, like Duisburger Kupferhütte de Renania or the powerful French Saint Cobain¹²². Surprised by how much its rival could suffer, Rio Tinto hit back on the English market, increasing its sales from 25,000 tonnes in 1921 to 85,000 tonnes by the end of 1922. Apparently, the difference in quality of the Rio Tinto resources went unnoticed at the time of signing, and Tharsis continued to improve on the successive reductions made by its rival¹²³.

The struggle lasted a few months. All the parties suffered equally and none was able to come out victorious. So by the end of 1922 the producers were ready to renew conversations. Rio Tinto came up with the formula of an association of pyrite producers led by Tharsis, Orkla and itself. It would include the possibility of granting the association the competence to establish quotas and prices. Up to there, the three firms were in agreement. The discrepancies arose when it came to fixing the system of decisions, since Tharsis and Orkla were not willing to accept the supremacy of Rio Tinto¹²⁴.

So, the first half of 1923 saw the prices of pyrites at rock bottom. An acceptable level of profits was only achieved because of the favourable situation of copper prices, which nobody knew how long would last. The situation took a turn for the worse when in June it became known that the American and Italian producers of native sulphur had formed a production and sales cartel¹²⁵. Rio Tinto realized that the situation could get out of their hands and waived its veto right in the association¹²⁶. Following new talks and the entry of two new members, Mason & Barry and la Société de Pyrites, the Association of Pyrite Producers was finally constituted in London on July 19, 1923 and for the next three years. As of that date the price of pyrites would be agreed on by all the members equally, and would function according to the following quotas:

Chart 3: Pyrite market division system from the 1923 agreement.

Market over....	2,870,000 Tonnes		2,970,000 tonnes		3,070,000 tonnes		3,170,000 tonnes		3,254,550 tonnes or more	
	%	Tonnes	%	tonnes	%	tonnes	%	Tonnes	%	Tonnes
Rio Tinto	50.125	1.438.590	50.481	1.499.290	50.126	1.559.990	51.126	1.620.690	50.929	1.657.500
Tharsis	21.636	640.940	21.789	647.140	22.068	673.340	22.068	699.540	22,169	721.500
Orkla	10.818	310470	10.818	323,570	11.034	336.670	11.034	349.770	11,084	360.750
M & Barry Soc. des Pir.	17.421	500.000	16.835	500.000	15.772	500.000	15.772	500.000	15,818	514.000

Source: Agreement between pyrite producers, 132AQ 106, file 1^a.

¹²² Checkland, S.G., *The Mines of Tharsis*, 199.

¹²³ Harvey, C., *The Rio Tinto C.*, 172.

¹²⁴ Checkland., *The Mines of Tharsis*, 199; Avery, D. *Not on Queen Victoria's Birthday*, chapter 5.

¹²⁵ Revista Minera. 8-5-1923, p. 251 and 1-6-1923, p. 298.

¹²⁶ Avery, D. *Not on Queen Victoria's Birthday*, chapter 5.

The agreement constituted a clear case of a rationalization cartel, with high internal regulation, strongly centralized decisions, a firm commitment to control prices and reduce costs derived from a scarcely efficient separation of sales areas. The sulphur sub-products were given priority over the metal ones. Similarly noteworthy were the internal control mechanisms on sales and the decision making, which took mutual distrust almost to the limits. Not even the union between Tharsis and Rio Tinto would be enough to get decisions, which were subject to almost unanimous agreement of the members, something which represented a huge drawback to even the most minimum manoeuvrability of the Association at short and medium term.

The signing of this agreement had created special unease in Rio Tinto, although its mentors considered it a lesser evil. Former chairman Fielding, who had opposed the agreement thought that an absolute advantage over the rivals was being thrown away since Orkla and Tharsis were putting their pyrite in port at a cost of about 15 shillings the tonne, while Rio Tinto could produce the same amount for 7 shillings and six pence. Similarly, the Italians and North Americans were selling their unit of sulphur at 18 cents, as opposed to the 10 cents charged by Rio Tinto. Fielding could see no objective reason for keeping Rio Tinto in the Association. The company was, according to him, perfectly able lower the price of pyrites to 12 shillings the tonne and so put pressure on Tharsis to negotiate under better conditions. Many mines would close at this price including some of those bought by industrial companies like Saint Gobain. Such businesses would then be interested in buying on the market. Neither did he believe that any dividend would be lost, because the decrease in sale prices would be offset by the increase in consumption and the results from the construction of a plant in England where the profits from sulphur and iron would compensate what was then being lost in the sales of raw pyrites. The estimated profit was 200,000 pounds/year¹²⁷.

The rest of the board, on the other hand, and with the support of the Rothschilds, preferred to be more prudent and was not of the opinion that this was the best moment to terminate the contract with the association. Doing so would not benefit the company excessively since the market was saturated with contracts until 1927¹²⁸. In support of this, a study conducted in December 1924 by the company's head of commerce, A.J. Clift, reported that if Rio Tinto left the Association it would lose up to 1,163,000 pounds in the following four years¹²⁹. It would also cause unnecessary harm to the members of the association, which could be highly prejudicial in the long term. Tharsis soon imitated the hypothetical industrial expansion of Rio Tinto and built more factories¹³⁰ and

¹²⁷ Report of the interview between Fielding and Weill of 19-6-1925, ARP 132AQ 106.

¹²⁸ "Report of the meeting between Geddes and Weill"(26-7-1925); ARP, 132AQ 106, dossier 1.

¹²⁹ Harvey, C., *The Rio Tinto Co.*, 208.

¹³⁰ "Report of the meeting between Geddes and Weill"(26-7-1925); ARP, 132AQ 106, dossier 1. Tharsis went so far as to organize a syndicate to finance the construction of a sulphuric acid plant,

there was a risk of messing up the new financial support of the Scottish company of the size of Morgan, Greenfell & Co¹³¹. Indeed, Fielding was left out of the final decision and Sir Auckland Geddes, who was in favour of negotiating, was promoted to chairman by the Rothschilds.

From the start the Association proved to be not very efficient. In fact, even though it had increased sales, this was due more to the post-inflation period in Germany than to the good running of the Association. Rutherford had manipulated it from the beginning to his own interests, taking it towards a policy increased sulphur prices. Meanwhile, other non Association producers like Cyprus Mines Corp. took advantage of the lack of flexibility of their competitors and gained more and more market share. At least 28 lesser mining firms had also voluntarily not come in on the agreement and they quickly gained 35% of the market. If that were not enough, the Association had been incapable of properly organizing the distribution of the purchasing areas, with the result that there were any savings in freightage and customs duties. The situation was highly unfavourable for Rio Tinto. It was the company that obtained copper at the lowest cost in all the world because it distributed a large part of its enormous production among manufacturers of sulphuric acid, who returned the slag, ready for metal extraction, at a cheap price. If, as was beginning to occur, the chemical industries moved towards obtaining the acid from native sulphur, the company could lose a lot more through a decrease in sales, even selling more expensively, than in a market war¹³².

Faced with all these conditions, Rio Tinto announced in 1926 that it would not be renewing its agreement with the association, which in practical terms was the same as announcing the death of the organization. In unison, and given that it was not disposed to let the market sink again, the board of Rio Tinto manoeuvred things so that the company could gain control of the market without Tharsis being able to get into a position where it could catch them worse off again. In October 1926, Rio Tinto reinforced its old relation with Metallgesellschaft and together they formed a new organization, the European Pyrites Corporation (EPC), which essentially replaced the association under the conditions that were suitable to a Rio Tinto. During 1927 the EPC managed to persuade Mason & Barry, Orkla and the Spanish San Platón to waive their rights to the sale of pyrites in exchange for a drop in production. Other agreements followed to limit purchasing areas with the Société des Pyrites, the North American Cyprus and the German mines of Menggen and Oberungarische¹³³.

in which they put up 50% of the necessary 400,000 pounds. Rutherford shelved the project the moment the agreement of the Association was signed; Checkland, S.G.-opus cit, p. 199.

¹³¹ Report of the meeting between Weill and Lionel Rothschild of 19-6-1925, ARP 132AQ 106, 1^a file.

¹³² Harvey, C., *The Rio Tinto Co.*, 173 y 208.

¹³³ Harvey, C., *The Rio Tinto Co.*, 209; Avery, D., *Not on Queen's Victoria*, p.p. 312-313.

Totally isolated, Tharsis gave in in 1929 and signed a new agreement with Rio Tinto. There would be no control of prices or market shares. Thereafter, the market would move according to a system of three lists of customers. The first list was that of the clients of Rio Tinto and its associates; the second those of Tharsis. Neither could touch the other's list. The third list was made up of free companies that were not tied to either of the two businesses. Here each could compete for them in the conditions it wished. The agreement would be binding until 1934, when it was renewed, given the good results it had supposed. In April 1936 the chairman of Rio Tinto, Auckland Geddes, and Rutherford went to New York to make an agreement with American producers regarding a definitive assignation of the sulphur market in Europe¹³⁴. Thus the danger of a shift in pyrite was dispelled and the commercial wars became a thing of the past.

Conclusions

In this article we have analysed the employed by the Rothschilds over almost a century of business activity in the non ferrous minerals international markets. The simultaneous participation in highly diverse markets does, however, share a common characteristic. The use and industrial applications of these minerals had few substitutes, which meant that the demand was not very elastic in terms of market price, in turn favouring the acquisition of any surplus and so be in a position to exercise a monopoly.

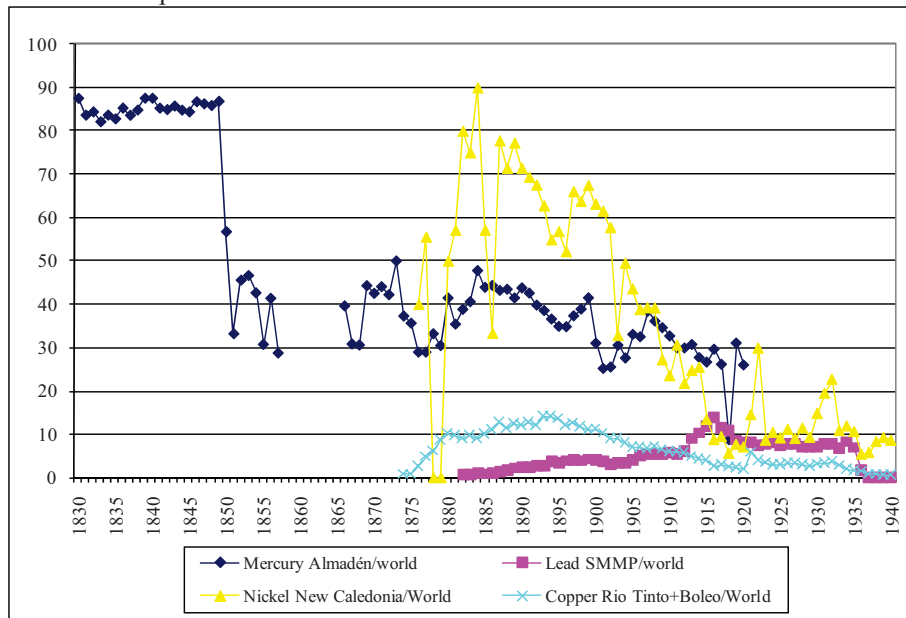
It is one thing to come in on a market with an inflexible price demand but quite another to attain a dominant position which allows one to put up the prices and to buy up any surpluses. The Rothschilds carried out a whole range of actions of different natures in their quest to obtain the ownership rights to exploit and trade favourably in strategic minerals like mercury, lead, nickel, copper and pyrites. On occasions they would wait patiently for the moment to buy shares in the companies, when these were on the stock market and the conditions for mining exploitation were clearly defined. On others, they would directly acquire the ownership of the mines via their own financial reserves, taking advantage of the treasury needs of governments or owner companies. On yet other occasions they controlled the technological processes of extraction, transformation or smelting and introduced innovations that, thanks to the scale economies that these generated, enabled them to gain important economic margins and to control world markets. When necessary, they would resort to all types of scheming to prevent competitors obtaining the finance they required, or they would flood the market with their surplus production so as to make the prices plummet and render companies they wished to buy temporally unviable. Finally, apart from these habitual practices, they also actively sought out incomes, blithely resorting to corrupt actions of all natures and insider dealings to obtain the concessions they desired from the Spanish Government, as they would systematically do to obtain

¹³⁴ Checkland, S.G., *The mines of Tharsis*, p.p. 202-203.

the mining rights of the Almadén mercury. One thing that must never be forgotten if we are to understand the enormous pressure they could apply is the huge financing power the House of Rothschild wielded and the powerful position they occupied through being one of the main creditors of the Spanish state.

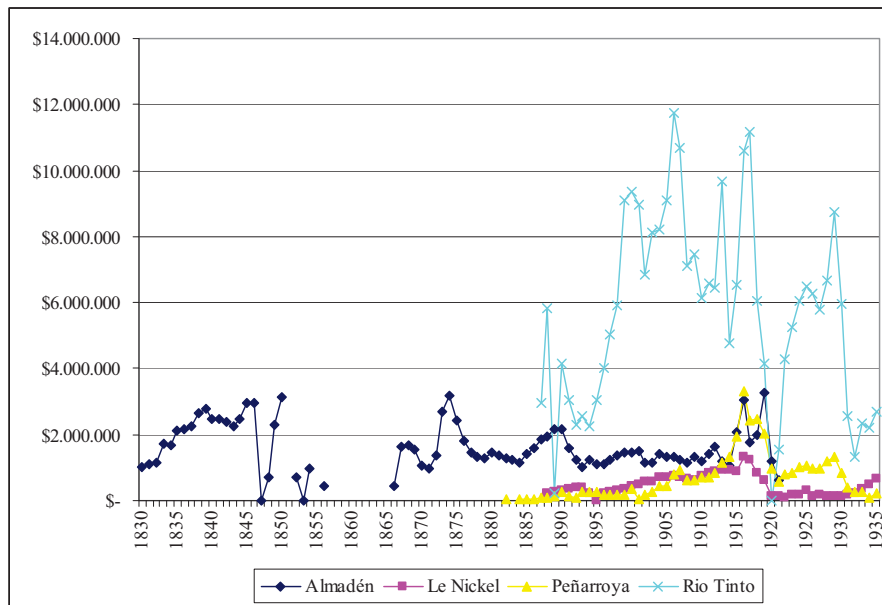
In any case, the aim of gaining a categorical share with which to manage the market was successful in certain situations only. The only true monopolies were Almadén between 1830 and 1847 and Le Nickel up to 1896. In both cases the existence of a sole real competitor meant a de facto duopoly until 1940. The Le Nickel agreement led to stable prices for a surprisingly long time (see graph 2), in spite of the continued loss of importance for the Rothschild business on the world stage. The giants, Peñarroya and Rio Tinto, gave more weight to the fact that it was a dominating business in its respective markets than to a share of a market where there was little concentration in demand.

Graph 6: Worldwide market share of the Rothschild businesses.



Source: Graphs 1-4.

Graph 7: Operative profits of Rio Tinto, Peñarroya and Le Nickel and Almadén during the years of Rothschild control, 1830-1935.



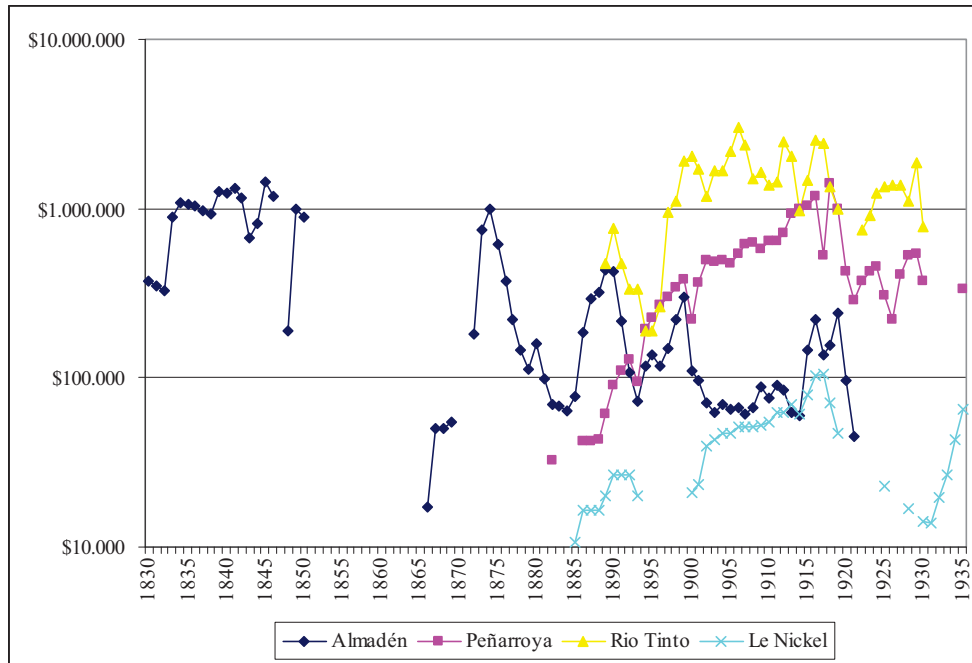
In terms of their companies and the markets they were involved in, the consequences of their actions were far reaching. On the one hand it is seen how the market agreements they favoured significantly slowed down any processes of concentration of those involved, as well as many processes of vertical integration of their production, which would have been highly recommendable in a competitive scenario. For the same reason, the technological factor was relegated to a second level and businesses involved agreed to forgo improving both the scale of their production and reducing prices by any of the various means they had available. However, it seems more than clear that the strategy was more profitable for the businesses and promoters alike. The long term effect on results was spectacular (See graph 5). Evidently the profits were greater in the periods of greater market control and, specifically, according to markets in chronological terms, it was as follows: Mercury (1835-1847, world monopoly), Copper (1895-1918, friendly world oligopoly for copper and sulphur), Lead (1909-1930, cartel and control of sales) and Nickel (1896-1940, world duopoly).

In short, the decisive factor of the commercial strategy of these businesses was the Rothschilds' determination to use agreements, or when possible absolute sales monopoly, based on their own, or an associated, commercial network that was at the level that the secondary sector was acquiring.

It was the result of premeditated decisions. The Rothschilds' natural modus operandi was the monopoly and they systematically refused to participate in economic activities in which they would have to compete on an equal footing with others. In short, they staked their interests in business sectors or areas where control of the market would result directly in extraordinary profits. The inherent profits of such actions were not always tangible, on occasions they opened the door to parallel speculations on the London Metal Exchange or the Paris and London stock markets, which did not cash available funds, but at the most basic

quantifiable level gave them the portfolios of the businesses in question and from there, abundant profits (See graph 6).

Graph 6: Profits per dividend for the Rothschilds from their operations.



In our opinion the case of the Rothschilds is a spectacular illustration of the business tendency to seek out positions of market power and it represents a relevant experience of how the lack of international market regulations when there are inflexible demands makes it difficult for the efficient equilibriums of competitive markets to come about. Today there is much talk about global economy, its market failings and the need for international regulation. The case studied here shows that the problem is not so new and it reveals the scope of large financial businesses and their skill in spheres which can provide them with high returns by entering and exiting markets depending on the situation and the economic conditions.

Appendix 1

- Holdings of the Rothschild Frères at 31-12-1906.

CONCEPT	Num. Shares	Value (francs)
Public Debt (29 different titles)		80.507.106
Shares in credit banks (10 entities)		12.220.823
Banque de France	1.300	5.135.000
Others 9		7.085.823
Shares in Insurance (7 companies)		5.778.875
Shares in diamond mines		62.190.792
De Beers (preferential)	35.883	16.290.882

De Beers (ordinary)	74.634	45.899.910
Shares in copper mines (3 companies)		126.026.134
Cie du Boleo	3.772	20.368.800
Rio Tinto (preferential)	354	53.454
Rio Tinto (ordinary)	47.356	105.603.880
Shares in other mining and industrial companies (22 companies)		39.322.419
Le Nickel	8.116	6.249.320
Sté Minière et Metallurgique Peñarroya	14.036	16.843.200
Sté d'Eclairage et force pour l'électricité	8.940	6.213.300
A further 19 companies		10.016.599
Shares in oil and oil related companies		22.935.495
Sté de Naphte Caspiène (Bnito)	5.683	7.515.767
Royal Dutch Petroleum Co.	321	4.753.882
Shell Transport & Trading Co.	25.000	947.063
Sté de Naphte Mazout	9.940	3.286.412
A further 11 companies		6.432.371
Shares Canals, ports and waters		19.668.239
Suez Canal	2.536	11.450.040
Cié Générale des Eaux	3.272	6.511.280
A further 5 companies		1.706.919
Shares in gold mines and prospecting (43 companies)		8.108.756
Shares in French railways		39.627.248
Nord	19.595	34.781.125
París Lyon-Méditerranée	2.519	3.287.295
A further 3 companies		1.558.828
Shares in American railroads (7 companies)		4.994.830
Shares in foreign railways (4 companies)		17.224.363
Lombardos	35.619	6.589.515
Madrid-Zaragoza-Alicante	24.321	10.336.425
A further 2 companies		298.423
Jouissance shares (11 securities)		925.258
Bills and participations (14)		14.958.170
City and State bonds (3)		1.299.930
Various company bonds (8)		1.813.466
French and foreign railway bonds (14)		13.757.294
Chemins du sud de l'Austriche	17.622	8.722.890
A further 13		5.034.404
American railroad bonds (5)		4.428.154
Values under negotiation or in syndicate (15)		2.750.516
TOTAL PORTFOLIO VALUE		478.537.868

Source: Rothschild Records, London, RFamFD/5.

Appendix 2

Evolutionary stages of the mercury market

Date	Name	Sponsor	Participants	Form	Conditions	Effectiveness
1830-1847	Rothschild monopoly	- Rothschild	- Almadén	World monopoly	Monopoly sales in London and Mexico by Rothschild agents	- Rise in prices (↑179%) - Stability of supply.
1847-1866	Competition	-	- Almadén - New Almaden	Competition	-	- Sinking of prices (↓50%)
1866-1914	World duopoly	- Rothschild - Quicksilver Mining Co.	- Almadén - Quicksilver Mining Co.	World duopoly	- Respect for sales areas.	- Stable prices (except 1870-1875) - Increase in world supply (↑60%)
1914-1918	War	- Rothschild	- Almadén.	European duopoly	- Sales: one Italian	Rise in prices

	Agreement	- Monte Amiata - British, Spanish and Italian Governments	- Monte Amiata		vial per two Spanish flask, - Fixed price (24 pounds)	(↑300%)
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Evolutionary stages of the lead market

Date	Name	Sponsor	Participants	Form	Conditions	Effectiveness
1909-1914	International cartel of lead producers	Metallgesellschaft	- See chart 1	World cartel	- Single seller on commission. - Quotas.	- Rise in prices (↑66%) - Increase in world supply (↑10%)
1917-1918	Minerais & Metaux	Peñarroya	32 companies	European Cartel	- Central sales - Single price	Prices kept high
1931-1932	Lead Producers' Reporting Association	European producers	European producers (50% of world production)	World cartel	Restrictions on and financing of Stocks	Scarce
1938	Lead Producers' Association	European and American producers	Productions of Birmania, Yugoslavia, Australia, Mexico, Argentina and Peru	World cartel	Restrictions on production	Scarce

Evolutionary stages of the nickel market

Date	Name	Sponsor	Participants	Form	Conditions	Effectiveness
1881-1891	Nickel monopoly	- Le Nickel.	- Le Nickel.	World monopoly	Single seller	- Controlled drop in prices. (up to ↓50%) - Increase in supply (*7)
1891-1996	Competition	-	- Le Nickel - Canadian Copper+Orford Copper	Competition	-	- Sinking of prices (↓60%) - Reduction in production (↓20%)
1895-1901	Nickel cartel	Metallgesellschaft	- Le Nickel. - Canadian Copper+Orford Copper+International	World cartel	Not known	- Recovery of prices. - Increase in world supply (↑100%)
1901-1910	Nickel cartel	- Metallgesellschaft - Mond Nickel	- International Nickel Company - Mond Nickel - Le Nickel	World cartel	- Single seller on commission. - Territorial division. - Mond Nickel quota of 15% of market	- Stable prices - Increase in world supply (↑100%)
1923-1930	Nickel cartel	- International Nickel Company - Mond Nickel - Le Nickel - Henry Gadner	- International Nickel Company - Mond Nickel - Le Nickel - Henry Gadner	World cartel (except EEUU)	- Quotas : Inco: 41%. Mond : 41% Le Nickel: 18% - Fixed sales price.	- Recovery of prices. - Recovery of production.
1930-1943	Nickel cartel	- International Nickel Company - Mond Nickel - Caledonickel	- International Nickel Company - Mond Nickel - Caledonickel	European cartel	- Quotas. - Fixed price - INCO compensates reduction in prices in Europe	- Controlled reduction of prices - Increased US sales.

Evolutionary stages of the pyrites market

Date	Name	Sponsor	Participants	Form	Conditions	Effectiveness
1878-1884	Iberian pyrites producers cartel	- Rio Tinto - Tharsis - Mason & Barry	- Rio Tinto - Tharsis - Mason & Barry	European cartel	- Increase in prices - Shared out market	- Increase in prices (↑19%) - Increase in world supply
1905-1921	Cartel de productores ibéricos de	- Rio Tinto - Tharsis y Mason & Barry.	- Rio Tinto - Tharsis - Mason & Barry	European cartel	- Shared out market	Independent for each producer

	pyrites					
1923-1926	Association de Productores de Pyrites	- Tharsis - Rio Tinto	- Rio Tinto - Tharsis - Mason & Barry - Orkla - S. Francaise des Pyrites	European cartel	See Table 3.	Scarce: Unstable prices.
1926-1930'	European Pyrites Corporation	- Metallgesellschaft - Rio Tinto	- Rio Tinto - Mason & Barry - Orkla - S. Francaise des Pyrites - Cyprus Co. - Menggen - Oberungarishe	European cartel	- Sharing out of sales areas. - Reduction in production - Quotas	Increase in prices (↑10%)
1929-1934	Entente Rio Tinto-Tharsis	- Tharsis - Rio Tinto	- Tharsis - Rio Tinto	European cartel	- Sharing out of customers	Contained price lowering

Evolutionary stages of the copper market

Date	Name	Sponsor	Participants	Form	Conditions	Effectiveness
1887-1889	Monopolio del Cobre Secretan	Hyanthyn Secretan (Société des Metaux)	27 mining companies.	World monopoly	Three-year exclusivity contracts	Price increases (↑100-150%)
1895-1901	Copper producers cartel	Rothschild	Rio Tinto and Anaconda	World cartel	• Agreement with the other producers • Maintaining Stocks • Progressive sales	Price recovery (↑36%)
1918-1925	Copper Export Association	American producers	American producers + Katanga	World cartel	• Common agency for non USA sales • Quotas • Single fixed sales price	Selling off war stocks Stabilization of prices
1927-1935	Copper Exporters Incorporated	American producers	American producers (95% world production)	World cartel	Contained production	Effective price control until 1928
1935-1939	International Copper Cartel	European and American producers	Rhokana Mufulira Kananga Braden Chile Exploration Cie. De Mines de Bor Rio Tinto	World cartel	Control of prices and productions according to the market outside the U.S.A.	Recovery of prices (1930 levels) Increase in production