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Keywords: bullionism, capital controls, silver outflows, silver-point mechanism, smuggling, oligopsony, arbitrage.

JEL Classification: D43, E52, L22, N13

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THE MICROECONOMICS OF BULLIONISM: ARBITRAGE, SMUGGLING AND SILVER OUTFLOWS IN SPAIN IN THE EARLY 18TH CENTURY*

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ABSTRACT

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“Laws made against Exportation of Money or Bullion, will be all in vain. Restraint, or Liberty in that matter, makes no Country Rich or Poor: As we see in Holland; which had plenty of Money under the free liberty of its Exportation; and Spain, in great want of Money under the severest penalties against carrying of it out”.

Locke (1695): Further Considerations Concerning Raising the Value of Money

INTRODUCTION

The discovery of America was followed by a flow of precious metals to Spain and Portugal and, from there, throughout the world. Gold and silver were of large and growing importance in international trade during the Early Modern period. Spain was a main player in this international trade because the Spanish-American colonies produced three quarters of the world's silver and one half of the world's gold. Historiography has estimated the quantities of gold and silver transferred from the New World to the Old World, but we know little about the reasons for the bullion outflows. This paper analyzes the causes of precious metal outflows from Castile to the main northwestern European bullion centers in the early 18th century.

Castile enacted bullionist laws to prevent the outflow of precious metals during more than four centuries, from the Late Middle Ages to the mid-19th century. Administrative prices prohibited the exchange of gold, silver or billon at a different price than the official parity, and bans on exports forbade the exportation of gold or silver without a license. The consequence of the bullionist legislation was the absence of a free bullion market. However, a black market developed and a majority of the silver that arrived from Spanish America was smuggled from Cadiz to the rest of Europe. This paper provides black market prices for silver in Cadiz. The international character of the arbitrage business forced merchant-bankers to exchange information continually. Letters between correspondents of the merchant house *Roux* (Marseille) provide data with which to calculate the silver-point mechanism to measure the profitability of arbitrage exactly as 18th-century merchants practiced it. The discovery of data on the black market for silver in Cadiz has been a milestone in helping to understand the reasons behind the silver outflows.

The common understanding of the operation of the specie-point mechanism refers to an institutional setting of free bullion movements, such as that of the late 19th century¹. But bullionist restrictions changed the performance of silver points. Smuggling was led by a cartel of foreign merchants who had the market power to drive down the price of silver in the Cadiz black market and the necessary international connections to illegally extract and distribute bullion from Cadiz. The silver-point mechanism shows that, from 1729 to 1737, the gap between the implicit spot exchange rate and the lower silver point made arbitrage systematically profitable. From mid-1737 to 1741, the gap was corrected because the Spanish crown reacted to the illegal silver outflows with a devaluation that equalized the implicit spot exchange rate and the arbitrated parity, so arbitrage stopped being profitable.

The paper is organized as follows. The first section explains Castilian bullionist regulations against silver exports and how smuggling took place. The second section analyzes the oligopsonistic structure of the silver black market in Cadiz, which drove down silver prices. The third section describes silver arbitrage according to the *Roux* banker archive. The fourth section calculates the silver-point mechanism. The appendix focuses on the methodology and database.

1. WHY SILVER SMUGGLING?: THE RULES OF THE LAW VERSUS THE RULES OF THE GAME

Castilian economic policy in the Early Modern period was dominated by the strategy of controlling the precious metal that arrived from the colonies. Spanish America produced 85% of the world's silver and 50% of the world's gold during the period from 1493-1820.² Bullion mines in Spanish America were operated by private agents, who had to pay 20% of their total extraction to the Monarch.³ Precious metals were repatriated to Castile in the Spanish vessels that traded with the colonies. In the 18th century, royal remittances represented 10% of total precious metals repatriated, and private remittances represented the remaining 90%.⁴ Thus,

¹ Officer (1986), Canjels, Prakash-Canjels and Taylor (2004), Flandreau (1996, 2004), and Esteves, Reis and Ferramosca (2007).

² Calculated from Merrill, C.W. (1930) and Ridgway, R.H. (1929)

³ The extraction tax for precious metals was 20% (*quinto Real* - Royal fifth), and it was reduced to 10% (*diezmo Real* - Royal tenth) in the 18th century (in 1716 for Mexico and in 1735 for Peru). Haring (1939), p. 198.

⁴ Average remittances for the period 1717-1786, calculated from García-Baquero (2003), p.114

Castile received a systematic inflow of gold and silver by private agents from the colonies. Because Castile was the main producer of precious metals, bullionist laws were implemented to retain bullion in Castile according to the bullionist doctrine of precious metal possession as the measure of wealth. All Castilian legislation about trade with the colonies was subordinated to the government's goal to accumulate precious metals in Spain.⁵ Bullionist policy remained the essence of state economic policy during the 16th, 17th and 18th centuries, reinforced through stagnated legislation and immobile institutions.⁶

Castile enacted bullionist laws that originated in the late Middle Ages and remained in force until colonial independence. Castile's bullionist legislation was characterized by anachronistic contents based on the successive ratification of previous laws. Two types of bullionist laws regulated bullion exchange with the objective of avoiding bullion outflows: administrative prices and bans on exports.

On the one hand, the price of the exchange of precious metals into Spain was regulated.⁷ Ingots had to be sold to the mint at the mint price. Administrative prices prohibited the exchange of gold, silver or billon coins at a different price than the official parity, i.e., the legal value of coins in units of account⁸. The fixation of an administrative price for precious metals in Spain was regulated by the Mint Regulation of the year 1497 and was in force until the Reform of the Monetary System of the year 1848.⁹ Successive regulations modified the official parity between coins and the unit of account but maintained the prohibition against selling coins as commodities at a higher price than the official parity. Consequently, no legal market existed in which to freely exchange precious metals as a commodity. Castile only

⁵ Girard (1967), p. 33

⁶ Bernal (1999), Stein and Stein (2000), p. 6.

⁷ *Recopilación ley IV tit 18 lib 5 year 1498, Recopilación ley VI tit 18 lib 6 year 1550, Recopilación cap 18 aut 16 tit 21 lib 5 1652, Recopilación aut 40 tit 21 lib 5 year 1704, Nueva Recopilación ley X lib IX tit XVII year 1743.*

⁸ The aim of these laws was to prevent the exportation of bullion: *"We have been informed that there is so much greed to take gold coins out of our kingdoms, that both foreigners and natives are involved in the business of collecting gold coins and paying for them more than their value, in order to take them out to other kingdoms, thus making profits, with no fear of the punishments that our laws provide; as the laws of our kingdom stipulate that no one can pay for coins more than their value"* [*"porque somos informados que es tanta la codicia, que hay en sacar la moneda de oro de nuestros reinos que así extranjeros como naturales tiene por trato de recoger la moneda de oro y dar por ella más de lo que vale, por la llevar a otros reinos y ganar por ella, sin temor de las penas de nuestras leyes contenidas, que por las leyes de nuestro reino está proveído que por las monedas no se pueda llevar más de lo que valen"*] (ley VI, tit 18, lib 6 R year 1550)

⁹ The Mint regulation was compiled in *Ordenanzas que regulan las Casas de Moneda de 13 de Junio de 1497*. This regulation prohibited the exchange of silver at a higher price than the Mint Price, but there is no reference to gold. The price of gold was regulated in the following year (*Ley IV tit 18 lib 5 Recopilación year 1498*). The reform of the monetary system in 1848 was compiled in *RD de 15 de abril de 1848*.

accepted precious metals as money, exchanged at the official parity. At the end of the 18th century, contemporaries claimed that “Spain is absolutely the only country in Europe in which there is not trade of gold and silver, and where there is no specialized merchant house dealing with this kind of business”.¹⁰

On the other hand, bans on exports prohibited the export of gold and silver without a license until the mid-19th century.¹¹ The Treasury Department (*Consejo de Hacienda*) issued licenses to export specific amounts of precious metals only to businessmen who justified the “provisions that they should make out of the Kingdom”.¹² Additionally, the importing of precious metals from the American colonies was controlled by the institution that oversaw trade with the colonies: *Casa de Contratación*.¹³ A merchant had to register gold and silver as soon as his vessel tied up in Cadiz and pay the import tax for both ingots and coins.¹⁴ Ingots had to be sold at the Mint price in the *Casa de Contratación* and sent to the Mint for minting. Coins received a certificate that proved the registration. The transport of precious metals into Spain was forbidden by sea or land, except to be delivered to the mint or to be exchanged for goods, cases in which a license was needed.

The consequence of bullionist legislation was the absence of a free bullion market. However, a black market emerged in Cadiz, and a great proportion of the silver that arrived from Spanish America was smuggled from Cadiz to the rest of Europe. The estimates of the percentage of silver that was illegally exported are between 14% and 50% in the 16th century, up to 85% in the 17th century and approximately 50% in the 18th century.¹⁵

How did the illegal exchange take place? Because Castile prohibited the existence of a market for silver, we could have expected the Spanish-American silver to be traded directly to the European bullion markets. But this did not happen, and a black market was created in Cadiz. The Castilian crown concentrated the monopoly of trade with the American colonies using one single port; first, Seville (1495/1503-1717), through the ports of Cadiz and Sanlúcar

¹⁰ Larruga (1787-1800), vol. 3, p. 44.

¹¹ The beginning of the prohibition is compiled in *Quadernos de Guadalaxara de D. Juan I y D. Enrique III*. In addition, according to Alcobilla (1868, vol. 9, p. 305), the free export of gold and silver in both ingots and coins was permitted from 1849 (RR.OO. 2 November 1849). The bans on export are compiled in *Nueva Recopilación tit. XIII, lib. IX: “de la saca prohibida de oro, plata y moneda del Reyno”*.

¹² *Pragmática 13 Septiembre 1628. Madrid*.

¹³ *Recopilación de Indias, lib. IX, tit. XIII*. Veitia (1672). Hamilton (1934).

¹⁴ García Baquero (1988), vol. 1, pp. 197-210

¹⁵ Morineau (1985), pp. 242 and 375. Serrano Mangas (1989, p. 316) estimates that 70% of the silver that arrived from Spanish America in the first half of the 17th century was smuggled.

de Barrameda, and later, Cadiz itself (1717- 1765/1789).¹⁶ Cadiz was, therefore, the commercial geo-strategic center that connected the Mediterranean Sea - Atlantic Ocean - North Sea - Baltic Sea maritime route through the Strait of Gibraltar. Bullion shipped from the New World to the Old World had to pass through Cadiz. As the Castilian crown concentrated the monopoly of trade with the American colonies in the port of Cadiz, the importers from Spanish America and exporters to Europe exchanged silver in the black market in Cadiz.

A nationality criterion defined the sides of the silver black market in Cadiz. The supply side consisted of the Spanish businessmen who imported the silver from America to Cadiz. Trade with the colonies was restricted to the Spanish merchants¹⁷, who had to be registered as members of the guild *Consulado de Cargadores de Indias* (Consulate of Delivery Agents for the Indies) and could trade for themselves or as commissioners for other Spanish businessmen.¹⁸ The *Consulado de Cargadores de Indias* had judicial, fiscal, financial and administrative tasks. It was the merchants' court for the *Casa de Contratación*, the collector of commercial taxes for the monarch, the moneylender for the crown and the registry of the merchants with American colonies. Because of the guild's registry, we know the names of all *Cargadores de Indias*: in our period from 1730-1742, 1,250 merchants were registered.¹⁹

The demand side consisted of the foreign businessmen who illegally exported the silver from Cadiz to Europe. These businessmen could not legally trade with the American colonies either directly or through the *Cargadores de Indias*. Silver traveling from the Spanish-American colonies to Spain was taken directly to the foreign ships anchored in the bay of Cadiz, which belonged to foreign merchants living in the city. The foreign merchants who had settled in Cadiz smuggled the silver because they were granted diplomatic immunity. Spain had granted commercial concessions to foreign merchants through commercial treaties signed after the Peace of Westphalia due to the Spanish economic backwardness and loss of political power.²⁰ Several clauses in the commercial treaties gave foreign merchants indirect advantages for the smuggling of bullion because, although it had been explicitly prohibited,

¹⁶ Bernal (1992), García-Baquero González (1988, 2002)

¹⁷ *Real Cédula 27 July 1592, Real Cédula 24 May 1686*, García-Baquero (1991), pp. 69-101, *AGI Consulados leg 63A year 1747*, in Bustos (2005), p. 130.

¹⁸ García-Baquero (1991) pp.69-101.

¹⁹ Ruiz Rivera (1988), p. 113-130, reproduces the list with the names of *Cargadores de Indias*.

²⁰ Report about the excess of smuggling, 1738-1744, *AGI, sección 5a, Gobierno, Legajo Indiferente General 2479 (microfilm C-1557 and C-1558)*. Girard (1967), McLachlan (1974), Stein and Stein (2000).

several loopholes gave protection to foreign merchants. Foreign merchants' books could not be searched by Spanish authorities, and foreign merchants could not be prosecuted by a Castilian judge. They had special judges of their nationality –*juez consensuador*– who safeguarded their interests according to their national legislation.

Therefore, Spanish merchants shipped the silver from the Spanish-American colonies to Cadiz. In turn, foreign merchants who had settled in Cadiz bought the silver from the Spanish merchants in the black market and sold it abroad. Both market sides won with the illegal exchange. The silver sellers avoided paying the very high import tax by bringing the silver into Cadiz illegally, without registration²¹. The silver buyers circumvented bans against silver exports. Voltaire (1756) described silver smuggling in Cadiz as follows: *“The way in which, for a long time, foreigners appropriated the gold and silver that the galleons supplied from America was singular. The Spaniard, who is the factor of the foreigner in Cadiz, hands over the ingots he has received to some brave men called Metedores. These men, armed with small pistols and swords, carry the numbered ingots to the city walls, and hand them over to other Metedores, who carry them onto skiffs. These skiffs take the ingots onto vessels in the bay. These Metedores, these factors, the assistants, the guards who never disturbed them, all of them had their rights, and the foreign merchant was never deceived”*.²²

2. OLIGOPSONISTIC STRUCTURE OF THE SILVER BLACK MARKET

Cadiz had a population of approximately 60,000 people in the mid-18th century.²³ Its economy was based on trade performed by businessmen who practiced wholesale trade with America or with the main European commercial and financial centers.²⁴ We have seen in the previous section that nationality defined the direction of trade in the market: Spanish

²¹ During the period from 1720-1765, the taxes on gold and silver introduced from America to Castile were more than 7% for gold and more than 10% for silver. García Baquero (1988), vol. 1, pp. 197-201

²² *“La manière dont on donna longtemps aux étrangers l’or et l’argent que les galions ont rapportés d’Amérique fut encore plus singulière. L’Espagnol, qui est à Cadix facteur de l’étranger, confiait les lingots reçus à des braves qu’on appelait Météores. Ceux-ci, armés de pistolets de ceinture et d’épées, allaient porter les lingots numérotés au rempart, et les jetaient à d’autres Météores, qui les portaient aux chaloupes auxquelles ils étaient destinés. Les chaloupes les remettaient aux vaisseaux en rade. Ces Météores, ces facteurs, les commis, les gardes, qui ne les troublaient jamais, tous avaient leur droit, et le négociant étranger n’était jamais trompé”* Voltaire translated metedor –which literally means person who put something- as “météore” (meteor). The emphasis is his. Voltaire (1990) [1756], vol. II, p. 337

²³ Cadiz was one of the main Spanish cities in 1750: Madrid had 160,000 inhabitants, Granada 70,000, Seville 66,000, Cadiz 60,000, Valencia 60,000 and Barcelona 50,000. Bairoch, Batou and Chèvre (1988), pp. 15-21.

²⁴ Carrasco (1997) p. 17

merchants traded with American colonies, whereas foreign merchants settled in Cadiz traded with the European centers. The foreign merchants in Cadiz were the “merchants in the shadow”, i.e., those who could not trade with American colonies *de jure* but who obtained the highest net income from the mercantile activity *de facto*.²⁵ Foreign wholesale merchants accumulated more than 80% of the total net income earned by trade in Cadiz by the mid-18th century.²⁶

The fiscal statistic *Catastro de Ensenada* shows the distribution of the net income of wholesale merchants by nationality in the mid-18th century (Table 2.1).²⁷ First, the Spanish merchants who traded with the Spanish-American colonies represented 59% of all merchants, but they earned only 17.5% of the income. Foreign merchants represented 41% of merchants and earned 82.5% of the total income. The nationalities of foreign merchants were French, Italian, German, Damascene (and Swedish and Prussian), Irish (and English) and Flemish. French merchants were the most important community of foreign merchants in Cadiz. They represented one quarter of all merchants and earned half of all merchants’ total annual net income per wholesale trade.

²⁵ García Baquero (1976), p. 488; Solano (1991), p. 347

²⁶ Proportion calculated from Campos and Camarero (ed.) (1990), pp. 114-115 (see Table 2.1). Foreign wholesale merchants earned approximately the 66% of the total net income earned by trade in Andalusia in the mid-18th century. García-Baquero (1991), p. 33

²⁷ The *Catastro de Ensenada* was a huge statistic computed by the Castilian government between 1750 and 1756 in the 22 provinces of the Castilian Crown to replace several taxes (*rentas provinciales*) with one single tax proportional to wealth (*contribución única*). Therefore, the aim of this statistic was to determine wealth. It comprised 40 questions about wealth from different productive activities, and question 31 asked for the annual net income of wholesale merchants. The answer for Cadiz broke down the net income of wholesale merchants by nationality for the activity of “trade and transfer of bills of exchange” for the year 1753; and, additionally, a correction of the statistic in 1762 added the number of merchants. The statistic computed in 1762 also corrected the data on net income, but the statistic computed in 1771 considered the 1753 data to be the good data. For this reason, I use the data from 1753. See Ruiz Rivera (1988), p. 72.

Table 2.1: Wholesale merchants' net income according to *Catastro de Ensenada, 1753*

Nationality	CADIZ			
	Wholesale merchants' annual net income (1753)		Number of merchants (1762)	
	Pieces of eight of old silver	%	Number	%
French	710,450	46.04	60	16.17
Italian	149,800	9.71	35	9.43
German	31,000	2.01	3	0.81
Damascene (Swedish and Prussian)	75,500	4.89	11	2.96
Irish (and English)	231,100	14.97	30	8.09
Flemish	74,700	4.84	14	3.77
Spanish- Cargadores de Indias ²⁸	270,724	17.54	218	58.76
TOTAL	1,543,274	100.00	371	100.00

Source: Net income data from the *Catastro de Ensenada* (1753), in Campos and Camarero (ed) (1990), pp. 114-115; number of merchants from the verification of the *Catastro de Ensenada* (1762) in García-Baquero (1988), vol 1, pp.491-492

The reason for foreign merchants' settlement in Castile was the attractiveness of the American precious metals, although their exportation was forbidden.²⁹ French merchants were the most significant foreign merchants in Cadiz in the 18th century because the Spanish Succession war had given privileges to the French merchants and expelled English Protestant merchants.³⁰ The regional origins of French merchants who settled in Cadiz are shown in Figure 2.1. According to a contemporary document written in 1714: "*Liste des négocians François établis à Cádiz*" (List of French merchants settled in Cadiz) (2 January 1714), two regions stand out: Bretagne (Saint-Malo) and Provence (Marseille).

On the one hand, the Saint Malo - Cadiz route was the maritime link for trade between West France and Spanish America beginning in the second half of the 17th century.³¹ According to L'Espagnol (1997), the Cadiz – Saint Malo route constituted one of the major European routes of redistribution of American silver beginning at the end of the 17th

²⁸ The Spanish are the *Cargadores de Indias*, but not all *Cargadores* registered in the *Consulado* appeared in the *Catastro de Ensenada*. Those who did not appear either did not practice or did not earn enough income, although they were registered as *Cargadores*. Ruiz Rivera (1988), p. 73.

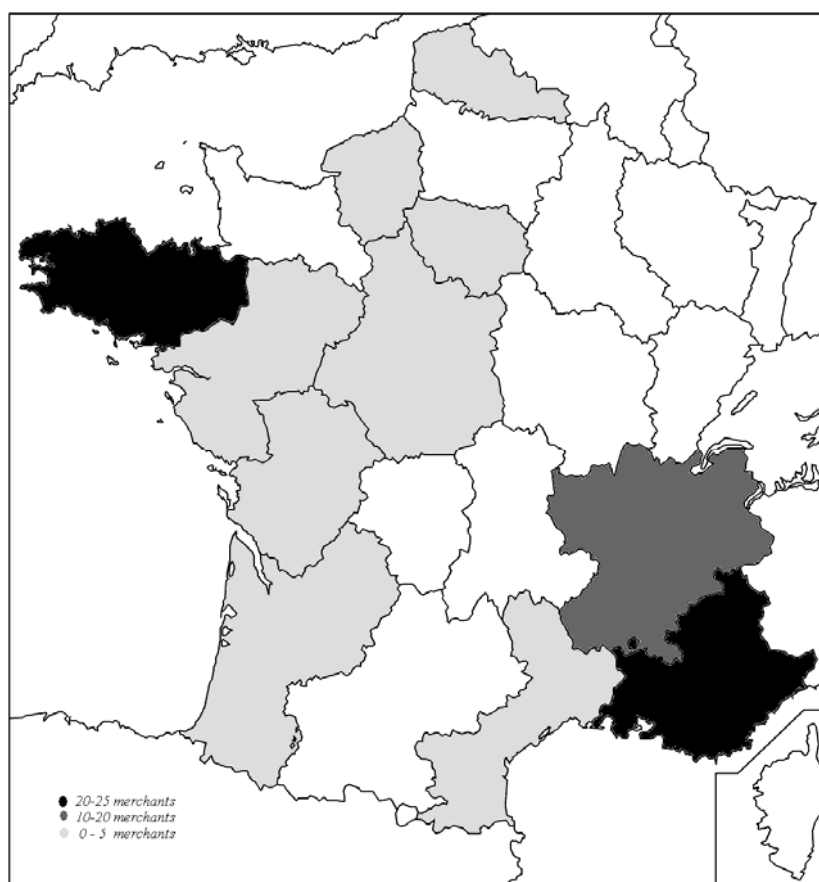
²⁹ Girard (1967), p. 37.

³⁰ Carrasco González (1997), pp. 22-26.

³¹ See L'Espagnol (1997), p. 403-493. Malouin's prominent commercial, shipping, and financial roles in the War of the Spanish Succession stemmed from previous decades of expansion at Cadiz. During the 1650s, Malouins obtained from the Spanish government licenses to ship silver to Saint-Malo in wartime. The regular shipper was La Lande Magon of Saint-Malo at Cadiz, the great-grandfather of one of the main silver smugglers. Stein and Stein (2000), p. 113 and L'Espagnol (1997), p. 125.

century.³² On the other hand, Marseille was the French Mediterranean port on the Old Levant route, a traditional channel for gold and silver to the East.³³ Flandreau *et al.* (2009a) pointed out the important role played by the Franco-Spanish connection in channeling the American treasure out of Spain: concretely, the Franco-Spanish monetary block formed by Madrid-Cadiz-Lyon-Marseille.³⁴ Merchant families from Bretagne and Provence had sent some of their members to Cadiz to expand the geographic network for distributing the silver.³⁵

Figure 2.1.: Regional origins of French merchants settled in Cadiz (1714)³⁶



Source: Author's elaboration from "Liste des négocians François établis à Cádiz, 1714", in Ozanam (1968), p. 278 (outline map: www.hist-geo.com)

³² L'Espagnol (1997), p. 410.

³³ Braudel (1979), vol. 3, p. 619. Marseille is considered in the literature to be one of the main centers of Spanish silver smuggling. Bernal (1992), pp. 317-318 and Bustos (2005), p. 390.

³⁴ Flandreau *et al.* (2009), pp. 163-164

³⁵ L'Espagnol (1997), p. 454

³⁶ There were 80 merchants registered, jointed in 68 Merchant Houses. Twenty-four merchants were from Provence (20 from Marseille, 2 from Toulon, 1 from Aix and 1 from Ollioules), 20 from Bretagne (8 from Saint-Malo, 6 from Nantes, 4 from Morlaix, 1 from Dinard and 1 from Landerneau), 12 from Lyon, and the other 24 from various places in France: 5 from Orléans, 4 from Rouen, 3 from Paris, 2 from Bordeaux, 2 from Lille, 1 from Rochelle, 1 from Laval, 2 from Languedoc, and 2 from the Basco-Béarnaise region (Bayonne and Lestelle). There were also 2 foreign merchants registered: 1 from Switzerland and 1 from Ypres.

The role of Marseille as a bullion trade center grew during the 18th century.³⁷ It is not surprising, therefore, that I have located the black market of silver in Cadiz in the Cadiz correspondence of the Marseille Merchant House *Roux*. Indeed, the banker *Roux* was a specialist in arbitrating with bullion in Marseille.³⁸ The Merchant House *Roux* operated from the beginning of the 18th century until the mid-19th century (1728-1843). *Roux* practiced a polyvalent business that embraced many commercial activities developed in a vast geographical domain of 360 cities in Europe, Levant, the Barbary Coast and the Antilles, with nearly 2,000 correspondents.³⁹ I have examined the Cadiz correspondents who arbitrated with silver together with *Roux* to achieve a good approximation of the major figures of the silver smuggling business. According to the *Roux* archive, the smugglers in Cadiz were the following eleven merchant houses: *Pierre, Athanase, Jolif et Cie* (1729-1730)-*Athanase, Jean Jolif et Cie* (1731-1736)-*Alain Jolif et Cie* (1737-1741); *Guillaume Jogues* (1730-1735); *Jamets, Verduc, Vincent et Cie* (1733-1736)-*Verduc, Vincent et Cie* (1737-1740); *Duval-Baude* (1733)-*Duval-Baude et Cie* (1739); *Guillaume Macé* (1729-1738)-*Guillaume Macé, fils et Cie* (1739-1740); *Casaubon, Béhic et Cie* (1731-1741); *Le Couteulx le jeune et Cie* (1729-1731)-*J. Le Couteulx, A. Le Normand et Cie* (1733-1741); *Magon et Lefer frères* (1730-1740); *Galibert, Cayla, Cabanes et Cie* (1730-1735); *Jean Solier et Cie* (1734-1739); and *Antoine et Pierre Masson* (1729-1731)-*Pierre, Guillaume et Joseph Masson* (1733-1736).

The smugglers were the most important wholesale merchants among all French merchants in Cadiz according to a contemporary ranking elaborated by J.-B. Partyet, a Maurepas in 1736.⁴⁰ Cadiz had an average of 60 French merchant houses from 1724 to 1790. The first-

³⁷ Rambert (1966), p. 545

³⁸ Rambert (1954), vol. 4, p. 480

³⁹ The archive of the merchant house *Roux* is a remarkable 18th-century commercial archive kept in *La Chambre de Commerce et d'Industrie de Marseille*. Its 1,320 bundles contain 78,274 documents of correspondence, 14,516 of accounting and 23,216 of commercial matters (sea and land transport, weaponry, food, raw material and manufactured goods). Rebuffat (1965), section L.IX. The correspondents in Cadiz reported to the *Roux* merchant house the black market prices of pieces of eight from 1729 to 1741. Then, *Roux* started to arbitrate with silver through the *Compagnie Royale d'Afrique*. The correspondence from the *Compagnie Royale d'Afrique* has not been preserved, so the series of black market silver prices in Cadiz is uninterrupted only from the foundation of the merchant house *Roux* in 1729 to the foundation of the *Compagnie Royale d'Afrique* in 1741.

⁴⁰ J.-B. Partyet a Maurepas, 12 March 1736, in Ozanam (1968), p.348. "We prepared... a state of the entire nation, which was divided into 5 classes according to approximate amount of trade that we believed every individual makes... These classes will be reviewed every year in order to consider any change in the trade activity of their members, and to include the new merchant houses that could have been set up in Cadiz under the French flag". ["*Nous dressâmes... un état de toute la nation, qui fut divisée en 5 classes selon le plus ou le moins de commerce que nous estimâmes qu'un chacun fait... Ces classes seront refaites tous les ans pour y insérer les changements auxquels la nouveauté qu'il pourroit y avoir dans le commerce de ceux qui les composent pourroient donner lieu, et les augmenter des nouvelles maisons qui pourroient s'établir dans la suite à Cadiz*"]

class French merchant houses were, on average, in the first quartile of all French merchants in Cadiz, and 100% of the smugglers were found within this first class.⁴¹ This means that silver smuggling was completely a business of the first-class French merchant houses.

Therefore, the French merchants were the most important group among all foreign merchants (Table 2.1), and the smugglers were the most important merchants among the French merchants settled in Cadiz (ranking by J.-B. Partyet a Maurepas, 1736). Finally, I use a ranking of net income elaborated by *Consulado de Cargadores de Indias* in 1771 for the project of fiscal reform “*contribución única*” to identify the importance of the silver smugglers relative to the total number of merchants in Cadiz.⁴² The results are summarized in Table 2.2.

Table 2.2: Wholesale merchants’ net income by nationality, 1771

Net income (pieces of eight of old silver)	FRENCH	GERMAN (Damascene, Swedish and Prussian)	IRISH (and English)	FLEMISH	ITALIAN	SPANISH
0- 7,999	80	14	38	18	43	283
8,000-15,999	15	4	4	1	4	1
16,000-23,000	6	1	0	0	0	0
24,000-31,999	2	0	2	0	0	0
32,000-39,999	3	0	0	0	0	0
40,000+	2	0	0	0	0	0
Total number	108	19	44	19	47	284
Net income per capita	6,606	5,605	5,418	3,932	3,198	954

Source: Author’s calculations using the list: “*Relaciones de comerciantes remitidas a la Escribanía de Cabildo, a 3 de junio de 1771*” (Archivo General de Indias, Consulados 892 bis), reproduced in Ruiz Rivera (1988), pp. 65-72.

The French group had the highest net income per capita, followed by the German, Irish, Flemish, Italian and Spanish groups. Only 1% of all merchants earned a net income higher than 32,000 pieces of eight of old silver, and all of them were French. The composition of the French group was fairly stable - lists available from the 16th century almost always show the same names⁴³ - which makes it easier to compare the names of smugglers who appear in *Fond*

sous pavillon françois”] Quotation reproduced in Ozanam (1968), p. 269

⁴¹ They all were first class –although Jolif and Jogues moved from first to second class and Lecouteulx from second to first class.

⁴² The list contained the names and net incomes for all wholesale merchants in Cadiz and was used to implement the “*contribución única*” project of fiscal reform, which started in the 1750s.

⁴³ Mauro (1990), p. 280

Roux (1729-1741) with the names listed in the “*contribución única*” project of fiscal reform (1771). The five merchants with the highest net income among all merchants in Cadiz were the silver smugglers: *Casaubon Domingo, por sí y Casaubon Behic y Cia, Solier, Marcos, por sí y por Cayla, Solier, Hermanos Cabanes y Compañía, Verduc, Pedro y Compañía, Masson, Josèph y Cia, and Lefer, Francisco por sí y Magon y Lefer Hermanos*.⁴⁴ These top merchants who appear as the smugglers in *Fond Roux* are the same merchants denounced by the Spanish authorities as bullion smugglers (1738-1744): *Casaubon, Behic et Compagnie* and *Cayla, Solier, Cabanes et Compagnie*.⁴⁵

Thus, smuggling was practiced only by a few very powerful foreign merchants who were able to smuggle the silver because they had an international distribution network and were granted diplomatic immunity to smuggle without the risk of being captured. The French smugglers were organized in a cartel of a few powerful merchants linked in networks. Historical 18th-century trade networks combined formal limited-partnership ties with informal alliances based on family ties. Marriage, partnership and trade were closely related. Merchant and family networks linked individuals from similar geographic origins and professions and were a common strategy used by Irish, Italian and French merchant houses and by merchants coming from the North of Spain and Catalonia. Alliances helped merchant houses to achieve stability and adequate operation and contributed to the expansion of merchants’ networks towards the main centers of European and Atlantic trade.⁴⁶

Stable networks were based on the principles of obedience and submissiveness to the decisions made by the family hierarchy. The power of the corporate family to interfere in the life of its members was strong. Both women and young men depended on family decisions. The agents sent to Cadiz by French merchants were generally their sons or other members of their families. They were often young bachelors who were learning commercial skills to

⁴⁴ The fifth most important merchant was not one of our smugglers: *Gilly, Simón, por sí y su Compañía*. But this merchant house did not exist in our arbitrage period (1729-1741). It appears in the ranking of French merchant houses in Cadiz of 1746. The other smugglers had lower net incomes that were still higher than the average: *Jolif, Juan y sus hermanos compañeros*: 8,000 and *Maccè, Nicolás, por Guillermo Maccè, Hijo y Cia*: 8,000. *Le Couteulx* did not appear in *Contribución Unica*. Only his partner appeared: *Lenormand, Antonio por sí y su compañía*: 18,000. However, according to *Almanach Général des marchands* (1772, p. 73), the company was *Le Couteux, Le Normand & Compagnie*. *Guillaume Jogues* and *Duval-Baude* disappeared from the ranking of French merchant houses in Cadiz of 1746. Ozanam (1968), p. 348.

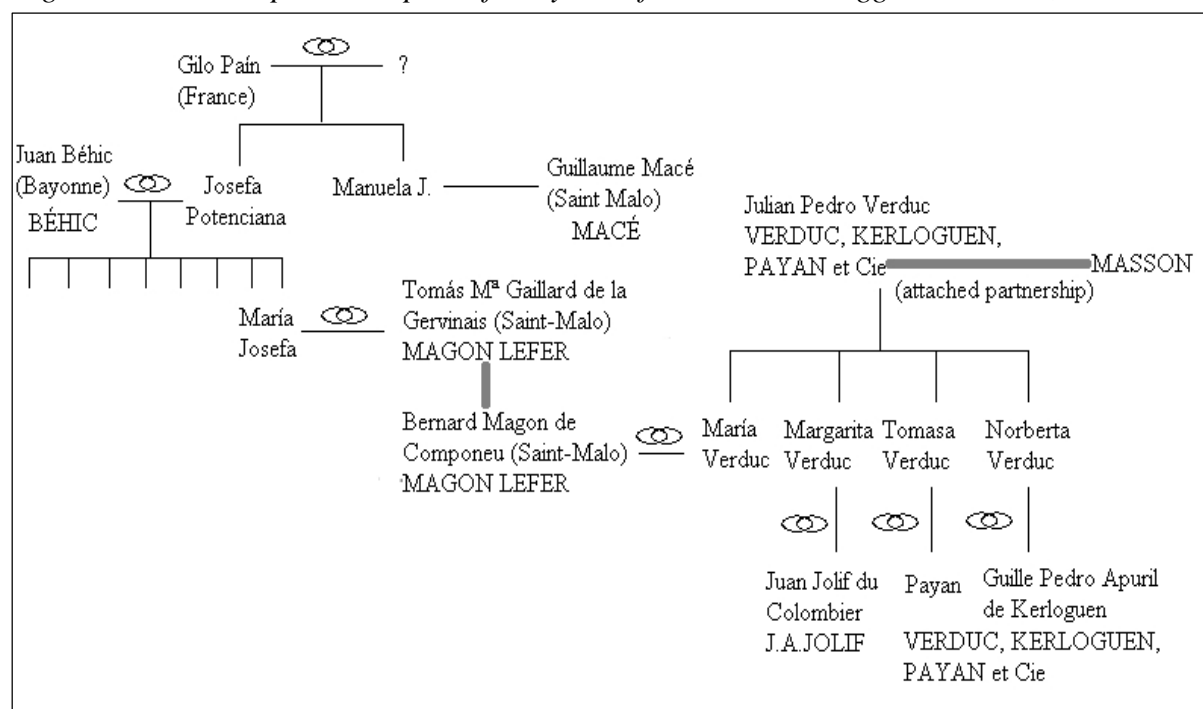
⁴⁵ Archivo general de Indias, sección 5ª, Gobierno, legajo 2479, Indiferente general (microfilm C-1557 and C-1558)

⁴⁶ Fernández (1997), pp. 173-174, Stein and Stein (2000), p. 72, Bustos (2005), pp. 465-469

create a branch in Cadiz or to eventually take charge of their parents' firms in France.⁴⁷ These agents were placed in the care of the members of the initial network of foreign businessmen who had previously settled in Cadiz.⁴⁸

The merchants' biographies obtained from notaries and ecclesiastical sources illustrate the strategies that bullion smugglers used to develop their networks in Cadiz: the long-run stability of their merchant houses was guaranteed by the transfer of partnership to younger relatives, and the houses' power was increased by strategic marriages that linked the most important merchant houses. On the basis of the biographies, I found ties among six of the eight merchant houses studied.⁴⁹ These merchant houses were mutually connected by the family and partnership ties that configured the cartel of smugglers (Figure 2.2).

Figure 2.2: Formal partnership and family ties of the bullion smugglers in Cadiz, 18th century



Source: Author's analysis. Biographies are available in Bustos Rodríguez (1995), Bustos Rodríguez (2005), Garcia-Mauriño Mundi (1999), L'espagnol (1997) and Rebuffat (1965).

⁴⁷ Girard (1967), Mauro (1990), p. 280, Fernández (1997).

⁴⁸ Carrasco (1997), p. 52

⁴⁹ I could not find ties with other houses in the cases of *Cayla*, *Cabanes*, *Solier et Cie* and *LeCouteulx, Le Normand et Cie*, either because they were really not connected to other houses or because I could not trace the connections.

Manuela J., the daughter of Gilo Pain, a French wholesale merchant in Cadiz, married Guillaume Macé, who was a partner of the French merchant house *Macé et Cie*. Gilo Pain's other daughter was married to Juan Béhic, another French merchant, who was a partner of the house *Casaubon, Béhic et Cie*. Juan Béhic's daughter, María Josefa, married Tomás M^a Gaillard, a member of the merchant house *Magon Lefer*. Another member of *Magon Lefer*, Bernard Magon, married María Verduc, who was the daughter of Julian Pedro Verduc, partner of the merchant house *Verduc, Kerloguen, Payan et Cie*. Julian Pedro Verduc's other three daughters also married French wholesale merchants: Margarita Verduc to Juan Jolif, partner of the house *Jolif*; and Tomasa Verduc and Norberta Verduc to two members of Verduc's own company, Payan and Kerloguen, respectively. Finally, the merchant house *Verduc, Kerloguen, Payan et Cie* had an attached partner, *Masson*, who was another of the French bullion smugglers in Cadiz.

The most important implication of the existence of a cartel of mutually connected smugglers was their ability to drive down silver prices in the Cadiz black market. Smugglers were the price-makers, as contemporaries recognized:

*“Despite this division of the body of merchants into 4 classes, by which the first one is formed by 12 houses, and it can be said that these 12 houses are practically of the same range, I believe it is my duty to inform you that the houses of Mr. Masson, Verduc, Vincent et Cie., Magon el Lefer, and above all, those of Mr. Casaubon, Béhic et Cie, and Cayla, Solier frères, Vendun et Cie., receive more merchandises, be they from France or from foreign countries, than the rest of the nation altogether; that Mr. Casaubon and Béhic, Masson, Wailsh, Handricx, Sobia et Vande, and Cayla, Solier frères, Vendun et Cie are believed to be the wealthiest Frenchmen in Cadiz: **these merchant houses are the ones that largely rule the price of exchange** together with that of Mr. Le Couteulx, who is significant in this kind of trade”⁵⁰*

⁵⁰ *“Malgré cette division du corps des négocians en gros en 4 classes, par laquelle la première étant composée de 12 maisons, on a lieu de juger que ces 12 maisons sont à peu près de la même portée, je crois cependant devoir, Mgs., vous observer que les maisons des Srs Masson, Verduc, Vincent et Cie, Magon et Lefer, surtout celles des Srs Casaubon, Béhic et Cie, et Cayla, Solier frères, Vendun et Cie, reçoivent plus de marchandises, soit de France, soit du pays étranger, que tout le reste de la nation ensemble; que les Srs Casaubon et Béhic, Masson, Wailsh, Handricx, Sobia et Vande, et Cayla, Solier frères, Vendun et Cie passent pour les plus riches François de Cadiz: **que ce sont ces maisons qui régulent principalement le prix du change**, ainsi que celle des Srs Le Couteulx, qui est considérable pour cette partie du commerce”*. The emphasis is mine. Partyet à Maurepas, 4 April 1746, in Ozanam (1968), p. 272-273

The nationality criterion of trade with Spanish America prevented silver from going directly to the European bullion markets: Spain imported and foreign merchants exported the silver, so a bullion black market appeared in Cadiz. Bans on exports created a barrier of entry to the business of illegal silver exports. Only foreign merchants who had diplomatic immunity could smuggle silver. In addition, only those foreign merchants powerful enough to have the international connections necessary to extract the silver were able to smuggle. The most important French merchants were the leaders of the smuggling operation and were organized into a cartel that drove down silver prices in Cadiz below the international price. Therefore, arbitrage with silver from Cadiz to the main European financial centers guaranteed systematic profitability. The next section explains how arbitrage took place according to *Roux* banker ledgers of silver arbitrage.

3. SILVER ARBITRAGE ACCORDING TO ROUX BANKER ARCHIVE

I performed an accurate reconstruction of arbitrage with silver practiced by contemporaries according to information from the *Roux* banker's archive. Arbitrage was a joint venture that set up operations for merchant-bankers in different cities on a joint account ("*compte à demi*" or "*compte a tiers*")⁵¹, and its success lay in the application of double-entry bookkeeping and the knowledge of local units of mass and world geography⁵². Arbitrage with bullion was denominated "bullion trade" ("*commerce des matières*"),⁵³ and its logic can be understood thanks to the documents kept in the accounting section of the archive "arbitrage accounts" ("*comptes d'arbitrage*"). The following examples explain arbitrage with silver (see

⁵¹ Taylor (1964), pp. 483-484

⁵² Double-entry bookkeeping system (*ou a l'italienne*) in Ricard, 1732, p. 521-600. *Roux* "exported" the system of double-entry bookkeeping for arbitrage with specie to his correspondents abroad. For example, J. A. Henry, correspondent in Constantinople, explained (1778): "We are going to follow your method of maintaining the accounts of arbitrage in two columns, which will be easier (...). By this current method, everything in a single account" (« Nous allons suivre votre méthode de tenir le compte d'arbitrage en deux colonnes ce qui sera beaucoup plus facile (...) Par cette méthode actuelle, le tout se trouve remis dans un seul compte ») and Peschaire from Naples (1784): "I have already written my accounts ½ in my books exactly as you have suggested, which is, effectively, the most succinct and clear method" (« J'ai déjà fait le compte à demi sur mes livres exactement comme vous me l'indiquez, ce qui est, en effet, la manière la plus succincte et la plus claire ») Carrière (1973), pp. 767-779.

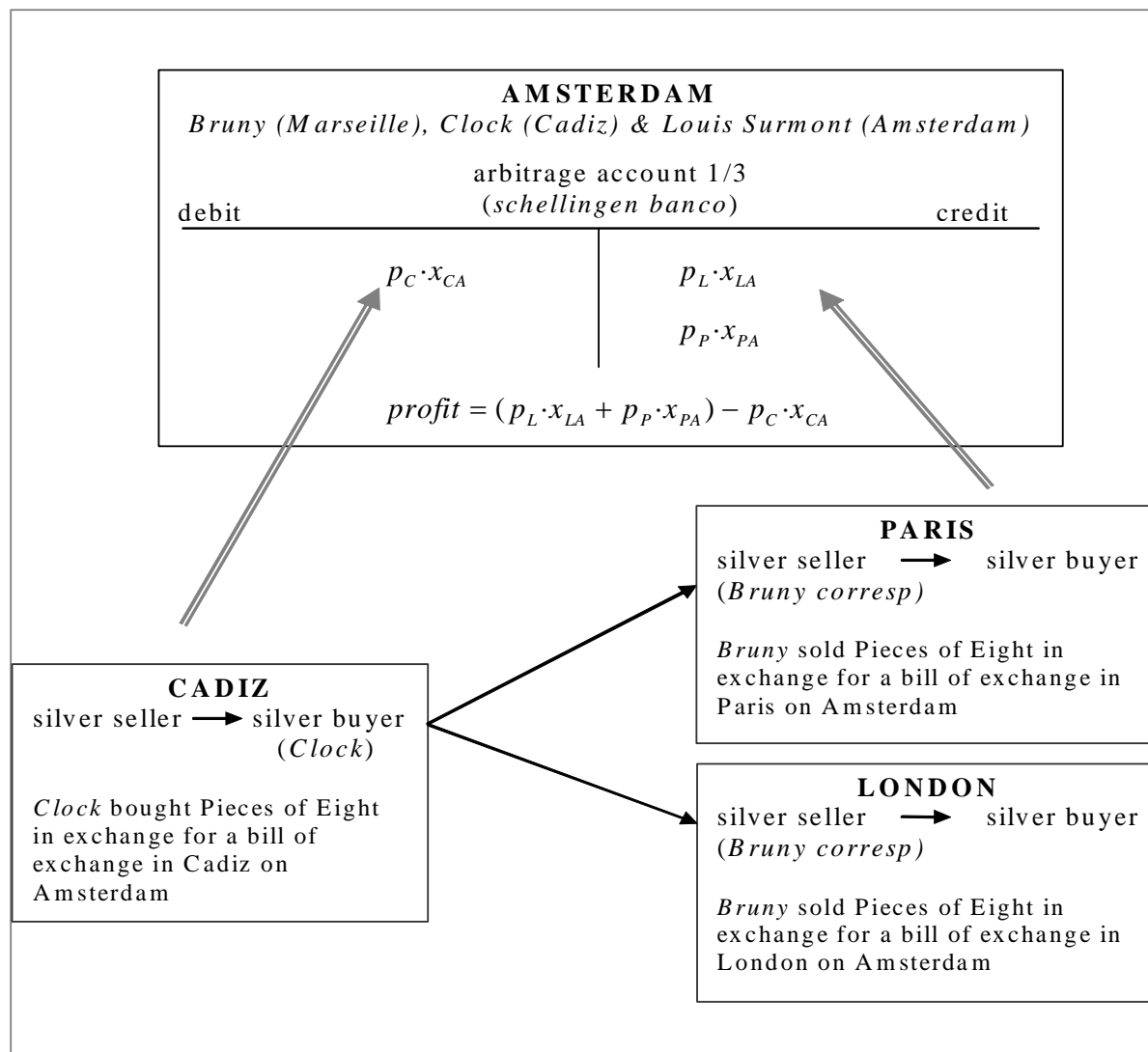
⁵³ *Matières* was the French word for bullion in the 18th century, according to the *Roux* archive. This same word is still used in the Rothschild archives in the mid-19th century. See Flandreau (1995), pp. 193-225

Figures 3.1 and 3.2).⁵⁴ Arbitrage was conducted between two or three partners from different cities, who bought pieces of eight in Cadiz and usually sold them in other European centers, such as London, Paris or Marseille. The first partner was the *Roux* merchant house in Marseille, the second partner was its correspondent in Cadiz and the third partner was a banker from a European center (e.g., Lyon, Paris, Amsterdam). The profit, namely, the difference between buying prices in Cadiz and selling prices abroad, was shared among the partners.

Figure 3.1 shows arbitrage with silver between three partners operating with a joint arbitrage account during the year 1728. The partners were *Raymon Bruny et Cie*⁵⁵ from Marseille, *Brethous Clock et Cie* from Cadiz and *Guillaume Louis de Surmont* from Amsterdam, who had a joint arbitrage account (“*compte a tiers*”) in Amsterdam. When the silver arrived in Cadiz from Spanish America, the partner of the joint account in Cadiz, *Brethous Clock*, bought the silver in Cadiz in exchange for a bill of exchange in Cadiz on Amsterdam. The seller of silver in Cadiz cashed the bill to receive a credit balance in Amsterdam, while *Bruny, Clock & Louis de Surmont* had one entry on the debit side of the joint arbitrage account ledger. Then, *Brethous Clock* shipped the silver from Cadiz to Paris and London, and *Bruny’s* correspondents in Paris and London sold the silver there in exchange for bills of exchange in Paris or London on Amsterdam. The buyer of silver reduced his credit balance in Amsterdam, while *Bruny, Clock & Louis de Surmont* cashed the bills in Amsterdam, thus having one entry on the credit side of the joint arbitrage account ledger. Finally, the profit was calculated as the difference between the entries on the credit side and the entries on the debit side. This profit was shared among the three partners at the end of the year after deducting costs.

⁵⁴ Fond Roux, L. IX section II- compte arbitrage: liasse 53. These two examples are the only accounts of specie arbitrage preserved for our period of study because the accounting registers were destroyed in a fire in 1941. Rebuffat (1965), p. 89.

⁵⁵ Raymon Bruny was Roux’s uncle. On 1 October 1728, he transferred the merchant house *Raymon Bruny et Cie* to his two nephews, Jean-Baptiste-Ignace and Pierre-Honoré Roux. The new merchant house was named *Jean-Baptiste, Honoré Roux et Cie*. Rebuffat (1965), p. 89.

Figure 3.1.: Scheme of arbitrage according to the arbitrage accounts⁵⁶

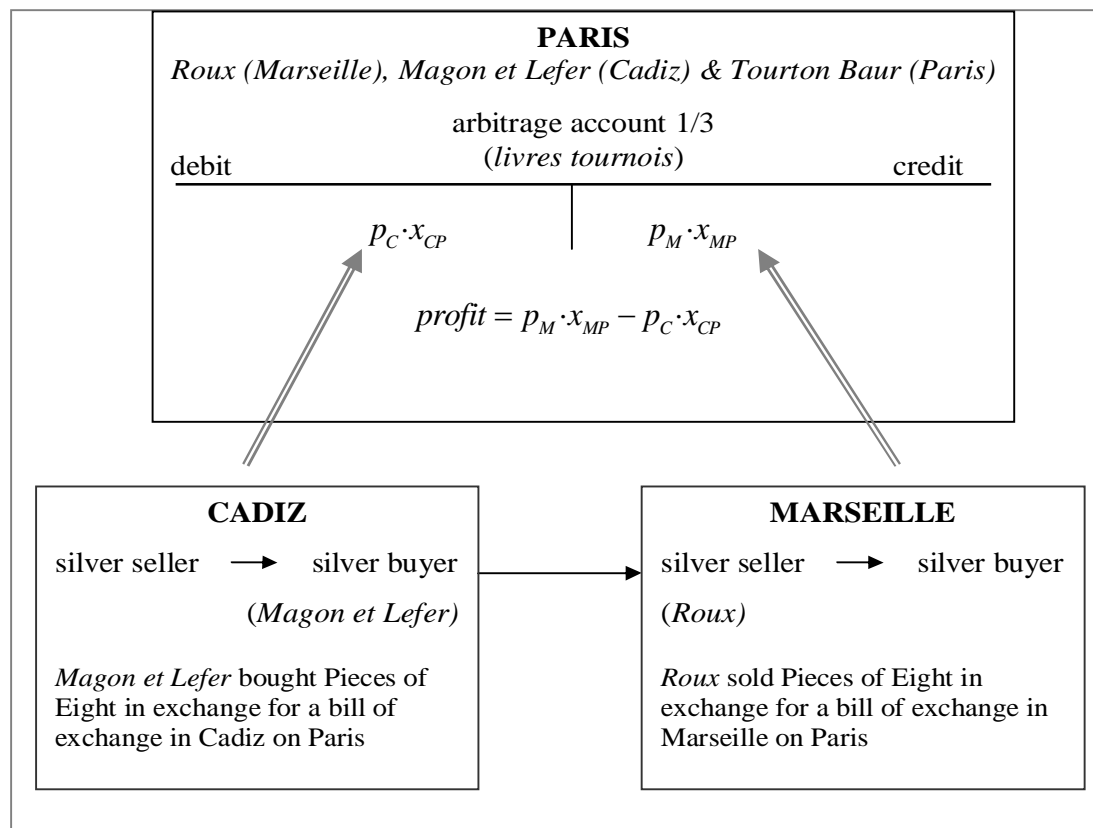
Source: Author's elaboration from *Fond Roux, L. IX section II- compte arbitrage: liasse 53*.

Figure 3.2 shows arbitrage with silver between three partners operating with a joint arbitrage account during the year 1730. *Jean-Baptiste et Honoré Roux* from Marseille, *Magon et Lefer frères* from Cadiz and *Tourton Baur et Cie* from Paris had the arbitrage account in Paris. First, *Magon et Lefer frères* bought the pieces of eight in Cadiz in exchange for a bill of exchange in Cadiz on Paris, which was cashed in one entry on the debit side of the joint arbitrage account. Second, *Magon et Lefer frères* shipped the silver from Cadiz to Marseille, and *Roux* sold the silver in Marseille in exchange for a bill of exchange in Marseille on Paris,

⁵⁶ p_C denotes the black market price of silver in Cadiz; p_L and p_P are the market price of silver in London and Paris, respectively; x_{CA} is the spot exchange rate in Cadiz on Amsterdam; x_{LA} is the spot exchange rate in London on Amsterdam; and x_{PA} is the spot exchange rate in Paris on Amsterdam.

which represented one entry on the credit side of the joint arbitration account. At the end, the profit, calculated as credits minus debits, was shared among the partners.

Figure 3.2.: Scheme of arbitrage according to the arbitrage accounts⁵⁷



Source: Author's elaboration from *Fond Roux, L. IX section II- compte arbitrage: liasse 53*.

The examples have shown that arbitrage was conducted between silver and bills of exchange instead of the traditional version of arbitrage between gold and silver.⁵⁸ Arbitrage with silver was cashed with a multilateral bill-of-exchange payment.⁵⁹ According to the examples, silver arbitrage from Cadiz to Paris and London was settled through a third center, Amsterdam, and silver arbitrage from Cadiz to Marseille was settled through a third center, Paris. The great negotiability of bills of exchange drawn on the main financial centers allowed the multilateral settlement in the 18th century. Flandreau *et al.* (2009a) recently measured the

⁵⁷ p_C denotes the black market price of silver in Cadiz; p_M is the market price of silver in Marseille; x_{CP} is the spot exchange rate in Cadiz on Paris; and x_{MP} is the spot exchange rate in Marseille on Paris.

⁵⁸ For arbitrage between bullion and bills in the Early Modern period, see Quinn (1996) and Nogues-Marco (2011a).

⁵⁹ International trade was based upon multilateral payments in the 18th century. Heckscher (1950), Sperling (1962) and Flandreau *et al.* (2009a).

degree of multilateralism of bills of exchange in mid-18th-century Europe: only 18% of bills were directly traded between two cities, 75% had to pass through an intermediary center and 7% needed two intermediaries⁶⁰. The main financial centers were the intermediary connecting centers: Amsterdam, Paris and London. It is thus not surprising that silver arbitrage was settled through the main financial centers (Amsterdam and Paris in examples 1 and 2, respectively). Sellers of silver in Cadiz preferred to have a credit balance in the main financial centers rather than in Cadiz.

The next section measures the profitability of silver arbitrage explained in this section according to *Roux* merchant-banker ledger accounts.

4. SILVER-POINT MECHANISM, CADIZ-LONDON THROUGH AMSTERDAM

The profitability of arbitrage is measured with the silver-point mechanism formula, which represents arbitrage operations as explained with previous examples. Although the dynamic of silver arbitrage permitted the use of different destination centers for different arbitrage operations, the scarcity of bullion market prices for the 18th century limits the calculations to one single arbitrage operation: silver shipped from Cadiz to London through Amsterdam.

The silver-point mechanism represents the law of one price for silver specie, i.e., in the absence of transportation and other transaction costs, competitive markets will equalize the price of the silver coin *old Mexican piece of eight* in the two centers, London and Cadiz, when both prices are expressed in the same currency:

$$p_L = p_C \cdot x_{CA} \cdot x_{LA} \quad (4.1)$$

where p_L denotes the market price of silver in London (pence sterling), p_C denotes the black market price of silver in Cadiz (*peso de plata antigua*), x_{CA} is the spot exchange rate in Cadiz on Amsterdam, x_{LA} is the spot exchange rate in London on Amsterdam and $x_{CA} \cdot x_{LA}$ denotes the multilateral spot exchange rate between London and Cadiz through Amsterdam (pence sterling/*pesos de plata antigua*).

⁶⁰ Flandreau *et al.* (2009a), p. 162

In reality, arbitrage involved costs. The silver-point mechanism between Cadiz and London through Amsterdam considering costs is given by equation 4.1 plus costs, as represented by equation 4.2⁶¹:

$$(1 - c_{CL}) \frac{p_L}{p_C} \leq x_{CA} \cdot x_{LA} \leq (1 + c_{LC}) \frac{p_L}{p_C} \quad (4.2)$$

where $\frac{p_L}{p_C}$ is called arbitrated parity⁶²; c_{CL} is the cost of trading the silver from Cadiz to London; and c_{LC} is the cost of trading the silver from London to Cadiz.

The specie-point mechanism recognizes that gold and silver, along with bills of exchange, may be used to settle international payments. The exchange rate will not be exactly the arbitrated parity, but it will fluctuate within the silver-points because shipping silver involved transaction costs. To prevent arbitrage, for a given spot exchange rate between Cadiz and London and the market price of silver in London, the market price for silver in Cadiz could not rise higher than the point where it became profitable to send silver from London to Cadiz or fall lower than the point where it became profitable to send gold from Cadiz to London.

When is arbitrage profitable? If the exchange rate goes up the upper band $\left((1 + c_{LC}) \frac{p_L}{p_C} < x \right)$, exporting silver from London to Cadiz is profitable, and if the exchange rate goes down the lower band $\left((1 - c_{CL}) \frac{p_L}{p_C} > x \right)$, exporting silver from Cadiz to London is profitable. Thus, silver-point breaks mean that the exchange rate falls below or rises above the

⁶¹ The multilateral silver-point mechanism equals the bilateral specie-point mechanism defined by Flandreau (1996, p. 422 and 2004, p. 59), assuming the arbitrage condition for the triangular arbitrage of bills of exchange, i.e.,: $x_{CA} \cdot x_{LA} = x_{LC}$, where x_{CA} is the spot exchange rate between Cadiz and Amsterdam, x_{LA} is the spot exchange rate between London and Amsterdam, and x_{LC} is the spot exchange rate between London and Cadiz. I tested the stochastic integration for the bills of exchange market, i.e., drawing a hypothetical spot bill between London and Cadiz is equivalent to drawing a hypothetical spot bill between Cadiz and Amsterdam plus another bill between London and Amsterdam. The spot exchange rate in London on Cadiz and the spot exchange rate in Cadiz on Amsterdam multiplied by the spot exchange rate in London on Amsterdam are strongly correlated (Pearson correlation coefficient is 0.96), so I accept the integration of the bills market. Therefore, the results do not differ between bilateral and multilateral arbitrage. Contemporaries practiced multilateral arbitrage because the sellers of silver preferred to have credit balances in the main centers (e.g., Amsterdam) rather than in Cadiz, not because they obtained an extraordinary profitability through the triangular arbitrage with bills.

⁶² The arbitrated parity (or arbitrated par of exchange) between London and Cadiz is defined by the relative market prices: p_L / p_C . Arbitrated par of exchange is a 19th century wording. Flandreau (1996, p.422 and 2004, p. 59). See also Tate (1834, pp. 169-170). Merchants in the 18th century used the name “par or equality of exchange” Giraudeau [1756] (1796, p. 15) or the name “accidental par”. Newton (1734).

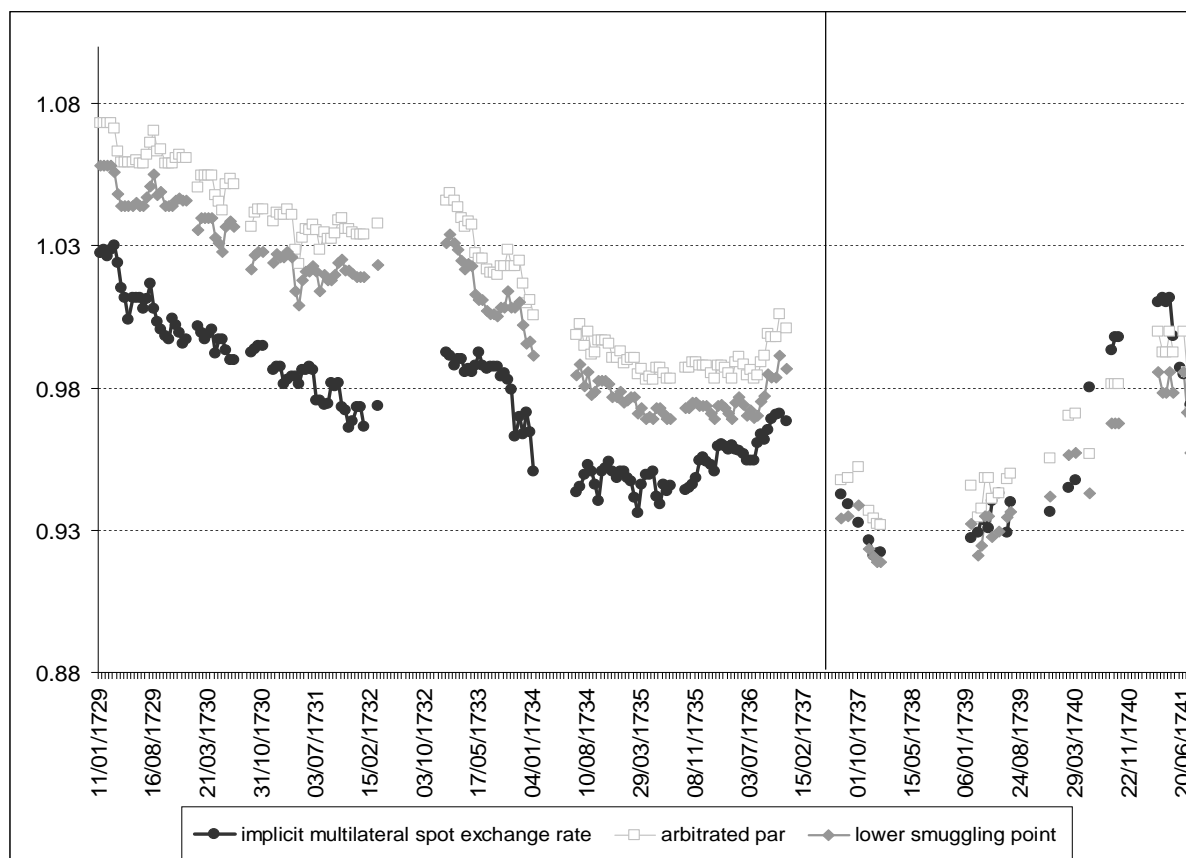
bullion point at which sending silver from one center to the other become profitable. We should expect breaks to be short lived because arbitrageurs will buy silver in the center with the lowest market price and sell it in the center with the highest market price, which will adjust prices to eliminate arbitrage profitability. Thus, the process of arbitrage should maintain the exchange rate within silver-points, and few and no persistent breaks are expected. This reasoning works well when silver movements are free. Nogues-Marco (2011a) has calculated the specie-point mechanism for London and Amsterdam in the mid-18th century and demonstrates that bullion markets were integrated when bullion movements were free; thus, only a few non-persistent breaks occurred. International arbitrages ensured uniformity in the market price of gold and silver in London and Amsterdam in the 18th century.

But international arbitrages do not ensure uniformity in the market price of silver when bullion movements are controlled. The arbitrage mechanism of adjustment demands free bullion movements and perfect competition where both buyers and sellers are price takers. However, we have seen in previous sections that Castile forbade bullion exports and free bullion exchanges, and the oligopsonistic structure of the black market of silver in Cadiz enabled buyers to purchase silver at a lower price than would have prevailed in a competitive market. Buyers were price markers, so drove down prices to create systematic arbitrage profitability. I construct the lower silver point according to equation 4.2 to measure profitability in exporting silver from Cadiz to London. The Appendix explains the data and calculations, and Figure 4.1 shows the lower silver-point between Cadiz and London through Amsterdam.

According to results shown in Figure 4.1, we can distinguish two different periods. In the first period, from 1729 to 1737, there was a systematic gap between the implicit spot exchange rate and the lower silver-point, which made arbitrage systematically profitable. International markets were connected through smuggling, but smuggling did not ensure uniformity of the silver prices in Cadiz and London. In a perfectly competitive market, arbitrageurs should have bought silver at the lowest market price (Cadiz) and sold it at the highest market price (London), which would have adjusted prices to make arbitrage unprofitable. However, in an imperfect competitive market, long-run profitability was maintained over nine years without price adjustment because oligopsony drove down prices in Cadiz. Figure 4.2 measures profitability as the gap between the exchange rate and the

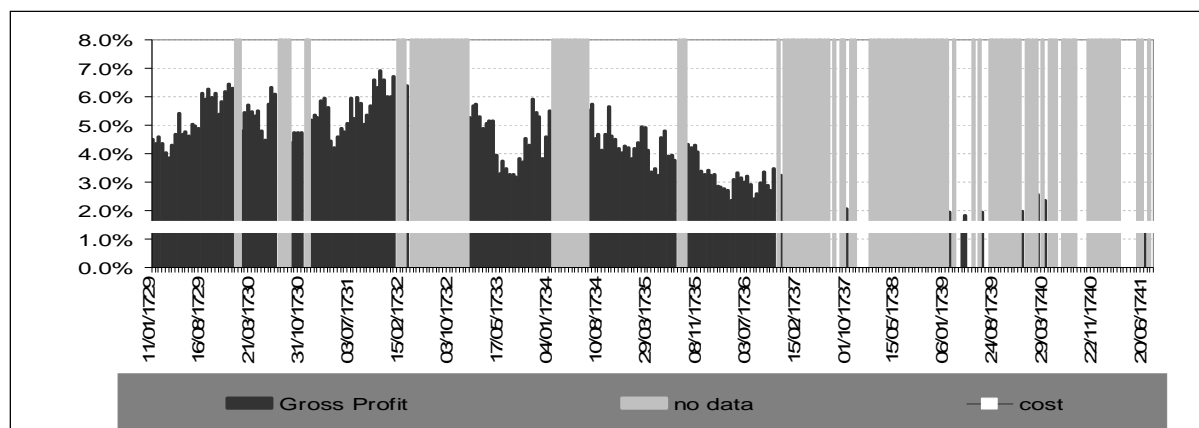
arbitrated parity (gross profitability) and the gap between the exchange rate and the lower silver-point (net profitability, i.e., gross profitability minus costs).

Figure 4.1: Lower band of arbitrage equation between London and Cadiz, 1729-1741
(half-monthly observations), pence sterling/peso de plata antigua
(normalized at intrinsic par, 1729-1737, $54 \cdot 8/10=1$)



Source: see Appendix

Figure 4.2: Profitability of the silver arbitrage from Cadiz to London, 1729-1741



Source: see Appendix.

Figure 4.2 shows the profitability of the silver arbitrage from Cadiz to London. From 1729 to 1737, arbitrage was systematically profitable because there was a gap between the oligopsonistic price in Cadiz ($p^{oligop} = p_C$) and the international price in London ($p^* = p_L \cdot x$)⁶³. We have seen that if the exchange rate goes down the lower band $\left((1 - c_{CL}) \frac{p_L}{p_C} > x \right)$, exporting silver from Cadiz to London becomes profitable. According to Figures 4.1 and 4.2, the exchange rate was systematically below the lower silver band because the oligopsonistic price in Cadiz was below the international price:

$$p_L \cdot x \equiv p^* \geq p^{oligop} \equiv p_C \quad (4.3)$$

The difference between the international price and the oligopsonistic price in Cadiz measures the oligopsonistic market power. The larger the gap between the oligopsonistic and the international prices, the higher the oligopsonistic power. However, the oligopsonistic price has a floor, which is the official parity (\bar{p}). The oligopsonistic price cannot be lower than the official parity, i.e., the legal value of the old Mexican pieces of eight coin. If the oligopsonistic black market price was lower than the official parity, the sellers of silver in Cadiz would move the silver from the commodity market to the money market because coins circulated at the official parity in the money market:

$$p_C \equiv p^{oligop} \geq \bar{p} \quad (4.4)$$

The existence of a floor for the oligopsonistic market price gave the government the possibility to apply an exchange rate policy oriented to the bullionist aim of avoiding silver outflows. On 16 May 1737, the Spanish government moved the official parity from 1 piece of eight coin equal to 10/8 *peso de plata antigua* to 1 piece of eight coin equal to (10 5/8)/8 *peso de plata antigua*.⁶⁴ In other words, the government fixed the official parity at the same level as the international price to remove the arbitrage profitability (see Figure 4.2). The devaluation equalized the implicit spot exchange rates and the arbitrated parity from mid-1737 to 1741, so arbitrage stopped being systematically profitable (see Figure 4.1).

⁶³ Assumes that the London market is a competitive market and its price represents the international price. British law has permitted the exportation of bars and foreign coins in gold and silver since 1663 (Munro, 1992, p. 212). Our representative coin, the old Mexican piece of eight, had a free quotation in the London Stock Exchange in the 18th century.

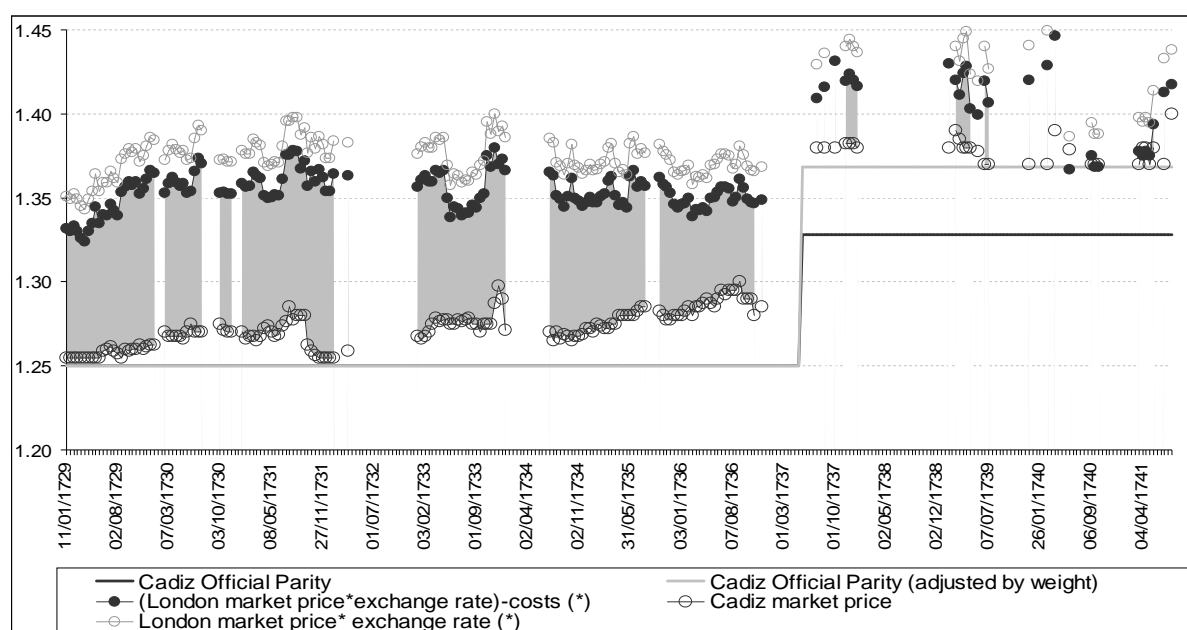
⁶⁴ Autos Acordados (1772), libro 5, título XXI, auto 61. Novísima Recopilación (1805), libro 9, título XVII, ley 8, and Innocencio Aparici (1741), pp. 24-26

Therefore, the oligopsonistic price was enclosed between the international competitive price and the official parity. The international price was the maximum price because the oligopsonistic markdown is equal to zero at the international price (equation 4.3). The official parity was the minimum price because below the official parity, sellers would use the coins as money at the official parity and would not sell them as commodities (equation 4.4). Merging equations 4.3 and 4.4 gives the oligopsonistic price enclosed between the international market price and the Cadiz official parity:

$$p^* \geq p^{oligop} \geq \bar{p} \quad (4.5)$$

Figure 4.3 shows the Cadiz oligopsonistic price enclosed between the international market price and the official parity. The grey zone shows the net profitability of arbitrage. Before the devaluation, the buyers of silver in Cadiz gained the difference between Cadiz shadow market prices and London prices (grey zone). The oligopsonistic price fluctuated between official parity and the international price (equation 4.5), but the devaluation increased official parity at the international price level. The gap between international market prices and official parity was reduced, thus eliminating the possibility of driving down the shadow prices in Cadiz below the international price.

Figure 4.3: Official parity in Cadiz and market prices in London and Cadiz, 1729-1741 (half-monthly observations), pesos de plata Antigua/old Mexican piece of eight

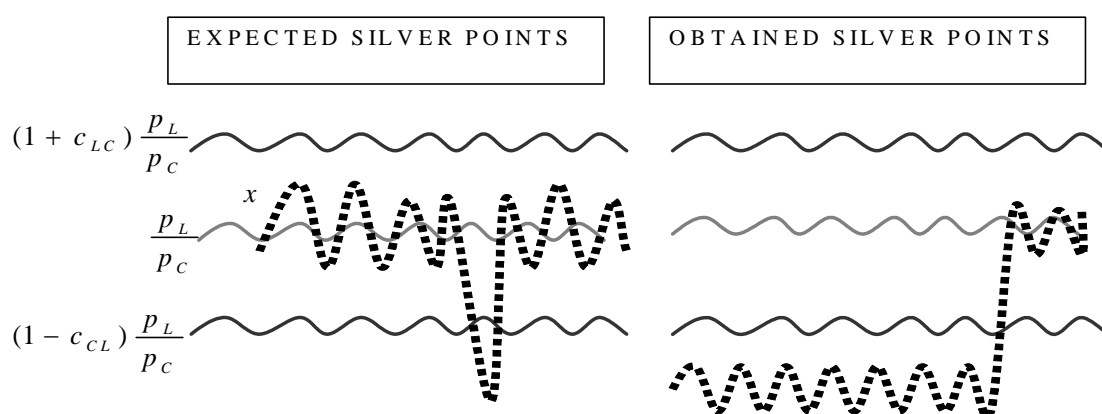


Source: see Appendix.

(*) Cadiz prices are given per coin, while London prices are given per standard ounce. Abrasion has been added to London prices to compare with Cadiz prices.

In summary, Figure 4.4 summarizes the behavior of the silver-point mechanism with free bullion movements compared with bullionist controls. For a case of free bullion movements, we should have expected occasional silver-point violations adjusted by arbitrage. That is, for a given London-Cadiz exchange rate and silver price in London, the silver price in Cadiz should not fall lower than the point at which sending silver from Cadiz to London became profitable. If the silver-point were violated, we would expect that arbitrageurs bought silver in the center with the lowest market price and sold it in the center with the highest market price, which would adjust prices to eliminate arbitrage profitability. However, obtained silver-points for a case of bullionist controls show a very different picture. From 1729 to 1737, there was a systematic bias between the implicit spot exchange rate and the lower silver point that made arbitrage systematically profitable. Despite smuggling, which connected international markets, arbitrage did not adjust prices because the oligopsonistic structure of the black market in Cadiz maintained shadow prices below the international price to make arbitrage profitable. But from 1737 to 1741, the bias was corrected because the Spanish government reacted to the illegal bullion outflows with a devaluation, which equalized the implicit spot exchange rates and the arbitrated parity. The long-run effectiveness of devaluation will depend on the evolution of international price levels. The problem of the exchange rate policy is that the international price is a variable and, therefore, in order to maintain the bullionist political goal, the government must change the official parity occasionally according to the fluctuation of international prices.

Figure 4.4: Expected vs. obtained silver points



Castile applied several devaluations that are compiled in Castilian legislation. The legislation states specifically that avoiding the extraction of specie was the reason for the devaluations⁶⁵. Devaluation restricted bullion outflows, but it was an unpopular monetary policy because it changed the legal relation between the unit of account and the medium of exchange; thus, it altered the measure of value and provoked “*darkness, confusion and abuses*” in the Castilian monetary system.⁶⁶

The most interesting implication is the effect of oligopsony on quantities. Oligopsony limited smuggling *per se* because silver outflows were lower under oligopsony than under perfect arbitrage competition. To some extent, oligopsony was helpful to the government. If it had not existed, pressures from international prices would have been much greater. Indeed, this may explain why the government implicitly accepted the existence of the cartel. Of course, smuggling was not good from a bullionist point of view, but cartelized smuggling was better than competitive smuggling.

CONCLUSIONS

This paper has calculated the profitability of silver arbitrage from Cadiz to London to understand the basis for the Castilian bullion outflows by combining new data from primary sources collected in the *Roux* banker archive (Marseille). The arbitrage equation measures the gap between the exchange rate and the relative bullion prices in two centers. If the gap is larger than the arbitrage costs, arbitrage is profitable, and bullion will be shipped from the cheapest to the most expensive center.

When studying arbitrage profitability in Spain, a basic problem arises. Market prices for bullion are not available because no legal bullion market existed. As the main producer of precious metals, Spanish monetary policy focused on hindering the movement of gold and silver from the American colonies to other countries. From the late Middle Ages until the mid-19th century, administrative prices prohibited the exchange of gold, silver or billon at a different price than the official parity, and bans on exports forbade the exportation of gold or

⁶⁵ Autos acordados, Libro V, título XXI, auto L and auto LI, 14 January 1726

⁶⁶ *Dictamen sobre moneda*, 4 Dec 1834, in Prieto and De Haro, 2004, pp. 210.

silver without a license. The consequence of the bullionist legislation was the absence of a free bullion market and the formation of a black market for bullion in Cadiz. The discovery of data on the silver black market in Cadiz has permitted the profitability of silver arbitrage to be calculated in the present study.

The silver black market in Cadiz was not a perfectly competitive market. The sides of the black market for bullion in Cadiz were defined by nationality. The suppliers of silver in Cadiz were the Spanish merchants who could legally trade with the colonies. The demanders of silver were the foreign merchants who had settled in Cadiz and who were not allowed to import silver from the Spanish colonies. These foreign merchants had diplomatic immunity and could therefore illegally extract the silver from Cadiz and smuggle it to main centers in Europe. The French merchants who had settled in Cadiz were the main smugglers, and they were the most important merchants in Cadiz according to Spanish fiscal sources and French contemporary reports on French merchants who settled abroad.

The smugglers' network reveals the oligopsonistic structure of the silver black market in Cadiz. The most important foreign merchants in Cadiz were members of international societies with partner companies abroad. The smugglers were organized in long-run networks and were specifically directed to undertake illegal trade operations between the Spanish-American colonies and Europe through Spain. Networks gave smugglers enough market power to drive down the price of silver and provided them with the necessary international connections to illegally extract and distribute bullion from Cadiz. Silver smugglers were the price-markers, according to contemporary reports.

The capability of smugglers to drive down prices made arbitrage systematically profitable. The archival research in the account books of *Fond Roux*, a leading 18th-century French merchant from Marseille, provides an explanation of the exact working of the arbitrage with silver. The arbitrage was conducted between silver and bills by three partners from different cities. The first partner was the *Roux* merchant house in Marseille, the second partner was its correspondent in Cadiz, and the third partner was a banker from another European center. These partners had a joint arbitrage account in a main financial center, for example Amsterdam, to settle the arbitrage operations. The partner in Cadiz bought the silver in the Cadiz black market in exchange for a bill of exchange drawn in Cadiz on the main center, Amsterdam. The seller of the silver in Cadiz cashed the bill to receive a credit balance in

Amsterdam, while the arbitrageurs had one entry on the debit side of the joint account ledger. The partner in Cadiz shipped the silver from Cadiz to a main European bullion market, for example, London. The correspondent in London sold the silver in exchange for a bill of exchange drawn in London on Amsterdam. The buyer of silver reduced his credit balance in Amsterdam while the arbitrageurs cashed the bill in Amsterdam, thus having one entry on the credit side of the joint account ledger. Finally, the profit was calculated as the difference between the entries on the credit side and the entries on the debit side in the joint account ledger. This profit was shared among the three partners after deducting costs.

The profitability of arbitrage has been measured using the silver-point mechanism. This paper reconstructs the silver-point mechanism between London and Cadiz through Amsterdam for the period from 1729-1741, for which half-monthly quotations of silver in the Cadiz black market are available. I consider data of arbitrated parity between the two centers, arbitrage costs, and spot exchange rates calculated from the exchange rate paid in bills of exchange at maturity. Then, I compare the implicit spot exchange rate with the arbitrated parity adjusted by costs. Results show that, from 1729 to 1737, the gap between the implicit spot exchange rate and the lower silver-point made arbitrage systematically profitable. From mid-1737 to 1741, the gap was corrected because the Spanish crown reacted to the illegal silver outflows with a devaluation that equalized the implicit spot exchange rate and the arbitrated parity; thus, arbitrage stopped being profitable.

In summary, this article has analyzed the behavior of the silver-point mechanism for a case of bullionist controls. A silver-point mechanism with free bullion movements does not yield a systematic profitability of arbitrage because violations of the silver-point provoke arbitrage, which will adjust prices to eliminate profitability. However, a silver-point mechanism with bullion controls explains continuous silver flows because the market power created by the bullion controls preserves the price gap between the international and domestic silver prices, thus maintaining systematic profitability despite arbitrage. In the case of Castile in the early 18th century, bullionist regulations distorted the system and created a black market for silver. The black market was controlled by the most relevant foreign merchants, who had diplomatic immunity for smuggling and were organized in a cartelized network to drive down prices in Cadiz and create a systematic profitability for arbitrating with silver.

PRIMARY SOURCES

Archives Départementales de la Gironde (Bordeaux): Répertoire Numérique du Fonds des Négociants, 7 B, liasses 1304, 1322, 1597, 1774, 2061 and 2162

Archivo General de Indias (Sevilla): Compradores de oro y plata. Contratación S.32. 4951a-4959; Contratación S.32, SS.1-SS.2; Consulados, 1606^a, 1606B, 1607, L.887. Expediente sobre los excesos de contrabando de Cádiz, 1738-1744, sección 5^a, Gobierno, Legajo Indiferente General 2479 (microfilms C-1557 and C-1558)

Biblioteca de Catalunya (Barcelona): Recopilación de la Leyes destos Reynos (1640), Recopilación de Leyes de los Reynos de las Indias (1681), Autos Acordados (1772), Leyes de la Nueva Recopilación (1777), Novísima Recopilación de las Leyes de España (1805), Ordenanzas de Bilbao (1737), in Códigos Españoles Concordados y Anotados (1851).

Bibliothèque nationale de France (Paris): Almanach Général des Marchands, négociant & commerçants de la France et de l'Europe (1772), Chez Valade, Paris, Tolbiac V- 25865

British Library (London): The Course of the Exchange, 1720-1730 (MIC.A.787), 1731-1741 (MIC.A.788), and 1742-1759 (MIC.A.789).

Chambre de Commerce et d'Industrie (Marseille): Fond Roux (L.IX): Section II-comptabilité, comptes courants d'arbitrage, à demi ou à tiers, liasse 53. Section IV-correspondance passive Cadix, liasses 810-856. Section VI- monnaies d'or et d'argent: factures, liasses 1261-1264. Compagnie Royale d'Afrique (L.III) : Correspondance passive Cadix, liasse 364. Piastres, liasse 1017. Factures, liasse 1010. Cahiers de livraison et réception des piastres, liasse 1014-1015. Reçus de caissier d'achats de piastres et copies de ces reçus, 1741-1744, liasse 444. Livre de caisse des piastres, 1741-1794, liasses 446-448.

The Making of the Modern Economy (MOME), Goldsmiths' Kress Library: Newton, I. (1717) [1731]: Table of the Assays, Weights and Values, of most Foreign Silver, and Gold coins, actually made at the MINT by Order of the Privy Council, (updated table 28 March 1729).

REFERENCES

- (Martínez) Alcubilla, M. (1868): *Diccionario de la administración española, peninsular y ultramarina: compilación ilustrada de la novísima legislación en todos los ramos de la administración pública*, Imp. de la V. é Hijas de A. Peñuelas, Madrid.
- Bairoch, P., Batou, J. and Chèvre, P. (1988): *La population des villes européennes de 800 à 1850*, Droz, Genève.
- Bernal, A. M. (1992): *La financiación de la Carrera de Indias (1492-1824)*, Tabapress, Madrid.
- Bernal, A. M. (1999): "Las finanzas imperiales: expansión del oro y la plata por Europa", in C. Lopezosa Aparicio (dir.), *El oro y la plata de las Indias en la época de los Austrias*, Fundación ICO, Madrid, pp. 551-576
- Bustos Rodríguez, M. (1995): *Los comerciantes de la carrera de Indias en el Cádiz del siglo XVIII (1713-1775)*, Publicaciones de la Universidad de Cádiz, Cádiz.

- Bustos Rodríguez, Manuel (2005): *Cádiz en el Sistema Atlántico. La ciudad, sus comerciantes y la actividad mercantil (1650-1830)*, UCA-Sílex ediciones, Cádiz.
- Campos, J. and Camarero, C. (ed.) (1990): *Cádiz 1753. Según las Respuestas Generales del Catastro de Ensenada*, Centro de Gestión Catastral y Cooperación Tributaria, Tabapress, Madrid.
- Canjels, E., Prakash-Canjels, G. and Taylor, A. M. (2004): "Measuring Market Integration: Foreign Exchange Arbitrage and The Gold Standard, 1879-1913", *The Review of Economics and Statistics*, vol. 86, issue 4, pp. 868-882
- Carrasco González, M. G. (1997): *Comerciantes y Casas de Negocios en Cádiz (1650-1700)*, Servicio de Publicaciones Universidad de Cádiz, Cádiz.
- Carrière, C. (1973): *Négociants marseillais au XVIIIe siècle. Contribution à l'étude des économies maritimes*, Institut Historique de Provence, 2 vol.
- Céspedes del Castillo, G. (1996): *Las casas de moneda en los reinos de Indias*, Museo Casa de La Moneda, Madrid.
- Dasí, T. (1950-1951): *Estudio de los reales de a ocho: también llamados pesos, dólares, piastras, patacones o duros españoles*, Tip. Artística, Valencia.
- Esteves, R. P., Reis, J. and Ferramosca, F. (2009): "Market integration in the golden periphery. The Lisbon/London Exchange, 1854-1891", *Explorations in Economic History*, 46 (3), pp. 324-345
- Fallon, John P. (1988): *Marks of London goldsmiths and silversmiths (1697-1837)*, David & Charles; Newton Abbot.
- Fernández Pérez, P. (1997): *El rostro familiar de la metrópoli. Redes de parentesco y lazos mercantiles en Cádiz, 1700-1812*, Siglo Veintiuno de España Editores, Madrid
- Flandreau, M. (1995): *L'or du monde. La France et la stabilité du système monétaire international, 1848-1873*, L'Harmattan, Paris.
- Flandreau, M. (1996): "Adjusting the Gold Rush: Endogenous Bullion Points and the French Balance of Payments 1846-1870", *Explorations in Economic History*, 33, pp. 417-439
- Flandreau, M. (2004): *The Glitter of Gold. France, Bimetallism, and the Emergence of the International Gold Standard, 1848-1873*, Oxford University Press, Oxford.
- Flandreau, M., Galimard, C., Jobs, C. and Nogues-Marco, P. (2009a): "Monetary Geography Before the Industrial Revolution", *Cambridge Journal of Regions, Economy and Society*, 2, pp. 149-171
- Flandreau, M., Galimard, C., Jobs, C. and Nogués-Marco, P. (2009b): "The Bell Jar: Commercial Interest Rates between Two Revolutions, 1688-1789", in Jeremy Atack and Larry Neal (ed.), *The Origins and Development of Financial Markets and Institutions. From the Seventeenth Century to the Present*, Cambridge University Press, Cambridge, pp. 161-208.
- Flandreau, M. and Nogues-Marco, P. (2011): "Hidden in Exchange: On Measuring Interest Rates in European Financial Centres, Circa 1750", *Working Paper*.
- García-Baquero González, A. (1988) [1977]: *Cádiz y el Atlántico (1717-1778)*, Diputación Provincial de Cadiz, Cadiz.

- García-Baquero González, A. (1991): “El espacio comercial andaluz en el siglo XVIII: las áreas de mercado”, in García-Baquero (ed.) *Comercio y burguesía mercantil en el Cádiz de la Carrera de las Indias*, Diputación Provincial de Cádiz, Cádiz, pp. 31-44
- García-Baquero González, A. (2002): *Andalucía y la carrera de Indias, 1492-1824*, Editorial Universidad de Granada, Granada
- García-Baquero González, A. (2003): “American Gold and Silver in the Eighteenth Century: From Fascination to Accounting”, in Dennis O. Flynn, Arturo Giráldez and Richard Von Glahn (ed.): *Global Connections and Monetary History, 1470-1800*, pp. 107-121.
- García-Mauriño Mundi, M. (1991): “Los jenízaros ante el nuevo cuerpo de comercio de 1729”, in García-Baquero (ed.) *Comercio y burguesía mercantil en el Cádiz de la Carrera de las Indias*, Diputación Provincial de Cádiz, Cádiz, pp. 259-270
- García-Patón, F. (1903): *La fabricación de las monedas*, Tipografía de J. Benito Cerezo, Madrid.
- Girard, A. (1967): *Le Commerce français a Séville et Cadix au temps des Habsbourg : contribution a l'étude du commerce étranger en Espagne aux XVIe et XVIIIe siècles*, B. Franklin, New York.
- Giraudeau, P. (1796) [1756]: *La Banque reduite facile aux Principales Nations de l'Europe*, imprimerie de Leroy, Lyon.
- Hamilton, E.J. (1965) [1934]: *American Treasure and the Price Revolution in Spain, 1501-1650*, Octagon Books, New York.
- Haring, C.H. (1939): *Comercio y navegación entre España y las Indias en la época de los Habsburgos*, Fondo de Cultura Económica, México D.F.
- Hayes, R. (1719-1777): *The negociator Magazine of Monies and Exchanges*, Editions: Printed for R. Hayes 1st (1719), Printed for J. Noon 2nd (1724), Printed for W.Meadows 3rd (1730), Printed for J. Noon 4th (1739), Printed for J. Noon 6th (1740), Printed for J. Noon 8th (1754), Printed for G. Keith 9th (1764) and Printed for G. Keith 11th (1777), London.
- Innocencio Aparici, J. (1741): *Norte Fixo y Promptuario Seguro, arreglado à la ultima Real Pragmatica expedida en 16 de Mayo de 1737*, Imprenta de la Gaceta, Madrid.
- Larruga, E. (1787-1800): *Memorias políticas y económicas*, Imprenta de B. Cano, Madrid, 45 volums.
- Lemale, A. (1875): *Monnaies, poids, mesures et usages commerciaux de tous les états du monde*, Imprimerie du Commerce, Havre.
- L'espagnol, A. (1997): *Messieurs de Saint-Malo: una élite negociante au temps de Louis XIV*, Presses Universitaires Rennes, Rennes.
- Mauro, F. (1990): “Merchant communities, 1350-1750”, in Tracy, J.D. (ed), *The Rise of Merchant Empires. Long-distance trade in the early modern world, 1350-1750*, Cambridge University Press, Cambridge, pp. 255-286.
- McCusker, J. and Gravesteijn, C. (1991): *The beginnings of commercial and financial journalism*, Nederlandsch Economisch-Historisch Archief, Amsterdam.
- McLachlan, J.O. (1974): *Trade and peace with old Spain. A study of the influence of commerce on Anglo-Spanish Diplomacy in the first half of the eighteenth century*, Octagon Books, New York.

- Merrill, C.W. (1930): “Summarized Data of Silver Production”, *USA Department of Commerce, Bureau of Mines*, Economic Paper n. 8, Washington.
- Morineau, M. (1985): *Incroyables Gazettes et Fabuleux Métaux*, Maison des Sciences de l’Homme, Paris.
- Munro, J. H. (1992): “Bullionism and the Bill of Exchange in England, 1272-1663: A Study in Monetary Management and Popular Prejudice”, in Munro, J. H, *Bullion Flows and Monetary Policies in England and the Low Countries, 1350-1500*, Variorum, Great Britain.
- Nogues-Marco, P. (2011a): “Competing Bimetallic Ratios: Amsterdam, London and Bullion Arbitrage in the 18th century”, UC3M WP 11-03
- Nogues-Marco, P. (2011b): *Tipos de Cambio y Tipos de Interés en Cádiz en el siglo XVIII (1729-1788)*, Madrid: Banco de España, n. 58.
- North, D. (1968): “Sources of Productivity Change in Ocean Shipping, 1600-1850”, *The Journal of Political Economy*, vol. 76, no.5, pp. 953-970.
- Officer, L. H. (1986): “The Efficiency of the Dollar-Sterling Gold Standard, 1890-1908”, *The Journal of Political Economy*, vol. 94, no. 5, pp. 1038-1073.
- Ozanam, D. (1968): “La colonie française de Cadix au XVIII^e siècle, d’après un document inédit (1777)”, *Mélanges de la Casa de Velazquez*, IV, pp. 259-348
- Pradeau, A. (1938) [2001]: *Numismatic history of Mexico*, Snaford J. Durst, New York.
- Quinn, S. (1996): “Gold, Silver, and the Glorious Revolution: Arbitrage between Bills of Exchange and Bullion”, *Economic History Review*, vol. 49, no. 3, pp. 473-490
- Rambert, G. (1954): *Histoire du commerce de Marseille, de 1660 a 1789*, vol. IV, Libraire Plon, Paris.
- Rebuffat, F (1965): *Répertoire Numérique des Archives de la Chambre de commerce et d’industrie de Marseille. Fonds annexes de la Chambre. Tome II. Série L*, Imprimerie Robert, Marseille.
- Ricard, S. (1732): *Traité général du commerce*, Nicolas Struyck editor, Amsterdam.
- Ridgway, R. H. (1929): “Summarized Data of Gold Production”, *USA Department of Commerce, Bureau of Mines*, Economic Paper n. 6, Washington.
- Ruiz Rivera, J. B. (1988): *El Consulado de Cádiz. Matrícula de comerciantes (1730-1823)*, Diputación Provincial de Cádiz, Cádiz.
- Serrano Mangas, F. (1989): *Armadas y flotas de la plata (1620-1648)*, Banco de España, Madrid.
- Stein, S.J, and Stein, B.H. (2000): *Silver, trade and war. Spain and America in the Making of the Early Modern Europe*, The Johns Hopkins University Press, Baltimore and London.
- Tate, W. (1834): *The Modern Cambist*, Effingham Wilson, Royal Exchange, London
- Taylor, G. V. (1964): “Types of Capitalism in Eighteenth-Century France”, *The English Historical Review*, vol. 79, no. 312, pp. 478-497.
- Veitia Linaje, J. (1981) [1672]: *Norte de la Contratación de las Indias*, Instituto de Estudios Fiscales-Ministerio de Hacienda, Madrid.
- Voltaire (1990) [1756]: *Essai sur les mœurs et l’esprit des nations et sur les principaux faits de l’histoire depuis Charlemagne jusqu’à Louis XIII*, Bordas, Paris.

APPENDIX: SILVER-POINT MECHANISM DATABASE

This appendix explains the variables used to calculate the lower silver point: the silver market prices in London (p_L), the silver black market prices in Cadiz (p_C), the arbitrated par of exchange (p_L/p_C), the multilateral spot exchange rate between Cadiz and London ($x_{CA} \cdot x_{LA}$) and the cost of trading the silver from Cadiz to London (c_{CL}).

Silver market prices in London (p_L)

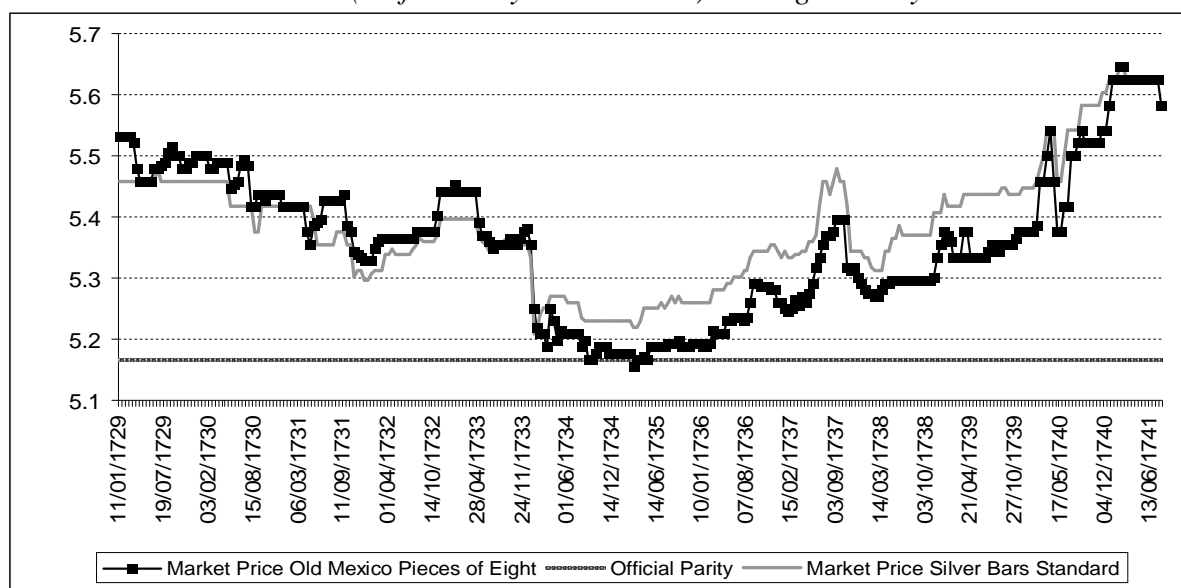
Data are taken from *The Course of the Exchange*, a twice-weekly financial bulletin that was first published in the 1690s.⁶⁷ The silver price was measured in shillings (s) and pence (d) units of account per standard troy ounce.⁶⁸ *The Course of the Exchange* collected data on silver bars and foreign silver coins, specifically pieces of eight.⁶⁹ I collected half-monthly prices of the Mexican pieces of eight at the beginning and the middle of every month - the precise dates correspond to the dates of the Cadiz data (see Figure A1). When quotations were given in a range, I converted ranges to the midpoint. England used the Julian calendar, but because Cadiz used the Gregorian calendar, I converted the dates of the Julian calendar (Old Style) into the Gregorian calendar (New Style) to maintain the homogeneity of the data.

⁶⁷ McCusker and Gravestijn (1991).

⁶⁸ Equivalent units of account were as follows: 1 pound Sterling (£-*librae*)=20 shilling, 1 shilling (s-*solidi*)=12 pennies (d-*denarii*). The fineness of the standard troy ounce was the Sterling Standard (Old Standard), which had 92.5% fineness. Fallon (1988, p. 9). The equivalences among the units of mass were 1 English Pound Troy=12 Ounces, 1 Ounce=20 Pennyweights, 1 Pennywt=24 Grains, 1 Grain=20 Mites. (Newton, 1731). One standard troy ounce was equivalent to 31.103496 grams in the International System of Units. Lemale (1875, p. 189)

⁶⁹ *The Course of the Exchange* compiled quotations on the Pillar piece of eight and Mexican piece of eight from 1721 onwards and on small Pillar pieces of eight and small Mexican pieces of eight from 1732 onwards. Pieces of eight were the only coins quoted in financial bulletins in London during the 18th century (until March 1795, when the French New Louis began to be quoted together with the pieces of eight).

Figure A1: Price of old Mexican pieces of eight on the London Stock Exchange, 1729-1741 (half-monthly observations) shilling/std. troy ounce



Source: *Course of the Exchange* for market prices and Feavearyear (1931, p. 346) for official parity.

Silver black market prices in Cadiz (p_c)

Data are taken from the correspondents' letters kept in the Merchant House *Roux*.⁷⁰ Cadiz correspondents reported the black market silver prices and sometimes added a description of the relationship between exchange rates and silver prices or a direct recommendation on arbitrage (i.e., whether to buy pieces of eight). Silver prices appeared inside the text or at the end of the letter together with the exchange rates (Figure A2 shows an example of pieces of eight quotations inside the text of the letter).

Figure A2: Pieces of eight quotation in Cadiz correspondent's letter

Source: Fond Roux, L. IX liasse 819 : letter Guillaume Jogues, 30 October 1730

⁷⁰ Cadiz correspondence is compiled in Fond Roux L.IX. Section IV: *Correspondance passive Cadix*, liasses 810-856.

Cadiz correspondents' letters in the *Roux* archive reported almost half-monthly black market prices of old and new Pillar and old and new Mexican pieces of eight. Letters were reported every week or two weeks.⁷¹ I collected half-monthly prices of old Mexican pieces of eight (see Figure A3).⁷² When quotations were in a range, I converted them to the midpoint. Prices were reported as the percentage of premium over the unit of account *peso de cambio* (also called *peso de plata antigua* or *peso de plata vieja*) per old Mexican piece of eight coin. The *peso de plata vieja* is an imaginary coin whose legal equivalence with the Spanish-American piece of eight coins was defined in Castilian legislation as follows:

→ from 08/09/1728 to 16/05/1737:⁷³ 1 piece of eight coin=10/8 *peso de plata antigua*

→ from 16/05/1737 to 29/05/1772:⁷⁴ 1 piece of eight coin=(10 5/8)/8 *peso de plata antigua*

The old Mexican piece of eight was struck in 67/8 pieces of 93.056% fineness per standard Cologne mark (25.60722 grams of fine silver/coin).⁷⁵ The Mint retained 3/8 pieces for seigniorage and brassage and gave 64/8 pieces to the ingot's owner.⁷⁶ The new Mexican piece of eight was struck in 68/8 pieces of 91.667% fineness per standard Cologne mark (24.85407 grams of fine silver/coin). The Mint retained 4/8 pieces for seigniorage and brassage and gave 64/8 pieces to the ingot's owner.⁷⁷ The old Mexican piece of eight remained as legal tender with the same legal value as the new Mexican piece of eight, although both coins differed in net silver weight.⁷⁸ Figure A3 shows the market value of the old Mexican piece of eight in comparison with official parity (tale value) and official parity adjusted by weight. Observe that the market values of old and new Mexican pieces of eight were adjusted by weight because the utility of silver in the commodity market depends upon the physical quantity (Nogues-Marco, 2011a)

⁷¹ I collected half-monthly prices available in 50 bundles of Cadiz correspondence from 1729 to 1741, which comprise approximately 5,000 letters. Fond Roux. L.IX, *liasses* 810-856.

⁷² The Mexico Mint started to strike the silver coin *real* in May 1535, in three-*reales*, one-*real* and half-*real* pieces, with four-*reales* pieces beginning in 1537 (Leyes de Indias (1681), book 4, title XXIII, law VII-VIII. Pradeau, 2001, p. 35). Old pieces of eight were struck from 1572 to 1734 (cob coins-Equilateral Jerusalem Cross type). These old pieces of eight stopped being struck in 1734, but they remained as legal tender; and new pieces of eight were struck from 1732 to 1772 (milled coins-Pillars of Hercules type) (Autos Acordados (1772), book 5, title XXI, auto 59-60-61-65-70. Pradeau (2001)).

⁷³ Autos Acordados (1772), libro 5, título XXI, auto 61.

⁷⁴ Novísima Recopilación (1805), libro 9, título XVII, ley 8, and Innocencio Aparici (1741), pp. 24-26

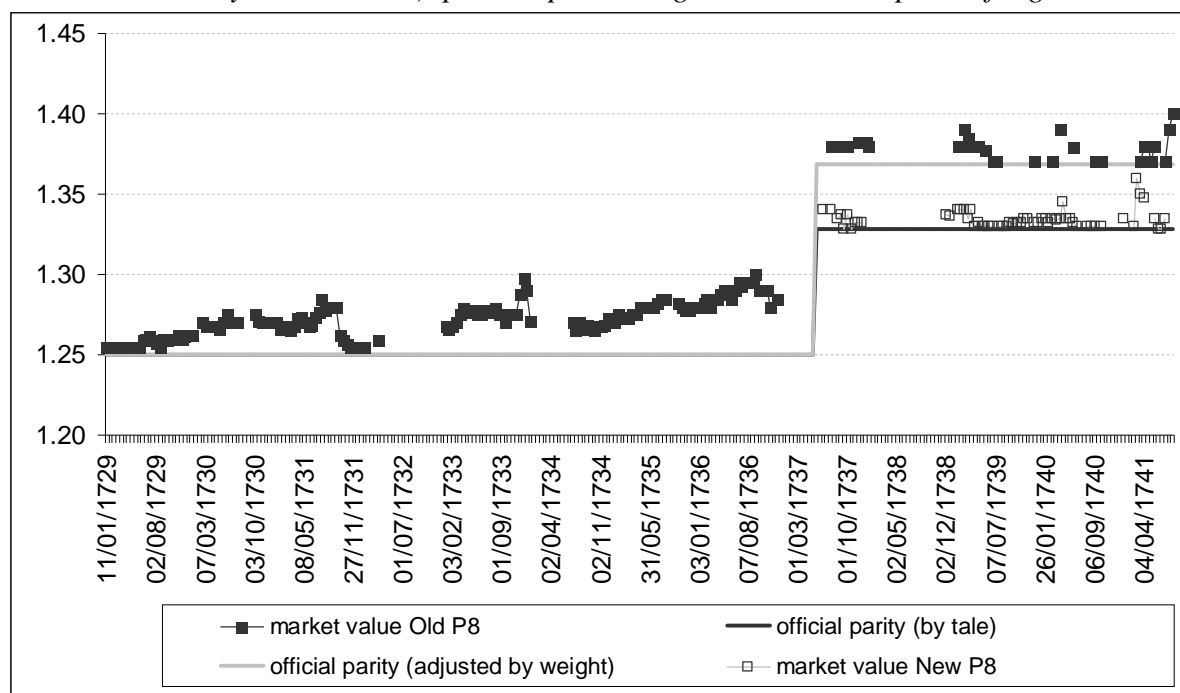
⁷⁵ One Cologne Mark ingot is equal to 230.465 grams. García-Patón (1903), p. 23 (tablas anejas a la ley de pesos y medidas de 19 de junio de 1849), and pure silver (100% fineness) is equivalent to 12 *dineros* (1 *dinero* = 24 *granos*). Dasí (1950), vol. 1, p. 21.

⁷⁶ Law 11/05/1535 in Leyes de Indias (1681), book 4, title XXIII, law VII-VIII and Law 04/11/1886 in Autos Acordados (1772), book 5, title XXI, auto 36. See also Céspedes del Castillo (1996), pp. 214-215

⁷⁷ Law 09/06/1728 in Autos Acordados (1772), book 5, title XXI, auto 59

⁷⁸ Innocencio Aparici (1741)

Figure A3: Black market price of old Mexican pieces of eight in Cadiz, 1729-1741 (half-monthly observations), peso de plata antigua/old Mexican piece of eight



Source: Fond Roux, L. IX *liasses* 810-856 for black market price. Castilian legislation for official parity (see text)

The arbitrated par of exchange (p_L/p_C)

The arbitrated par of exchange between London and Cadiz is defined by the relative market prices: p_L/p_C . London silver prices are given per unit of mass (standard ounce), while Cadiz silver prices are given per coin. I converted Cadiz prices per coin to prices per unit of mass to calculate the arbitrated par of exchange. Old Mexican pieces of eight had the following legal features: 930.56 ± 3.472 thousandths of fineness and 27.518 grams of gross weight.⁷⁹ We should also consider abrasion, i.e., weight deficiency with respect to standard weight resulting from wear and tear.⁸⁰ Abrasion is known because coins were always weighted according to Roux's invoices.⁸¹ Abrasion was 1.5%, so I considered a net weight equal to the legal weight minus abrasion.

⁷⁹ Law 11/05/1535 in *Leyes de Indias* (1681), book 4, title XXIII, law VII-VIII and Law 04/11/1886 in *Autos Acordados* (1772), book 5, title XXI, auto 36. See also Céspedes del Castillo (1996), pp. 214-215

⁸⁰ Officer (1986) and Flandreau (2004)

⁸¹ Invoices measured weight in Castilian units: 1 *Marco*=8 *Onzas* and 1 *Onza*=8 *Ochavas*. 1 *Marco* is equivalent to 230.465 grams. García-Patón (1903, p.23). One old Mexican piece of eight had a gross weight of 27.518 grams according to Castilian legislation, whereas it weighed approximately 27.079 grams according to Fond Roux invoices.

The multilateral spot exchange rate between London and Cadiz ($x_{CA} \cdot x_{LA}$)

The implicit spot exchange rate in Cadiz on Amsterdam was calculated according to the following equation:

$$x_{CA} = a_{CA} \cdot \left(1 + \frac{n}{365} \cdot r_A\right) \quad (\text{ducat of exchange/ } \textit{groot}) \quad (\text{A1})$$

where x_{CA} denotes the implicit spot exchange rate in Cadiz on Amsterdam, a_{CA} is the exchange rate in Cadiz on Amsterdam at 60 days and r_A is the commercial interest rate in Amsterdam.⁸²

The implicit spot exchange in London on Amsterdam was calculated according to Flandreau, Galimard, Jobst and Nogues-Marco (2009b). The exchange rate in London on Amsterdam is quoted systematically in the financial bulletin, *The Course of the Exchange*, at two different maturities: two-months and sight. In an earlier joint work (Flandreau *et al.*, 2009b), we took advantage of the two maturity quotations to produce a series of commercial interest rates for Amsterdam, London and Paris in the 18th century. I reproduce the same methodology here to calculate the spot exchange rate in London on Amsterdam. The long maturity exchange rate ($a_{LA}[n_l \text{ days}]$) and the short maturity exchange rate ($a_{LA}[n_s \text{ days}]$) can be written in terms of the implicit spot exchange rate x_{LA} :

$$a_{LA}[n_l] = x_{LA} / \left(1 + r_A^L \cdot \frac{n_l}{365}\right) \quad (\text{sterling pound/} \textit{schelling} \text{ bank}) \quad (\text{A2})$$

$$a_{LA}[n_s] = x_{LA} / \left(1 + r_A^L \cdot \frac{n_s}{365}\right) \quad (\text{sterling pound/} \textit{schelling} \text{ bank}) \quad (\text{A3})$$

Thus, solving the system of equations (A2) and (A3) derives the implicit commercial interest rate (r_A^L) and the implicit spot exchange rate (x_{LA}).⁸³

⁸² I have collected half-monthly exchange rates in Cadiz on Amsterdam from correspondence in the *Roux* archive. When quotations are given as a range, I convert such ranges to the midpoint. The exchange rate in Cadiz on Amsterdam is quoted in *groot/ducat of exchange*. One *ducat of exchange* was equal to 375 *maravedis*, and one *peso de plata antigua* was equal to 272 *maravedis*. Giraudeau, 1796, p. 239. The maturity for bills in Cadiz on Amsterdam is 2 months (1 Usances; 1 Usance = 2 months) plus 6 days of grace at payment in Amsterdam (Hayes 1724, pp. 261-265). The Amsterdam interest rate is the implicit market interest rate in Flandreau, Galimard, Jobst and Nogues-Marco (2009b). Actually, it is the interest rate in Amsterdam from London, and I take it as a proxy of the interest rate in Amsterdam from Cadiz. See Flandreau and Nogues-Marco (2011) and Nogues-Marco (2011b) for a more detailed explanation of the methodology.

⁸³ The exchange rate in London on Amsterdam was expressed in *schelling* and *groot* bank per pound Sterling at 2 usances (occasionally 2 and one half usances) and sight by Hayes (1739, p. 278). Two usances correspond to 2 months' maturity plus 6 days of grace (one usance in London on Amsterdam is 1 month). Sight is 3 days. Flandreau *et. al* (2009b), p. 186. England used the Julian calendar, but because Amsterdam used the Gregorian

Costs of arbitrage (c_{CL})

Costs are taken from *Roux's* invoices (see an example in Figure A4).⁸⁴ The total cost is 1.425%, which breaks down into financial costs and freight and insurance:

- Financial costs: Comprised of brokerage (2‰) plus the intermediation cost, which was a brokerage fee (2‰) when the intermediary was a partner or a commission (1‰) when the intermediary was a commission agent. For calculations, I consider the intermediary as a partner, which was the usual case according to the invoices.

- Freight and Insurance:⁸⁵ When organizing a maritime voyage, French ship owners involved as many as sixty participants in the venture, including merchant houses and bankers, professionals, nobles and stockholders.⁸⁶ The freight was defined as a global price for the trip and calculated according to the volume (and/or weight) of merchandise. Freight rates fluctuated during the 18th century, increasing in times of war and decreasing in times of peace. The insurance rate depended on the distance and fluctuated according to peace or war, although it decreased in the long run.⁸⁷ However, French freight and insurance for precious metals had a different logic and was constant in the 18th century. The gold and silver from Spain paid a fixed rate of 1% for freight and insurance, and in times of war, it was transported for free in the Royal vessels.⁸⁸ Freight and insurance for specie was denominated “port on board” (“*port à bord*”), and it was collected directly by the vessels’ captains from the sacks that transported the specie: “*The pieces of eight, when they arrive to Marseille, Genoa, London, Amsterdam, etc. pay some percentage, that is, an effective piece of eight out of every 100 effectives pieces of eight, which the captains of the vessels get themselves from the sacks*”.⁸⁹ Additionally, according to invoices, I should add the cost of transporting the sacks to the port (1/4‰).

calendar, I converted the dates of the Julian calendar (Old Style) into the Gregorian calendar (New Style) to maintain the homogeneity of data. I collected half-monthly data –the precise dates correspond to the dates of the Cadiz quotations. When quotations are given as a range, I convert such ranges to the midpoint.

⁸⁴ *Fond Roux L.IX. Section VI : affaires maritimes et commerciales. D. Marchandises. c) Produits manufacturés. Liasses 1,261-1,264 : Monnaies d’or et d’argent : factures*. The invoices, named cost and fee account (« *compte du cout et frais* »), included the following information: shipment identification (ship and captain’s name, cargo’s correspondent sign and the sack’s number) and cargo description (type of pieces of eight, quantity and weight per sack, unitary market price, total price, expenses and final price).

⁸⁵ Rambert (1954), pp. 556-596.

⁸⁶ Taylor (1964), pp. 483-484.

⁸⁷ The result of the decline in piracy was a lowering of insurance costs during the 18th century. North (1968), p. 960

⁸⁸ Rambert (1954), pp. 571, 582.

⁸⁹ Giraudeau, [1756] (1796), p. 460

Figure A4: Cost and fee account- partner ("compte du cout et frais")

Marseille R. J. B. honnoze Roux & Co. } Nous paye tiers
 Courton Baur & Comp.

Copie: Compte du Cout & frais des 4 sacs de V. Entiere
 mexiques Et menues des Indes Chargez à la drene des S.
 Roux & Comp. de Marseille sur Le paus La Buette
 Cap. de Blanc. Scauoir

N^o 33a36 { 2 sacs d. 2002 1/2 meix. et 234. 4. à 26 1/8 p. font... R^u 20180.-
 2^e menus des Indes 234. 4. à 86 d. l'atto ... 20167. ^w R^u 40,347.-

frais.

faux & port à la Maison ... R^u 10.-
 Courtage à 2 p. sur R^u 36167. ... 72.-
 Port à Bord à 1 p. ... 320.-
 Courtage de traites Mont R^u 40830.17 ... 81.17 483.17
 Sort au debit ou ^{te} à 1/3 avec les d. faux ... R^u 40,830.17

faux & Erreur & omission, à Paris le 20^e g. 1729
 en 3 par Duplicata

[Signature]

CHAMBRE DE COMMERCE
 ARCHIVES
 DE MARSEILLE

Source: Fond Roux, L. IX liasse 1,261 : Monnaies d'or et d'argent : factures