

Mexican Silver-Mining in the Eighteenth Century: The Revival of Zacatecas

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FOR WELL over three hundred years—from the late sixteenth century until the 1870s—silver was Mexico's chief export, nearly always amounting to more than 70 percent of the total.¹ During the first American silver boom, from the 1570s to the 1630s, the Mexican industry was overshadowed by the mines of Upper Peru, which supplied Spain with 65 percent of its registered bullion imports from the New World. By the eighteenth century, however, Mexico emerged as the world's chief producer of silver.² Indeed, in 1803 it was estimated that her mines produced over 67 percent of all American silver.³

This command of the market was achieved by a steady increase in production throughout the century. In 1632, for example, 5,109,000 pesos were minted in Mexico City, the only mint within the colony. This figure was not equalled until 1689,⁴ but during the eighteenth century mintage rose from 5 million pesos in 1702 to a peak of 27 million pesos in 1804.⁵ Despite various interruptions, caused by

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¹ For the sixteenth century see J. H. Parry, *The Spanish Seaborne Empire* (London, 1966), 242-243. In that century bullion never fell below 80 percent of total exports. For 1796-1820 see Miguel Lerdo de Tejada, *El comercio exterior de México* (México, 1853), unpaginated appendices, No. 54. During that period bullion amounted to 74 percent of exports. For the 1870s see *Estadísticas económicas del Porfiriato: comercio exterior de México, 1877-1911* (México, 1961), 80-81. By 1877-1878 bullion exports at last fell to 65 percent of exports.

² Earl J. Hamilton, *American Treasure and the Price Revolution in Spain, 1501-1650* (Cambridge, 1934), 34.

³ Alexander von Humboldt, *Ensayo político sobre el reino de la Nueva España* (México, 1966), 425.

⁴ Fausto de Elhuyar, *Indagaciones sobre la amonedación en la Nueva España* (Madrid, 1818), 12.

⁵ Humboldt, *Ensayo político*, 386-387. By law all silver—royal taxes and personal plate apart—had to be minted in Mexico City. Convention of currency as well as weights and measures are derived from United Mexican Mining Association, *Reports* (London, 1825-1829), Report by Lucas Alamán, May 28, 1826, Appendix vii. The pesos are standard dollars, *duros*, and *pesos fuertes* of 8 reales of silver. A mark of silver was exchanged at the Mint for 8 pesos, but 8½

famines and wars with Britain, every decade (with the exception of the 1760s) produced more silver than its predecessor. The increase of the 1770s was especially dramatic.

The effects of this Mexican silver boom were felt in several areas. Politically the increased colonial revenue accounted for much of the Spanish monarchy's new-found strength in the Caribbean and North America.⁶ Mexico's increased purchasing power stimulated the economy of the Spanish Peninsula. As Pierre Vilar has indicated concerning the expansion of the Catalán textile industry: "Catalán products were exchanged for growing quantities of colonial produce in general, and *Mexican silver* [Vilar's italics] in particular."⁷

Yet despite the central role of the Mexican silver-mining industry, both in the colonial economy and the Spanish monarchy, little or no attempt has been made to explain how or why its production quadrupled during the eighteenth century. Indeed even today the best introduction to the industry remains Alexander von Humboldt's *Political Essay on the Kingdom of New Spain*. The purpose of this article is to bring some light into a very obscure corner of business history. Clearly it would require an entire book to describe and explain the growth of an industry. Hence one mining camp has been selected for examination—Zacatecas in the years 1767-1809.

Before we turn to Zacatecas, however, some more general features of the Mexican silver-mining industry require discussion. In the first place, we must dismiss two possible causes of its continuous expansion—new discoveries and increased external demand. Discoveries are necessary to begin a mining industry and useful in bringing about any short term increase in production, but the maintenance of a continued upward curve for an entire century demands something more. In fact most Mexican mines went through a cycle of discovery, abandonment, revival, and decay, with few enjoying continuous production for over forty years.

Secondly, since by law all silver had to be minted, increased external demand expressed in the form of rising prices had little real effect. Of course, silver was pegged at a relatively fixed rate of exchange to gold. Moreover, since international commodity prices

pesos were actually coined from it. The hundredweight measure is a translation of *quintal* and equaled 100 Spanish pounds or 101½ English pounds. All yards are Castilian yards of a little over 33 inches.

⁶ Humboldt, *Ensayo político*, 548-549. By the 1790s the monarchy annually shipped out of Mexico some 9 million pesos.

⁷ Pierre Vilar, *La Catalogne dans l'Espagne moderne* (3 vols., Paris, 1962), III, 12.

began to rise in the latter part of the eighteenth century, the exchange value of Mexico's chief export product—silver coin—experienced a certain decline.

Any explanation for Mexico's increased silver production must be found within the structure of the industry itself. Here two possible types of analyses can be followed. On the one hand, general causes, such as improved technology, reductions in the cost of production, and a greater flow of investment capital, can be isolated and combined to form a probable, analytic explanation. On the other hand, since so little is known of the various camps that composed the industry, a form of entrepreneurial history can be employed, whereby the mines of one camp are selected for investigation. Needless to say, both lines of inquiry are obscured by the lack of sufficient evidence as to causes. Without detailed long-term account books of several mines, much of what we say remains hypothesis. Any description of the Zacatecas enterprises is partially vitiated by this absence of detailed costing, which largely confines the inquiry to capital formation. Before embarking on such a description, however, we must discuss the forces that underlay the general expansion of the industry.

To begin with, the techniques of excavation, drainage, and refining all improved during the eighteenth century. Mine shafts reached unparalleled depths—over 600 yards in the case of the Valenciana in Guanajuato—and long drainage tunnels or adits, cut beneath the lode, were more often used. The famous Veta Vizcaína adit, for example, was extended to 2881 yards.⁸ To service the deeper shafts more powerful whims (mule-drawn windlass hoists) were required. At the same time a greater proportion of metal was refined by slow amalgamation with mercury rather than by smelting in a furnace, and the amalgamation process itself was improved and better applied than before.⁹ Thus, although no new invention significantly altered the methods of production, existing techniques were improved and more widely and better employed. The units of production and the capital needed to finance them also notably increased, for the deeper the mine the more capital it required.

Equal in importance to technical improvement and more easily measured were the cost reductions effected by the Crown. In 1767 and again in 1776 it halved the cost of mercury, a Crown monopoly

⁸ José Rodrigo de Castelazo, *Manifiesto de la riqueza de la negociación de minas conocidas por la Veta Vizcaína* (México, 1820), 16.

⁹ In my forthcoming book, *Miners and Merchants in Bourbon Mexico*, I shall describe these changes in detail; the succeeding material is also based on that book.

and the vital catalyst of the amalgamation process. As a result, the proportion of refining costs for average ore represented by mercury fell from 41 percent to 25 percent. (Average ore is defined as yielding 3 ounces of silver per hundredweight of metal.) Similarly the Crown reduced the price of gunpowder, another monopoly, by a quarter.

These cost reductions were introduced by José de Gálvez, visitor-general to New Spain, 1765-1771, and Minister of the Indies, 1776-1787, who rightly perceived the silver industry to be the key to Mexico's economic and fiscal revival and set up an entire program of reform, designed to make mining profitable and respectable. At the institutional level he organized the industry into a guild, whose local courts were granted jurisdiction over all mining lawsuits. In Mexico City he established a Central Court of Appeal that also served as the industry's administrative tribunal, controlling a Finance Bank and a Mining College.¹⁰ In 1783 a new code of mining law was also promulgated. At the economic level Gálvez reduced the costs of mercury and gunpowder, and organized a central Finance Bank (which, however, was not successful). Furthermore, to encourage risky or costly enterprises, he granted individual exemptions from the standard 10 percent tax that the Crown levied on all silver produced.

Finally, to supplement this encouragement of the mining industry, Gálvez actively attacked the monopolist position of the Mexico City merchants. He terminated the former system whereby transatlantic commerce was confined to periodic fleets sailing from Cádiz to Veracruz and instead permitted individual voyages from most of the chief ports of the Peninsula. As a result, trade expanded rapidly; more merchants entered the scene; and both prices and profits dropped dramatically, so that many older, wealthy merchants preferred to abandon trade and invest their capital in agriculture and mining.¹¹ Thus at the time when mining profits were rising and the industry becoming more attractive to investors, commercial profits fell, and mercantile capital sought new outlets.

Gálvez' program of reform proved highly successful. In the 1770s silver production surged to unparalleled heights, from 11½ million pesos in 1765 to 21½ million in 1777; and it never returned to the levels of the 1760s until the civil wars of independence. Yet clearly

¹⁰ For these institutional reforms see Walter Howe, *The Mining Guild of New Spain and its Tribunal General 1770-1820* (Cambridge, 1949).

¹¹ Luis Chávez Orozco (ed.), *El comercio exterior y su influjo en la economía de la Nueva España en 1793* (México, 1960), 6-8, 98-100.

this success was made possible only by individual entrepreneurs who seized the opportunities created by Gálvez' reforms, for the Crown itself, of course, did not operate any mines. Gálvez made mining more profitable in areas such as Zacatecas and hence encouraged both merchants and miners to invest their surplus capital in the industry.

Discovered as early as 1546, Zacatecas soon became Mexico's chief mining camp.¹² John Chilton, an English traveler who visited the town in 1568, wrote: "We came to the mines of Sacatecas which are the richest mines in all the Indies, and from thence they fetch most silver."¹³ Precise figures of production in the early period are lacking, but in 1648 the Zacatecas treasury received a third of all the mercury dispatched to New Spain in that year, a proportion which would agree with later computations that the Zacatecas mines produced on an average about two million pesos of silver a year.¹⁴ This average was maintained until at least 1732, when the town's mines still produced about a quarter of all Mexican silver. In that year the town possessed 25 mills using the amalgamation process and 20 smelting furnaces.¹⁵ For nearly two hundred years Zacatecas maintained an unbroken record of high production despite the mid-seventeenth century depression that affected all the industry. But in the years after 1732, the town's mines were abandoned one by one, to lie waterlogged and unworked. By 1760 Francisco Javier de Gamboa, the Mexican mining jurist, stated of the camp: "Its mines have been very rich, but are no longer worked owing to their depth and flooding."¹⁶ Clear evidence of the industry's decline appears in the closure of its refining works; by 1767 only 5 mills and 2 furnaces remained in operation.¹⁷

The precise reasons for this rapid decline remain obscure. Writing in 1732, the Count of Santiago de la Laguna, a leading miner of the town, cited several cases of bankruptcy among fellow mineowners and claimed that in the past two years he himself had lost 50,000

¹² Elías Amador, *Bosquejo histórico de Zacatecas* (Zacatecas, 1892), 190; Miguel Othón de Mendizábal, *Obras completas* (6 vols., México, 1946-1947) V, "Compendio histórico de Zacatecas."

¹³ Richard Hakluyt, *Voyages* (8 vols., London, 1962), VI, 276.

¹⁴ A. Matilla Tascón, *Historia de las minas de Almadén* (Madrid, 1958), 223. Zacatecas received 2,000 hundredweights out of 5,998.

¹⁵ Conde de Santiago de la Laguna, *Descripción breve de la muy noble y leal ciudad de Zacatecas* (México, 1732), 44-50.

¹⁶ Francisco Javier de Gamboa, *Comentarios a las ordenanzas de minas* (Madrid, 1761), 510.

¹⁷ British Museum, Add. mss. 20999, "Representación sobre el estado de los reales de minas por Juan Lucas de Lassaga y José de la Borda," f. 565.

pesos. He ascribed his losses to the low quality of metal then being found in Zacatecas and the high price of mercury, which did not permit the profitable refining of much low and medium grade metal. The margin between costs and returns was very small, and hence bankruptcy became only too easy. Furthermore, it would appear that in some cases quarrels over drainage duties led to the abandonment of mines, and in others, notably the Quebradilla mine, drainage techniques were not adequate to conquer the rising level of water.¹⁸ Zacatecas suffered from the typical problems of an aging mining center—its mines were deep, so that drainage costs were high; yet its ores were by then of medium or low grade quality, so that production costs tended to swallow up profits. On top of this, the industry labored under heavy royal taxes of 10 per cent and the high price of mercury. Finally, it would appear that local drainage techniques were defective and local mine-owners peculiarly litigious.

Whatever the precise cause, when José de Gálvez reached Mexico, Zacatecas retained but a shadow of its past glory. Yet by 1803, when Humboldt visited New Spain, he found Zacatecas occupying third place among Mexican producers, inferior only to Guanajuato, another long established center, and Catorce, a relatively new discovery.¹⁹

How was Zacatecas revived? The decisive step was taken by José de la Borda, the most notable miner of his day, who since 1716 had made and spent several fortunes gained at Taxco and Tlalpujahua, two camps near Mexico City.²⁰ In 1767 Borda, although famous, was virtually bankrupt, for he had invested nearly half a million pesos in the construction of the famous Santa Prisca in Taxco, a church which still numbers among the architectural glories of Mexico. In addition Borda owed 400,000 pesos to various persons, including 112,000 pesos to Manuel de Aldaco, manager of the leading Finance Bank of Mexico City and his backer in former ventures.²¹ Moreover, although his mine of Chontalpa near Taxco had produced over two million pesos, his most recent venture had proved unsuccessful. Mexican mining was a hazardous game even for the expert; the trick was to know when to pull out.

In order to pay off his debts and recoup his fortune, Borda de-

¹⁸ Biblioteca del Real Palacio (Madrid), Mss. 2824, miscelánea de Ayala X, f. 132.

¹⁹ Humboldt, *Ensayo político*, 333; by this time its share in total production amounted to about 12 percent.

²⁰ See José Antonio Ximenes y Frías, *Fénix de los mineros ricos* (México, 1779), and Manuel Toussaint, *Taxco* (México, 1931), 86-95.

²¹ Archivo General de la Nación de México (hereafter cited as AGN), Minas Tomo 106, exp. 4. José de la Borda to Viceroy Bucareli, March 1775.

ecided to abandon the mining camps of the Center and go north, to Zacatecas. He was aware of its deplorable condition, since in an influential report to José de Gálvez he had used this as an argument for a general reduction in the price of mercury. Furthermore, he had asserted that the Crown should grant special assistance to miners engaged in risky and costly renovations, pointing to an old, never-invoked law that permitted tax reductions for the operation of old, deep mines.²² Borda soon followed this general argument with the proposal that he himself should attempt the renovation of the Quebradilla, a Zacatecas mine full of both metal and water.

Gálvez and the viceroy, the Marquis of Croix, who had already discussed with Borda ways to develop the industry, immediately approved his project and gave him extraordinary fiscal assistance. They conceded him full exemption from the silver tithe during the period of initial renovation; then, once his initial costs were recouped, he was granted a 50 percent tax reduction for twenty years. In addition, during the entire period he was to receive mercury at the cost price of 30 pesos a hundredweight.²³ These privileges, the first of their kind to be granted, became the model for many similar individual concessions and indicated both the new flexibility of colonial administration, hitherto so hidebound, and its evident desire to promote the industry.

Naturally Borda's reputation helped him to gain the favors. As early as 1761 Gamboa, the mining jurist, wrote: "By reason of his vast understanding and management of this occupation, José de la Borda can be pointed to as the first miner in the world."²⁴ And indeed Viceroy Croix expressly emphasized his technical superiority to justify the tax concessions: "José de la Borda is without doubt the person in this kingdom who knows most about mines and the machinery for their excavation and drainage. . . . By means of his renovation [of the Quebradilla] the miners of Zacatecas and of the Far North will learn how to manage his machines, and hence the means to drain and restore many rich mines."²⁵ Thus the Crown

²² British Museum, Add. mss. 20999, ff. 562, 598, 604.

²³ Archivo General de Indias, Sevilla (hereafter cited as AGI), Audiencia de México, leg. 2235, *Real orden*, March 12, 1768; see also Fabián de Fonseca and Carlos de Urrutia, *Historia general de la Real Hacienda escrita . . . por orden del virrey conde de Revillagigedo* (6 vols., México, 1845-1853), I, 38, 343.

²⁴ Gamboa, *Comentarios*, 380.

²⁵ AGI, Audiencia de México, leg. 2235, Croix to Crown, May 26, 1767. It is interesting to note that Borda's assistant, Juan Pablo Echevoyen, a Basque, had studied mining techniques in England; indeed, in 1761 he was denounced to the

employed fiscal weapons to promote the diffusion of technical knowledge.

At first, however, Borda delayed his attack upon the Quebradilla, a notoriously difficult mine, since, despite his fame and royal backing, he was unable to find a financial backer. Instead he addressed his efforts to a separate lode in the Zacatecas camp, the Veta Grande, where he opened seven mines. Even so, he was obliged to borrow 30,000 pesos from friends, and, this spent, another 18,000 pesos from the Crown, before the venture proved successful. But in the succeeding eight years these mines produced over 1¾ million pesos. With his profits Borda constructed a huge refining mill, the Saucedo, which, he claimed, could handle 3,000 hundredweight of metal a week, being the largest in the entire North. He also bought the nearby hacienda of Malpaso for 102,000 pesos to supply the mill's 1400 mules with maize and straw as well as maize for his workers.²⁶

Since the Veta Grande mines were not included in his tax exemptions, Borda took advantage of local unemployment to reduce his labor bill—which in the mining phase of the industry usually amounted to about 70-80 percent of the total cost. Hitherto pick and blast men in Zacatecas earned 6 reales a day and took a quarter of the metal they produced. Borda cut their daily wage to 4 reales and reduced their share of the metal to an eighth.²⁷

By 1775 Borda found that the San Acasio, his best mine, had reached a depth of 240 yards and that its ore was yielding only two ounces of silver per hundredweight, so that its operation was barely profitable. At last he decided to drain the Quebradilla. Here a few years earlier a local company of merchants had lost 300,000 pesos, but Borda's superior technique soon conquered the mine. As he later wrote in triumph: "When the water taken out by my whims is compared to theirs [of the previous company] then everyone must agree that water which was insuperable for them is like a toy for me."²⁸ Moreover, from April 1775 to November 1779, when the mine produced 93,774 marks of silver, he enjoyed full tax exemptions, which, together with cheap mercury, amounted to a grant of 98,053 pesos. From this sum and his profits he constructed another huge refining

Inquisition as an Englishman. See Manuel Toussaint, *Don José de la Borda restituida a España* (México, 1933), 9.

²⁶ AGN, Minas 106, exp. 4, Borda to Bucareli, March 1775.

²⁷ Archivo Municipal de Zacatecas, Tomo 23, Dr. Antonio Bugarín to Intendant Felipe Cleere, undated, 1788-1789.

²⁸ AGN, Minas 106, exp. 4, Borda to Bucareli, March 1775.

mill, "The Holy Family," that contained 70 arrastres (a mule-drawn grinding device) and 10 stamp mills.²⁹

The absence of more detailed accounts makes it difficult to evaluate the several financial advantages which Borda enjoyed. Compared to his predecessors he was able to reduce costs in both the mining and the refining stages of his enterprise; in addition, he obtained considerable tax exemptions. We may presume that his superior technique, while the indispensable prerequisite of his success, did not of itself reduce expenses. All calculations, however, are partially vitiated by our ignorance of one piece of information, the distribution of total production cost between mining and refining; hence we cannot assess the eventual weight of any percentage reductions at either stage.

Nevertheless, we can point to considerable economies. If we roughly calculate (using information from other minefields) that the wage bill amounted to about 75 percent of the total cost of mining, then Borda, by cutting wages from 6 reales to 4 reales a day, reduced total mining costs by 25 percent. Furthermore, he obtained a greater proportion of the metal produced. At the refining stage we have already pointed out that for the amalgamation of a medium grade ore (3 ounces of silver per hundredweight) mercury absorbed about 25 percent of total refining costs, at the new price of 41 pesos 2 reales 11 granos a hundredweight. Borda's supply of mercury at 30 pesos a hundredweight reduced the proportional cost of mercury to about 18 percent. In addition to the greater return on medium range ores that this cheap mercury provided, Borda was also able to refine profitably a wider range of low quality ore.

Finally, his tax rebates in the years 1778-1790 totalled 166,639 pesos, a sum which taken as a percentage amounted to 7.3 percent of overall production, a reasonable return upon capital. Borda did not depend upon his tax exemptions, for he had worked the Veta Grande mines without such support. Nevertheless, without their incentive he might never have dared transfer to Zacatecas. At it was, at the time of his death in 1779, Borda had paid off his debts, and in 1790 his only son, a priest, Manuel de la Borda, estimated his property at a million pesos, of which 300,000 pesos was invested in houses in Mexico City. But by then the Quebradilla lay once again flooded, and Borda's heir vainly petitioned the Crown for a 100,000 pesos

²⁹ AGN, Minas 115, exp. 1, Report by Borda's manager, Ventura de Arteaga, March 6, 1780.

loan to renovate his property.³⁰ In Mexico a mining success or bonanza rarely lasted for more than a decade without the need arising for major capital investment in the form of new shafts or adits.

Borda's intervention brought about a major renewal of personnel in the Zacatecas mining industry. A report of 1784 stated that the city's chief miners were Ventura de Arteaga, Borda's former manager; Marcelo de Anza, the nephew of his principal associate; and his two French "nephews," Francisco Javier and Julián Penmartin.³¹ In addition, a new wave of Basque immigrants began to enter the industry, acting as merchant-bankers and independent refiners. It must be remembered that the workers always sold their share of the metal to men of this group, who surrounded all the great integrated enterprises which mined and refined their own metal.

If Borda had succeeded largely by superior technique, the next generation relied upon heavy capital investment. Zacatecas had reached the stage where companies, by reason of their better staying power, stood more chance of success than individual entrepreneurs. In 1783 two competing companies were formed to drain and operate the Veta Grande group of mines. The organizers of the first one were Marcelo de Anza and Ventura de Arteaga backed by Antonio de Bibanco, the chief miner of Bolaños, and Ramón de Goya, a Mexico City merchant. These men petitioned the Crown for tax exemptions, since they estimated initial drainage costs at half a million pesos. However, the second company, which was organized by the local parish priest, Dr. Antonio Bugarín, and supported by a mixed group of lawyers, priests and widows, put the cost of renovation at only 50,000 pesos.³² Eventually, on July 19, 1786, a United Company was formed. Anza and his backer, Goya, withdrew; Arteaga became the general manager; and a miscellaneous group of local Zacatecas residents and Mexico City merchants and financiers subscribed to 40 shares, each with a nominal value of 10,000 pesos.

The project soon proved more costly than anyone had anticipated.

³⁰ AGN, Vínculos 123, exp. 3, Manuel de la Borda to Audiencia, August 22, 1790.

³¹ AGI, Audiencia de México, leg. 2205, Mint Superintendent to Gálvez, September 26, 1790. The Penmartin, who hailed from Oloron, France, were in danger of arrest during the 1790s. On February 25, 1795, their Zacatecas guarantor, Fausto de Arce, wrote to the Viceroy of Francisco Penmartin: "He is a man as addicted to Spanish rule as his uncle D. José de la Borda." Contrary to Manuel Toussaint's claim that Borda was Spanish, he continued: "D. José de la Borda conducted himself without remembering his French origin." See AGN, Historia 503, exp. 47.

³² AGN, Minas 107, exp. 1.

By December 1788 the company had called up and spent without return some 3,000 pesos per share. Most of the local residents, the original partners of Dr. Bugarín, cancelled their subscriptions, so that only 22 out of the original 40 shares remained operative.³³ Despite a short spurt in production in 1791-1792, when some profits were distributed, costs continued to exceed returns, so that shareholders were called upon to invest well beyond the original stipulated 10,000 pesos a share, with the result that during the 1790s most remaining shareholders withdrew. In 1797 the company petitioned the Crown anew for tax exemptions in order to balance its accounts. Evidently impressed by the tale of woe, the colonial authorities granted the company a full tax exemption for six years and a supply of mercury and gunpowder at cost price, to become operative after the lifting of the British naval blockade occasioned by Spain's alliance with Napoleon. No one could doubt that the company had a good case; by 1804 the total deficit (i.e., capital invested without return) stood at 1,198,930 pesos, and only 11¾ shares remained operative.³⁴ Thus after some 17 years production the mine had yielded almost no return to its owners.

The size of the mine is hard to estimate. By 1797 the main shaft had reached a depth of 360 yards, whereas 450 yards were deemed necessary. To drain this and other shafts some 17 whims were required, serviced by 660 mules at a cost of 2,400 pesos a week. In all, the mine cost 6,000 pesos a week to operate. Naturally, most operating costs were financed from production, for the shareholders' capital was largely invested in the plant. By 1803 the company had purchased or constructed three refining mills (including Borda's Saucedá) that contained 138 arrastres. The total value of these mills, together with the plant of the mine, was reckoned at 931,768 pesos, amounting to most of the current subscribed capital.³⁵ Thus the Veta Grande company operated a vast integrated enterprise that ranked among the largest in Mexico. Certainly it was the largest in Zacatecas. By 1803 the intendant stated that the company possessed a quarter of the town's refining plant.³⁶ Out of a total 460 arrastres the company possessed 138, whereas the next largest refiners, Marcelo

³³ AGI, Audiencia de México, leg. 1587, Viceroy Azanza to Crown, August 27, 1798.

³⁴ AGN, Minas 108, Statement of company's agent, undated, 1805.

³⁵ AGI, Audiencia de México, leg. 1587, Statement by company's agent, March 1797.

³⁶ AGN, Historia, 49-26, Intendant Rendón to Viceroy, May 3, 1803.

de Anza, the Borda family, and Manuel de Rétegui, owned but 64, 50, and 24 arrastres respectively.

The long term investment that had created this huge enterprise was justified and rewarded in 1805, when the mine finally struck it rich and disbursed plenteous profits. But only five shareholdings had survived the subscription demands, which by that time amounted to 78,000 pesos per share. Several partners had been obliged to withdraw after heavy investment: Gaspar Martín Vicario, a Mexico City merchant, lost 88,500 pesos in the venture; Juan Fernández Peredo, 55,000; Dr. Luis Beltrán, 38,500; and so on. As might be expected, the five surviving shareholders were all wealthy men.³⁷ By 1803 Juan Bautista de Fagoaga, the owner of 4 shares, had subscribed 314,000 pesos. His brother, Francisco, the Marquis of Apartado, and Antonio Bassoco each paid 235,000 pesos on their 3 shares. The Marquis of Bibanco subscribed 117,550 pesos for his 1½ shares and the remaining partner, Vicente Olloquí, 19,625 for a mere ¼ share. Over a period of seventeen years these five men invested 922,205 pesos in the Veta Grande.

Some measure of the profits that eventually rewarded their persistence can be obtained from the payments made to Bibanco's daughter, owner of 1½ shares. In the years from 1805 through 1807 she received 377,164 pesos. Moreover, the mine continued to yield further returns in the years that followed. But who were these five shareholders, and what was the source of the capital they invested in the Veta Grande?

The Fagoaga brothers were experienced miners and the owners of Mexico's chief silver bank, which had been established by their father, a Basque immigrant, as early as the 1720s. This bank was later managed by their brother-in-law and cousin, Manuel de Aldaco, and backed many of Mexico's leading miners, including José de la Borda. Indeed it was at the latter's suggestion that they tried to drain the Santa Brígida at Real del Monte, losing nearly half a million pesos in the attempt. For a time their most reliable and constant source of income was the Apartado office where gold was separated from silver. This they rented at a nominal price from the Crown.³⁸ But in 1779 Gálvez abruptly reincorporated the office into royal administration—and this precisely when the Fagoaga's silver

³⁷ AGN, Minas 46, exp. 3, Inquiry into company's shareholding, January 31, 1805; AGN, Vínculos, 213, exp. 3, Statement by Bibanco's estate lawyer, July 1809.

³⁸ AGI, Audiencia de México, leg. 2214, Marquis of Apartado to Viceroy, August 31, 1793.

bank had so lost its liquidity that their investments were largely confined to their own mines at Sombrerete and Fresnillo, a little north of Zacatecas.³⁹ Indeed, by the late 1780s the family fortunes were sinking fast, and no doubt their shares in the Veta Grande would have been cancelled had not their mine at Sombrerete, the Pabellón, struck an extraordinarily rich mass of metal.⁴⁰ It was this bonanza of 1791-1792 that financed their further investments in Zacatecas and Fresnillo. Reinvestment of mining profits provided the major source of the Veta Grande company's capital.

Antonio de Bibanco, a Castilian immigrant, had also made his fortune in mining. In the 1770s he renovated the mines of Bolaños, selling out in 1786 after a sudden inundation of his property. He possessed a fortune of about half a million pesos, invested in haciendas and mining enterprises, of which the Veta Grande was the largest.⁴¹

By contrast, Antonio Bassoco, a Basque immigrant, was a Mexico City merchant who had made his fortune in commerce and by marriage to his cousin, the daughter of the Marquis of Castañiza. In the 1780s he withdrew his capital from trade, where profits were declining, and invested it in finance and mining. He possessed interests in Bolaños and Capula, but the Veta Grande became his major investment.⁴² He commented ruefully on his various ventures: "There is nothing less certain than the calculations made concerning the costs of mining and the time required, and this uncertainty prevents people from entering the industry, which is generally regarded with horror among merchants."⁴³

Olloquí apart, the surviving shareholders of the Veta Grande were all extraordinarily wealthy; each was worth more than a half million pesos. Moreover, the preponderant share of the capital represented the reinvestment of mining profits. Yet, despite the experience of the Fagoagas and Bibanco, they chose mines that required almost twenty years exploitation before yielding a profit. Mexican mining was nothing if not hazardous; and it was a game which the wealthy and the persevering stood the best chance of winning.

Not all heavy investment was rewarded with success. Marcelo de

³⁹ Bernard Bobb, *The Viceroyalty of Antonio María Bucareli, 1771-1779* (Austin, 1962), 237-239.

⁴⁰ Trinidad García, *Los mineros mexicanos* (México, 1895), 162-165.

⁴¹ AGI, Audiencia de México, leg. 1745, Bibanco to Crown, June 23, 1789.

⁴² Ricardo Ortega y Pérez Gallardo, *Historia genealógica de las familias antiguas de México* (3 vols., México, 1908-1910), II, "Condado de Bassoco." See also Lucas Alamán, *Historia de Méjico* (5 vols., México, 1849-1852), I, 59, 305 and Appendices, 47-48.

⁴³ AGN, Minas 87, exp. 6, Bassoco to Viceroy Revillagigedo, June 15, 1791.

Anza, nephew of Borda's chief associate, worked the Canteras and San Francisco mines, which in the period 1772-1792 produced 720,329 marks of silver. But by 1798 he had fallen about 700,000 pesos into debt; his mines were too deep, their metal of poor quality. More as an act of mercy to his debtors than to him, the Crown agreed to reduce his taxes from the tithe to a twentieth and to supply mercury at cost price, both concessions to last for ten years.⁴⁴ Anza was the third case of such exemptions, clear evidence that the mines of Zacatecas were regarded as in especial need of fiscal relief.

Anza's losses bankrupted his chief backer, Manuel Ramón de Goya, a Mexico City merchant who had invested half a million pesos in these mines. This sum represented his entire fortune, valued in 1786 at 200,000 pesos. It also included 300,000 pesos which he had misappropriated from the account of the Obregón family, the chief partners in the Valenciana mine of Guanajuato, for whom he was receiving agent.⁴⁵ By 1791 his fraud was discovered, and he died bankrupt.

During the 1780s Zacatecas attracted another major entrepreneur, Manuel de Rétegui, a Basque immigrant who had made his fortune during the period 1772-1787 at the neighboring camp of Fresnillo. He then transferred to Zacatecas, where he soon succeeded in restoring the old Malanoche mine, a success that placed him among the town's richest miners. Despite certain failures—he lost 150,000 pesos in the San Bernabé and a similar sum when he attempted to invade the Veta Grande company's territory—by 1804 Rétegui estimated his fortune at half a million pesos, invested in mines, refining mills, and commerce. His production figures compare favorably to those of Anza or Veta Grande; between 1787 and 1805 he presented 756,785 marks of silver at the local treasury.⁴⁶ Moreover, he was about the only major Zacatecas miner who was not eventually granted tax exemptions, although he petitioned for them during his unsuccessful attempt to renovate the San Bernabé mine.

By the end of the 1780s at least three groups of mines were in production—the San Francisco of Anza, the Veta Grande, and the Malanoche of Rétegui. In all these mines the workers received shares

⁴⁴ AGI, Audiencia de México, leg. 2212, Viceroy Azanza to Crown, July 27, 1799.

⁴⁵ Biblioteca Nacional (México) Mss. 1374, petition of José Antonio Ansac, June 19, 1786; for his misappropriation see Archivo Histórico de Guanajuato, Protocolos de Cabildo, October 25, 1791; December 1, 1792.

⁴⁶ AGI, Audiencia de México, leg. 2248, Viceroy Iturrigaray to Crown, September 26, 1806.

of the metal they produced. Rétegui, for example, permitted his workers to take a sixth as compared to the eight that Borda had introduced. But whatever the proportion, enough metal was sold to enrich a group of independent refiners, mainly Basque in origin, and cause them to consider the renovation of local mines. Two such men, Fermín de Azpezechea and Bernardo de Iriarte, both Basques, first seized virtual control of the local guild court, or deputation. Then in 1792, they registered mines that lay within the territory of the Veta Grande company, acting in conjunction with Manuel de Rétegui and using the deputation's authority to confirm the legality of the registration. However, the company protested to the viceroy and demanded that the case be tried by the superior mining court of appeal in Mexico City.⁴⁷ The upshot was a truce—Azpezechea and his partners abandoned their claims to the company's mines; and apparently in return he was conceded a free hand to take over the property of the Borda family. By 1794 a new company formed by Azpezechea had registered the Quebradilla and Cabras mines after the local deputation rejected the protests of Borda's grandchildren. Admittedly, the family lacked capital to renovate the flooded mine, but the seizure was an undoubted piece of legal chicanery.⁴⁸

The new company, divided into the usual 24 shares, was entirely recruited from Zacatecas. Azpezechea took 8 shares, Bernardo de Iriarte 6, and Francisco Javier Penmartin, Borda's unfaithful "nephew," 3 shares. Work on this second renovation of the Quebradilla began in April 1804 and proceeded until January 1808 without any profit to the partners. Indeed, they spent 150,000 pesos before producing a single mark of silver, and by 1808 their investment, they claimed, amounted to 862,606 pesos. Into this sum the partners doubtless included ploughed back profits. But in view of their difficulties, in January 1809 the company was granted a fifty percent tax reduction and a supply of mercury at cost price.⁴⁹ To facilitate this concession it had subscribed 50,000 pesos to the Patriot War Fund, clear evidence concerning the value of such exemptions.

The enterprise was surprisingly large. Some five shafts, serviced by 14-16 whims, were required to drain the mine. The central shaft, although not very deep—it had only reached 168 yards in 1804—needed eight whims alone. These were operated by some 800 horses that consumed 18,000 fanegas of maize a year. The labor force was

⁴⁷ AGN, Minas, exp. 107, Company's agent to Viceroy, undated, 1792.

⁴⁸ AGI, Audiencia de México, leg. 2245, Viceroy Branciforte to Crown, June 26, 1797.

⁴⁹ *Ibid.*, leg. 1634, Viceroy Garibay to Crown, July 16, 1809.

correspondingly high—2,500 persons, of whom 1,415 worked underground. With such a labor force weekly expenses were high—in 1809 perhaps 18-20,000 pesos a week.⁵⁰

Confronted with such heavy costs, the company, which dominated the local deputation, took the decisive step of suppressing the system whereby the workers took a certain share of the metal they produced. Instead they were reduced to a simple daily wage; moreover, part of this wage was paid in goods and not in cash, despite laws to the contrary. In 1810 the workers protested without avail to the viceroy: "In addition to the fact that in the mine of Quebradilla they do not pay us in the customary fashion [i.e., with shares], they are destroying us by giving us our salary in goods."⁵¹

Yet by 1810 the company had struck it rich, and in addition to normal profits, the partners enjoyed tax reductions and the share of metal that the workers would normally have taken. How much the mine produced, or how great were these profits we do not know, but a later account reckoned that in less than nine years the Quebradilla company paid the Crown 528,413 pesos in taxes, which at 5 per cent would roughly amount to a production of over a million pesos a year.⁵²

By now it should be clear how Zacatecas was restored. In comparison to Guanajuato, Mexico's chief mining center, or to Catorce, the period's most brilliant discovery, Zacatecas must be regarded as a marginal case, heavily dependent upon outside capital attracted in part by the exceptional fiscal concessions which the Crown offered. Only with the formation of the Quebradilla company did locally-generated capital promote the development of a major mine. Otherwise, all the town's chief enterprises were financed or inspired by entrepreneurs whose capital and experience had been gained elsewhere—in Taxco, Fresnillo, and Sombrerete. Ploughed-back mining profits combined with mercantile capital to renovate the town. Moreover, the prevalence of tax reductions, which were apparently unknown in Guanajuato and in Catorce, emphasizes the marginality of Zacatecas. Special inducements and special costing arrangements were required to keep its industry alive.

Clearly the role of Borda was all-important. Without his spectacular success we may doubt whether other investors such as Goya

⁵⁰ Carlos de Berghes, *Descripción de la serranía de Zacatecas formada por I.A. Bustamente 1828-1834* (México, 1834), 22-23.

⁵¹ Cited in Mendizábal, *Obras completas*, V, 207.

⁵² AGN, Minas 180, exp. 6, Zacatecas Mining Deputation to Crown, May 20, 1818.

or Rétegui would have risked their money so readily. Moreover, he proved to the Crown that tax reductions could increase production to the extent of finally increasing the overall tax yield. Without this proof we may doubt whether such fiscal concessions would have become so general. Similarly we may presume that his superior drainage techniques made possible many of the subsequent renovations.

The restoration of Zacatecas, if not entirely typical, was highly significant. By 1803 the town ranked third among Mexican mining camps. The manner of its revival illumines the economic forces that created and, more important, maintained the expansion of silver production in the later eighteenth century. In making silver mining more profitable, the Crown achieved its aim. Mining capital more readily reinvested its profits, and mercantile capital more readily entered the industry. Without such investment the Mexican silver boom could not have occurred. And since that boom sprang as much from the renovation of old mines as the more efficient exploitation of new discoveries, the history of Zacatecas in these years illustrates in microcosm a widespread movement at work in most of the older mining camps of Mexico.