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Abstract

This paper analyses a new, large dataset of silver prices, as well as silver and merchandise trade flows in and out of China in the crucial decades of the mid-19th century when the Empire was opened to world trade. Silver flows were associated with the interaction between heterogeneous monetary preferences and availability of specific coins. Before the 1850s, money markets became increasingly efficient, as reliance on bills of exchange allowed exports to grow in times when sound money was in short supply. When a new standard for silver eventually emerged, there was a new peak in China’s silver imports.

Introduction

In her book, *China Upside Down*, Man Houg Lin (2006) revisited the established understanding that silver flows in and out of China were driven by the balance of payments in her commercial relations with Europe, more specifically England, through the travails of the East India Company (EIC). Challenging conventional wisdom that attributed the outflows of silver from China in the 1820s-40s to the opium “drain”, she argued that China’s silver trade was susceptible to the supply of Spanish American silver that had replaced Japan as the source of silver imports after the 1680s. More recently, other

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research has contested this “supply side” explanation for silver flows through China, emphasising the demand side factors underpinning these imports: the Chinese did not demand just any silver; they demanded particular silver coins (Von Glahn 2012, 2018, Irigoin 2009a, 2018).

This paper extends the exploration of monetary factors underpinning China’s silver trade, which is part of the “demand side” explanation for silver flows through China (Irigoin 2020, Von Glahn 2020), to the central decades of the 19th century. We begin from the virtual cessation of silver imports in China in the 1820s and ends in the 1870s, before Western nations started minting special coins – “trade dollars”- to maintain their commerce with the Middle Kingdom. We consider newly identified trends of silver flows in the context of how monetary preferences varied over time and across places, to reveal these preferences among various types of silver bullion and species in circulation - Spanish dollar “Carolus”, Mexican dollars, sycee and bars of the English standard- in Britain, India, and China.

A lot has been written about the nature of Eurasia commerce and the role played by silver arbitrage in shaping it. Most of that research has related China’s silver trade to the balance of payments between Britain and British India on the one hand and of each of them with China, on the other hand. Senior economic historians of Asia have highlighted that the flows of silver that went from Britain to India throughout the 17th century, and further to China in the 18th century reverted flowing to India and even to Britain in the 1820s, with considerable implications for the three economies (Hamashita 2008). Notably, Chaudhury (1983: p. 871) found that “the mechanism for foreign exchange was sensitive to arbitrage between the various trading centres”. However, lack of data to quantify volume, values, and trends over time has held back the study of the drivers of this trade and their changes during the 19th century.

To fill the gap of literature, this paper first considers newly reconstructed trends in triangular merchandise and silver trade between China, British India, and

Britain and relate them to our stylised facts about monetary factors and the dynamics of financial integration. Hence, the “inside out” in the title showcases the mechanics and the timing of the silver flows in the commerce China had with her main partners from the West in the crucial central decades of the 19th century when China was “opened” to global trade.

Regarding the mechanism of silver trade, another stream of research has also looked into China’s international and domestic financial integration in the early 20th century relying on the specie points mechanism that underlies exchange operations (Jacks, Yan and Zhao 2017; Palma and Zhao 2021). This approach is only viable if data on parities are available, whereas there was no par value for silver in the Chinese monetary system during the 19th century. However, Kobayashi (2022) has revealed the role of the triangular settlement system based on exchange operations and silver arbitrage between Britain, India, and China over the 1850s-60s by applying an analogous approach, which relies on “bullion points”. Nevertheless, his study applied the bullion point method to the single silver prices yet did not integrate the heterogeneous demand for silvers in China into the empirical analysis.

This paper takes Kobayashi (2022)’s analysis of triangular settlements forward by examining how it interacted with monetary factors over a period when silver flowed in and out of China. Examining such interactions requires adapting the bullion points methods to the particulars of the heterogeneity of the silver monies and monetary regimes involved. Accordingly, we adapt the bullion points method to such a particular feature of Chinese money and build another estimate—silver points—which better captures the idiosyncrasy of Chinese monetary system. Moreover, to reconstruct silver points, we organized a consistent dataset of monthly exchange rates and silver prices in the multiple Asian cities and London over 1828-1870, derived from about 15,000 quotations of the price of species and bullions and exchange rates published in English commercial newspapers in London, and Indian and Chinese emporiums. This vital dataset standardized the variety of silver monies and bullion in circulation

in the East India trade to an ad-hoc parity for their weight and fineness based on the English troy standard (see Appendix I). To map dynamics of silver flows, we apply our own silver points analysis to this fresh data series relying on direct estimation of arbitrage costs based on observed information. We also rely on econometric analysis, estimating these costs and how rapidly arbitrage opportunities were exploited from the evolution of spatial differences in silver prices.

To anticipate our main results, we find that, on the one hand, silver flows were only loosely related to bilateral merchandise trade flows. Notably, we detect an only weak association between China's opium imports from India and silver flows in the opposite direction. On the other hand, silver flows were associated with the interaction between demand and availability of sound silver coins from Spanish America. Thus, in the 1830s and 1840s, it paid off to ship from Britain to China Spanish dollars, which commanded a premium only there, but not other silver types. As Spanish dollars were becoming increasingly rare, there developed networks of Anglo-Eastern exchange banks dealing with private bills of exchange, allowing intercontinental trade to grow with little movement of specie, and triangular silver arbitrage became increasingly efficient. During the 1850s, new Mexican dollars gained acceptance as a new monetary standard in China and became convenient means to settle Britain's still large trade deficit with the Middle Kingdom. At the same time, China's silver imports from Britain peaked.

Trade and Silver Flows

This section provides an overview of the net trade and silver flows between Britain, British India and China – and the US for silver- in the central decades of the 19th century. Our source are original trade statistics, mainly from British India's Bengal, Bombay, and Madras Presidencies.⁴

⁴ Because the India's trade data underlie our dataset, the currency unit is unified to Indian rupee in the figures showing trade volumes.

[FIGURE 1 HERE]

Figure 1 hence captures the essence of the historiographical understanding of the triangular relation (Chaudhuri 1983: p. 812, 813; Hamashita 2008) and represents the shifts in the historical imbalance in the British trade with Asia. India's surpluses in the commercial relation vis-à-vis China was offset by Britain's widening deficit with China until the mid-1850s. Triangular trade remained roughly balanced also in the second half of the 1850s as there developed a momentary deficit in India vis-à-vis Britain, at the same time as Britain was starting to close its trade deficit with China. However, the triangular balance broke down after the 1860s, due to two factors. Firstly, Britain turned to India as source of cotton when US supplies halted during the Civil War (1861-1865). In consequence, net imports from India to Britain suddenly, albeit temporarily, exploded. Secondly, after 1865, Britain narrowed her trade imbalance with China. Meanwhile, through the 1860s and 1870s, India continued to export large quantities of opium into China. As a result, while India came to enjoy a large trading surplus from 1862 onwards, it was not offset by any other bilateral commercial relation within the triangle. Another important finding from the figures is the opening of China: the combined effect of growing exports (from the 1840s) and eventually (from the mid-1850s) of imports from Britain meant that altogether the (nominal) value of trade between them saw an over fourfold increase during our period. Also, the trade between China and Britain became balanced by the 1870s reverting historical trends.

Figure 2 below shows China's balance of silver trade. Since it only includes flows from India, Britain and the US, the values it represents should be considered a lower bound of total silver flows into China: the latter were the two main and most consistent China's Western trading partners from the 1780s, but other Europeans also contributed marginally (Irigoin 2009a, 2020).

[FIGURE 2 HERE]

Historians of the EIC have estimated that until the late 18th century the bulk of China's imports from the West had been "treasure" as recorded in the sources. Clearly, until the early 1820s silver made up the major part of Europeans' exports to China – and Asia. Silver trade has been customarily seen under the light of British commerce and that of the EIC. Since Dermigny's (1964) masterpiece on Canton, however, it is clear that the EIC was less central than such scholarship assumed. Imports of silver through Canton reveal a couple of relevant facts: a) the silver flowing into China was chiefly coined silver and in the form of Spanish dollars, b) silver continued flowing to China beyond the EIC's records reveal, c) the largest inflows were in the later years of the Company which from 1792 (and between 1779 and 1785) had not sent silver to China from Britain but through private trade in Asia and d) after the 1780s the US became the main provider of silver coins to China and to India and their silver exports continued until the mid-1820s, when they plummeted sharply (Irigoin 2009a: figure 2). In the space of three years, they collapsed from 4.5 million Spanish pesos in 1826 to about 200,000 pesos in 1829.

The idea of silver flying out of China comes from the traditional view of the trade balance between China and Britain and the "triangular trade" as stated above. However, as it was well known to English merchants and Parliament at the time, until 1830 US exports of silver to Canton more than offset the exports of silver from China. The timing of these flows in and out of China are meaningful as well. Whereas the silver "drain" from China to India has traditionally been associated with the import of opium, the continuation of silver exports by US merchants and its sudden collapse after 1827 have been interpreted as separated from the opium – silver exchange. After all, silver exports from the West to India reduced drastically around the same time. In any case, contrarily to Lin's (2006) view, throughout the 19th century there was enough silver in the international economy to supply China at the rate of her historical imports by the 1820s in relation to the size of minting and exporting silver out of Mexico and the US re-exports (Irigoin 2009b). Silver inflows in excess for the outflows to India continued until the late 1820s. Even if they did not cease completely, the silver

balance of trade moved significantly against China from the mid-1830s until the early 1850s. As opium made the bulk of Chinese imports from India, it fuelled the notion of the “silver drain” -a drain of silver money from China which was the root of the various crises in the country, like the Daoguang depression (Lin 2006).

However, as Figure 2 shows, the flight of silver from China in the late 1830s and 1840s did not make a trend as the 1850s witnessed a sharp inflow of silver directly from Britain of extraordinary proportions. Between 1852 and 1857 Chinese silver imports from Britain jumped to an annual value of 24 million dollars on average, roughly six times larger than the largest ever inflow of silver before the 1820s. Moreover, the flow out of China was reduced during the 1850s. Significant, but short-lived, outflows repeated in the later 1860s into the early 1870s.

There is nothing obvious in the evolving bilateral merchandise trade to be related to the size and directions of silver flows in and out of China, or India. Opium, for one, remained China’s major item of import from India, but its value greatly exceeded that of silver outflows from China to India, by a factor of 4, on average.⁵ A poor association between the two series is confirmed by a Granger causality test, which soundly rejects the hypothesis that opium imports help predicting of silver outflows.⁶ There is a clear decoupling between bilateral merchandise trade and silver flows also on the other two routes. Between Britain and China, this decoupling was particularly evident in the 1840s, when silver net flows remained at an all-time low, with a yearly average of c. 186,000 company Rupees, and only two years with no recorded flow at all, despite a more than doubling in the size of Britain’s merchandise trade deficit, from c. 18 million to c. 48 million Rupees. Between British India and Britain, the

⁵ This is the median ratio between 1800 and 1874; the mean ratio, 10, is significantly bigger still, reflecting a very broad range (from -50 to 275). The median ratio considering gold as well is somewhat lower but not much at 2.5.

⁶ With a chi-squared statistics of 0.760 and a P-value of 0.383 (the null hypothesis is that opium imports do not Granger cause silver outflows).

decoupling is so extreme that silver flows were negatively correlated with trade deficits.⁷ Even from the conventional triangular perspective, silver flows were only weakly associated with imbalances between Britain's trade deficit with China and China's trade deficit with India: the correlation coefficient is as low as 4%. Clearly factors other than the balances of merchandise trade were associated with the ebbs and flows of silver in and out of Asian markets, raising two related questions: for what other reasons did silver move? And how were trade imbalances settled? Let us consider each of them in turn.

The Demand for Coins

On the first question with which we ended the last section, our contention is that silver flows were associated with the interaction between heterogeneous preferences for particular coins and their availability. To explore this hypothesis, we proceed in two steps. Firstly, this section shows that silver minted as Spanish dollars by the 1820s commanded an evolving premium relative to its intrinsic value and other forms of silver in China, but not in Britain and India. We relate changes in this premium to its increasing rarity and eventual substitution in the mid-1850s by the newly minted Mexican dollar as the accepted medium of exchange and measure of worth in the peculiar Chinese monetary system. Secondly, in the following section, while analysing the functioning of the trilateral settlement's system, we highlight that differences in the price across types of silver help explain directions of silver flows and their changes.

Our analysis relies on longitudinal data on prices for the distinct silver species and ingots as well as commercial exchange rates in the multiple cities. We have collated a novel series of high-frequency quotations of precious metals and bills of exchange printed in commercial newspapers in Asian cities. English language newspapers in Canton started to publish bullion, specie and exchange quotes

⁷ The correlation coefficient is -11% (our series start in 1827 and end in 1874). This coefficient is hardly affected by considering gold as well (-6%). It compares with 40% for India-China (67% considering gold as well) and 54% for UK-China.

from the late 1820s, and in Calcutta and Bombay from the early 1830s. Meanwhile, regarding northern China's emporium, Shanghai, financial quotations started to be published in local newspaper only in the 1850s. We thus collected quotes from an array of newspapers and organized them to monthly price series of each type of silver specie, namely, Spanish dollar, Republican/Mexican dollar,⁸ and bullion, i.e. sycee, and English silver bar, in Canton, Hong Kong, Shanghai, Calcutta, and Bombay, over January 1828-December 1870. In addition, to arrange the prices of identical silver between those Asian major cities and Britain, besides the extant price series of silver bar in London market, we derived the monthly quotes of (new) Mexican dollar from the British *the Course of Exchange*. The Appendix I explains how to derive the prices of silver species and ingots from the quotations and the temporal and locational coverage of organized price series. Figure 3 shows the price of silver, across types, in London, Calcutta (the Indian city with the greatest availability of data), Canton/Hong-Kong and Shanghai.

The four graphs are on the same scale and thus are directly comparable. It is immediately apparent that the price silver was significantly more stable in London than in Calcutta and, especially, Canton/Hong Kong and Shanghai. The other difference is even more telling. Only in China do we find a persistent and significant difference in the price of silver across types. In Canton/Hong-Kong, the Spanish dollar commanded a significant and widening premium until the mid-1850s, up until a maximum of 27% relative to high quality sycee in September 1856. In Shanghai, where sycee increasingly started to be used as a substitute for Spanish dollars, which could no longer be found (see extract from the North China Herald below), the pattern is similar, with a large premium relative to the Mexican dollar in the early 1850s, up to a maximum of 20% in April 1853. These premia compare with a maximum of just 9% in May 1868 in

⁸ This type of coin varied over time, and it served to distinguish it from the current Spanish dollar, or Carolus (Irigoin 2013, Von Glahn 2009). Originally in the 1820s and 1830s it comprised the coinage in South American republics of a variety of specie of very dissimilar quality and features. Increasingly after the 1840s great political stability and new management of mints in Mexico allowed for a more consistent and stable Mexican peso henceforth (Irigoin 2009b, 2010)

Calcutta, where the silver contained in sycee tended to be slightly more expensive per rupee than that minted in dollars (Spanish or Mexican). In London, the price of silver was essentially the same, regardless of whether it was minted or in bars, with the only and partial exception of the early 1860s after exceptionally large quantities of silver had been shipped to China (Figure 2), possibly causing a local shortage of (new) Mexican dollars. Then silver minted as dollars was worth more than that in bars, up to a maximum of 12% more in June 1863.

[FIGURE 3 HERE]

Why was China different? Before 1914, the empire in China practically never minted silver as to produce an official coinage and establish a mint price. So China performed with multiple units of accounts (imaginary monies) and diverse means of payment in copper and silver, which varied from province to province.⁹ The so-often quoted bimetallic system (of silver tael and copper cash as small change) was just notional, as it was the nominal 1:1000 ratio in regards their weight/value.¹⁰ The large inflow of very consistent and reliable foreign coins - which made the bulk of her silver imports since the mid-18th century- originated a good part of the circulating medium in South China (Irigoin 2020, Von Glahn 2020). In practice, Chinese used different means of payment- i.e. cash of copper and bronze, foreign silver coins and privately minted (irregular) silver ingots produced locally which coexisted with paper instruments denominated in monies of account. The extraordinary volume of silver coinage of consistent quality in Spanish America after 1730s resulted in a de-facto silver standard for specie

⁹ Coinage became a prerogative of the central government for first time in 1914. The first Chinese dollar minted at Tsien-tsin had a rate of 72/100 with the Kuping tael, with 900-thousands of fine; Nanking, Canton and Wuchang followed, but the republic could not maintain the standard for very long. Their lack of uniformity kept the Mexican dollar in circulation still by 1924 and only small denomination specie was current (Kann 1926:411, 423). Our own source, Edward Kann' book, published in Shanghai in 1926, was still priced in Mexican dollars.

¹⁰ With the Treaty ports a covenant shroff was appointed by the parties to assay weight and touch of the silver transacted. Before the job was done by independent shroffs (silver dealers who certified the quality of the coin or bar) by sealing and marking (chopped) the item. In time, the shroffs turned to ink to protect the integrity of the coin or bar.

worldwide and the source of silver coins for China.¹¹ Registered exports to Spain peaked at 35-40 million dollars a year in the 1780/90s when Spanish control over the colonial trade started to wane and silver flowed into Europe and the US directly for re-exports to Asia (Cuenca 2014, Irigoien 2020).

China's imports of silver reduced drastically in the 1820s, when the standard of the coin minted in Spanish America collapsed with Spanish rule. During the 20 or 30 years after 1810, for instance Mexico only had ten working mint houses where there had been only one for more than 250 years, with some of them being privately run by foreign companies. This fragmentation of minting meant huge disparities in the quality and aspect of the coins rather than an expansion of the coinage (Irigoien 2009b). A similar fragmentation occurred in the minting in all other silver rich districts in South America, destroying the standard of the Spanish dollar known to that date. Thereafter South American or Republican coins of diverse standards, weights and features filled the void of the Spanish coin bearing the face of the Spanish King – i.e. the Carolus. Even if obstacles to mining created by the wars of Independence, greatly diminished exports of silver out of Spanish America, exports did continue for the remainder of the 19th century.¹² Even at half or less of the previous output, it would have been more than sufficient to supply China with silver at the historical rates of imports of the previous 18th century (Irigoien 2009a).¹³ Merchant houses in Asia started distinguishing among these coins. For example, in 1829 the “Bullion Accounts” ledgers of Jardine Matheson separated “sycee” and “South American dollars” priced by weight (as commodity) against the sterling standard from the “new dollars and Carolus” quoted by tale as a varying rate (JM Archives A1/34). The

¹¹ Milled coins started in Mexico in the 1730s, in Lima (1750s) and Potosi (1770s). Mints' output boomed until 1800 at an annual 2% growth rate. It added coined silver to the international economy tens of millions per annum (from 9 million pesos per annum in 1730-35 to 32 million in 1800-1805).

¹² The Spanish dollar remained legal tender – the single foreign coin along the US dollar- in the United States until 1856 (Irigoien 2009a).

¹³ Dermigny (1964 II: p. 735), as explained in Irigoien (2009), shows that 7-years imports totalled 25 million dollars (1785-91), 29 million (1799-1806), about 70 million between 1814 and 1827.

unit of denomination in the bookkeeping was the “new dollars” with a price 1% over the Spanish dollar price.¹⁴

Instead, India’ sultanates and princely states minted silver, even before the EIC’s control of the territory. Yet silver was mostly imported to India. Under the rule of the Company and by the 1830s already there were three main types of rupees in circulation, along with gold “pagodas”: the sicca rupee of Bengal, the Arcot rupee from Madras and the rupee of Bombay, corresponding to the main three mints in British India. They had slightly dissimilar content of fine, hence price and exchange rate. In 1835 there was a unification of coinage with the creation of the Company rupee; this meant a reduction of intrinsic content of the sicca rupee of about 6.25% and provided for uniformity of the coinage in India based on the sterling standard of 180 troy ounce and .925 fine. Thereafter silver in India was quoted by weight as rate of the sterling price although in private and company records the Spanish dollars were accounted separately, by count (Bengal commerce report 1808-1842).

Thus, in China, unlike British India, there was no legal tender. There was no silver par either until well into the 20th century.¹⁵ Economic historians take the tael as currency unit whereas indeed it was measure of value; however, the tael is a unit of weight without a single standard for fineness (touch).¹⁶ Circulating silver in China by the 1820s took the form of ingots (sycee taels), foreign coins, and coins fragments after chopping or cutting them – the so called “broken” or “cut dollars”- catalysed by the end of the silver standard. Only full Spanish dollars were taken by count and at the market rate. At the time of the Treaty ports, the commissioner of Customs and Statistical Secretary to the Chinese Customs – and historian of the EIC- HB Morse counted over 170 “well

¹⁴ Long gone Spanish dollar remained the unit of account for the HSBC bank in Shanghai still in 1911. China problems in 1911-1913 were very similar to those in the 1850s (Kann, 1926: 408-409). See footnote 22.

¹⁵ see footnote 6.

¹⁶ Silver was privately minted in ingots which differ in size, weight and touch (standard) from one city or region to another. Some ideal types of tael – as units of account- existed to pay taxes or dues to the Imperial government.

recognized” and different taels of silver. Thereafter four ideal taels were principal, and they were in practice units of accounts (imaginary units) to standardize values in different sets of transactions and before particular authorities. Directions in the Treaty ports initiated (but not completed) a standardization of this peculiar system which, by relying on foreign money was subject to wild monetary exogenous variations, that was idiosyncratic of China. The standardization started, by establishing the ideal tael against which to fix a relation for the current silver to be used with the Chinese Imperial Maritime Customs Service and with the Treasury. The treaty of Nanking created the Haikwan tael for payments to the first and the Kuping tael for transactions with the Imperial Treasury in all government dues. The Tsao-piang tael was used throughout the provinces and Shanghai, and the Canton tael, the “heaviest” of the four, which was the best known to foreign merchants. The Tsao-piang was the one quoted by the Banks in Shanghai – also known as Shanghai tael.¹⁷ The Treaty ports prompted foreign Consuls to demand steps towards some monetary standardization during the disruption and monetary turmoil of the Taiping rebellion (1850-1864)¹⁸. It was not the first time: indeed, the request preceded the Opium wars (1839-1842 and 1856-1860). Already in 1835, the Canton Register pressed for the introduction into Canton of the republican Spanish American dollars of equal fineness at par with the Spanish dollar to no avail. The article invoked an edict from 1825 by the Daoguang emperor fixing the relative price of Spanish and incoming republican dollars.¹⁹

The treaty of Bogue (1843) finally allowed foreign merchants to establish the means of payment, and if different coins were introduced in the payment arising disputes could be appealed to foreign consuls²⁰. Their decision would be binding

¹⁷ There are doubts about the assigned weight but some state it to be approximately 565.65 grains troy (565.697 and some instances 565.704). The tael at Canton was heavier with a weight assigned of 578.85gr troy.

¹⁸ Tiping minted their own gold, copper and brass coins, and issued paper notes too.

¹⁹ By Daoguang edict of March 4th 1825 fixing the currency of dollars received by the Hoppo. The Canton Register (1835) vol 8 # 3 20th January 1835, p 10. Having found differences in the assay of the Spanish and the republican dollars the proclamation the latter should be received at a discount of 2 cash “for the sake of public convenience”.

²⁰ “English Consuls appointed to the different ports will, according to time, place, and circumstances, arrange with the Superintendent of Customs at each, what coins may be taken in

to local officials after establishing the parity among coins by an official assayer. This was also the base of Hong Kong monetary system, which, having failed to open a mint, took the Spanish dollar standard as their own (despite their belonging to the British Empire). Through this channel the (new) Mexican dollar taken at par with the Spanish dollar eventually replaced the latter as unit of account over time.

In the 1850s, concerted actions by merchants yielded better results in Canton where the Spanish dollar had been in circulation in the later 18th century at the rate of 0.72/0.74 to the tael since foreign coins started flooding Canton (Irigoin 2020). Thus, it was easier – faster for imperials officials than among private agents, Chinese bankers, shroffs and merchants- to replace the Spanish dollar as unit of account for the Mexican peso and the references to the Spanish dollar slowly ceased from 1853.²¹ The measure worked well in Canton. The move to standardization proved more problematic in Shanghai,²² probably because of the relation with producers of silk exports inland who staunchly demanded Spanish dollars for their goods (King 1965: 170, Irigoin 2013) and prompted an even higher premium for the Spanish coin (and conversely a discount on the Mexican one despite very similar standards).²³ A contract on Shanghai dollars was payable only in Spanish dollars or in other coins at a rate agreed upon the

payment, *and what percentage may be necessary to make them equal to standard or pure silver*” (Treaty of Bogue, art VII on “The manner of paying the Duties”, ratified in 1858 by Tientsin treaty art 33; emphasis added).

²¹ “as long as the supply of Carolus was adequate, the most important consequence of this policy was that *other dollars were re-exported to India rather than accepted at a discount*. The merchants were quite able to supply themselves with standard dollars and to calculate on the basis of them”. King (1965: p. 169)

²² In June 1856, native banks on their own initiative started turning from dollars to sycee and issuing bills payable in Shanghai taels. In November 1856 *The Times* reported “sales of shirting *against sycee* or bartered”, in December bills were quoted against sycee, which became practice in March 1857; merchants thus changed their accounts from dollars to tael, by June 1857. Differences remained -though the gap narrowed -with the use of tael (bullion) or dollar (Specie) as the standard to which the Chinese silver money would be pegged.

²³ Figure 3d highlights discounts on Mexican dollar in the early 1850s. Exchange on London rose from 5s7d to a record 7s9d in 1856, while in Hong Kong was within 5 shillings - the historical invoice price of the Company. The premium of a Spanish dollar over its intrinsic value made it at par with the Shanghai tael; the Mexican coin was at 34% discount having very similar weight and fine content. The Spanish dollar had become an imaginary money – a unit of account- the Shanghai dollar “so scarce was the coin that it was no longer used in ordinary transactions but for remittances to the silk district” (King 1965: p 172).

creditor (King 1965: 173), but on Shanghai the dollar had a large premium over the Mexican coin – even larger than in Canton-, so a move to standardize money current in Shanghai also effectively meant a “cry down” on the Spanish dollar (on the silver prices in China) if the Mexican one was to be adopted (see Figure 3c).

The following extract is from a despatch by the British consul at Shanghai to Sir John Bowring, 6 January 1858²⁴ aptly conveys the significance of the transition to the new Mexican dollar²⁵ and its effects on increasing local prices, which allegedly doubled. It is therefore worth quoting it at length:

“unfortunately, there are two standards of silver, the pure sycee, in which imperial duties are paid, and Shanghai sycee, in which commercial transactions are effected [the latter being on average about 11.^{1/2} taels worse than the former in purity, hence it takes 111.^{1/2} taels of Shanghai to make 100 taels of Haikwan (Custom House sycee)]. The Shanghai sycee, however rules, as the commercial medium and a tael weight of it represent the equivalent of a Carolus (Spanish) dollar. Still the inconvenience of bar or shoe silver as medium of value is very great, particularly in small transactions and the Mexican dollars is coming largely onto favour... It would be well if a tael or dollar coin could be struck, and thus set at rest the circulating currency of the port”.

“The fluctuations in the money market during the past year have been without parallel. In January it stood at 6s6d^{1/2}; in March and April from 7s5d to 7s6d; in August it fell to 6s9d, and it now stands at 5s10d for long dates. The fall latterly may be ascribed to the large amount of bullion imported and the depression in the home markets. Exchange at any rate below 6s4d is losing matter” “silver costs that laid down here; the consequence is that an export of 1,500,000 taels has taken place to India chiefly, and with present prospects, the probability is that it will continue. Copper cash, the currency of China, has been very scarce; a Spanish dollar that for three or four years was worth from 1,800 to 1,900 cash will now realise no more than from 950 to 1000 cash. *This has a serious effect upon prices, in fact doubles the price of all ordinary articles.* The importation has been large; it is difficult to know what amount arrived through private sources; but by the Peninsular and Oriental

²⁴ “Extract of a Dispatch addressed to the Consul at Shanghai to Mr. John Bowring, 6th January 1858. In “Silver & c. Copies of Correspondence received at the Colonial Office and the Foreign Office upon the subject of the supply of silver in the markets of China”; paper No. 287 (1857-1858). Enclosure 34, p 79.

²⁵ Quotes for the new Mexican dollar appeared in the Course of Exchange from 1825.

Company's steamers the amount may be taken in value at 20,400,000 Mexican dollars, or in sterling 5,400,000 pounds; a third maybe added for private hands 1,700,000 pounds, making an average total of 6,800,000 sterling".

Ultimately the shift to the Mexican dollar in Shanghai occurred over 1856-1857,²⁶ and bullion started to be taken for specie. In October 1856, the tael was at par with the Shanghai dollar so Chinese agreed to denominate their accounts in Shanghai currency taels and accepted sycee in payment since March 1857.²⁷ Silver flows turned back into China until the mid-1860s, however the inflow did not last, and the temporary flight even reached record figures afterwards (Figure 2). Pegging the Mexican dollar to the extinct Spanish dollar unit of account meant a "demonetization" of the Spanish dollar. The creation of the Shanghai tael/ dollar and taking Mexican dollars as a new "anchor" as in Canton did not ultimately solve the issues created by the demand on the no-longer existent Spanish dollar inside China -as the various "trade-dollars" minted specially for China trade until the 1890s attest. It did not end the dependence on foreign silver currency that Qing China particularly developed over the past hundred years. Thereafter other foreign dollars with very similar specifications than that of the Mexican coin were introduced in Shanghai, and China at large, with diverse but incomplete success. Between 1866 and 1868 Hong Kong coined 2 million dollars, closed the mint and replaced the Spanish dollar standard with the Mexican dollar standard. With the mint machinery spared from Hong Kong, Japan minted a silver trade yen slightly under the intrinsic value of the Mexican coin (374.4 grains of silver for 377.25 of the Mexican).²⁸ In 1885 and for ten years France minted 13 million of Saigon dollar coins with 378 grains of pure silver;

²⁶ it involved the creation of a Shanghai tael as unit of weight and unit of account, against which specie and bullion values fluctuated. Newspapers quotes started using it in September 1st 1857. *Overland China* #171.

²⁷ At 98/100 in relation to the Canton tael, it assumed at the standard sycee (.935); the Shanghai dollar or currency tael was priced at 111.6 to the Canton tael, the Shanghai tael of bullion was 103.9 Tsaoping tael per 100 Canton (liang) tael. Yet this imaginary intrinsic value of the Shanghai silver matched the standard of the Spanish dollar up to 1772- (.916/000 fine).

²⁸ The Osaka mint yen "cried up" the yen in 1875 but the measure brought Mexican coins to Japan rather than replacing them inside China and in 1878 the yen was devalued again and circulated in Coastal China, Hong Kong and Southeast Asia, between 1871 and 1897 Japan coined more than 165 million yen, 2/3 of which were shipped abroad (King 1965, p 179)

being heavier and with higher silver content it ended hoarded or melted; in 1895 – after various attempts back to the 1850s- British trade dollars were minted in Calcutta for China. The most competitive coin was the US trade dollar, with 400 grains and .900 fine minted for the Asia trade, to the amount of 36 million between 1874 and 1887.²⁹ Finally, and lastly, the first imperial silver mint opened in Canton in 1890. Its coins could not displace the current Mexican dollar and were priced by weight; but the imperial mint succeeded to provide the smaller denomination coins (.800 fineness). Several provincial mints opened elsewhere in China,³⁰ but Mexican dollars circulated at premium over intrinsic content still in 1913 – as the Carolus did after 1826-27.

We can only speculate on the implications for trade, using as starting point the newspapers of the time. Imports of Mexican coins increased in Canton first, and then in Shanghai in the 1850s. The trends in the balance of merchandise trade seem to capture them. As seen in Figure 1 for the first time ever trade with the UK balanced off. It is tempting to relate the growth of China's imports from Britain to China's newly acquired monetary stability.³¹ On the one hand, as the following extracts from the North China Herald, from 7th June 1856 and 3rd of January 1857 respectively, vividly describe, Chinese importers experienced inconveniences before the monetary fix:

“the money stringency became more marked ... current interest was at 1.80 to 2.00 per mille per diem (65 to 75per cent per annum) ... Carolus dollars could no longer be found in Europe at any price”; “confusion reigned supreme. Imports were imported in sterling, sold for dollars, and paid for in the only available medium, taels of sycee, but even sycee was scarce, since it was not attracted to the port by being the official circulating medium, Shanghai was in the predicament of having no standard of value for business transactions whether in buying or selling, we do not know what we shall receive, or what shall have to pay”.

²⁹ The weight and silver content intended to include the cost of laying the dollar in China; it was not legal tender in the US but its success being more valuable than its face value with the depreciation of world silver made the rate US dollar/ US trade dollars 1:0.86 creating problems for the US treasury [King 1965, p. 180-181]

³⁰ A silver coin minted in Fukhien at 517 grains troy with the God of Longevity stamped and a legend indicating a value of 7mace 2 candareen (Kann, 1926: 406)

On the other hand, sound money under the still functioning Spanish dollar's silver standard before the 1820s does not appear to have been sufficient to stimulate China's imports. Conversely, monetary instability in China in the 1840s seemingly did little to prevent the growth of Chinese exports to Britain, although these were even more directly affected by the shortage of "good" Spanish dollars than imports.

Monetary changes might have been related to the growth of Chinese imports also through another and possibly even more significant mechanism. As highlighted in the Bowring's 1858 report mentioned above, the newly found stability represented a sudden fall to the premium paid in China for Spanish dollars, (effectively a "crying down" of the sound silver coin), leading to a large increase of local prices of staple goods. Such an increase was bound to lead to an appreciation of the real exchange rate vis-à-vis Britain, propitiating Chinese imports, while holding back the growth of its exports. Indeed, by the same logic the previously rising premium on the Spanish dollar must have had an opposite effect and can thus potentially help explain why Chinese exports - but not imports- massively grew with the slashing of transoceanic shipping costs following the demise of the trading monopoly of the EIC in 1833 (Chilosi and Federico 2015). International and domestic prices were not fully integrated. Nevertheless, we can make some rough estimates. A back of the envelope computation, based on the premium paid on the foreign dollars in Canton/HK, can give us a sense of the likely significance of changes in the real exchange rate for trade. Holding constant (or suspending) the effects of monetary alterations on velocity and income, Chinese prices are expected to vary proportionally with changes in the nominal value of the money of account (Munro 2015),³² the Spanish dollar until 1856 and the Mexican dollar thereafter, in our context. Using our spot exchange rates and Britain's wholesale price index from Thomas and Dimsdale (2017), we can estimate that between 1833 and 1856 the effect of "crying up" the Spanish dollar on the real exchange rate between China and

³² Judging from the cases studied by Munro (2015), considering income and velocity might mute the effects of monetary changes on prices somewhat, but probably not that much.

Britain was a depreciation by 25%; the effect of “crying down” the Spanish dollar after 1856 on the same variable can be quantified as an appreciation by 18%. Given that the elasticity of exports (and thus presumably imports) is close to 1 (Ahmed et al. 2016: Table 1), the appreciation after 1856 can be expected to have increased China's imports and decreased her exports by about 15%. This means that in its absence its trade surplus vis-à-vis Britain in 1870 would have still been c. 40% of what it was in 1856, instead of having disappeared. In short, it does look like the crying down of the foreign silver coin was a significant contribution to ending China's secular trade surplus.

The Settlement Mechanism

We can now turn to the question of how trade imbalances were settled. The objective of the exercise is twofold. On the one hand, we attempt to understand how trade imbalances could be settled without moving specie— although arguably China wanted specie. On the other hand, we want to examine whether there were incentives to use particular types of silver when trade imbalances were settled with silver and the extent to which these matched the direction of flows. Beginning with the first issue, economic historians argue that silver had been the traditional way for setting the balance of payment in the early modern trade; this changed in the decades under study thanks to the use of cashless means of remittance or bills of exchange. Initially, at any rate, bullion continued to be the default choice, but bills, which were long known in Europe, did then become a convenient alternative in the East India trade. Testifying before the Select Committee on the affairs of the EIC in 1831, John Holsey Palmer, current governor of the Bank of England and partner in the house of Palmer, Mackillop and Co, with extensive business in Calcutta made this clear when he declared that:

“no allowance of interest in the interval between money being advanced in one country and the repayment being made in another ... All exchange operations in bills *have reference to the actual produce of the remittance in bullion* in the country to which those remittances are sent” (BPP 1831/32, p 107; emphasis added)

“The company *will at all-time order bullion to be transmitted*, if bills are not procurable at the bullion rate [remitters calculated the bullion rate by adding various costs for bullion shipping to its value]. If a bill of exchange was not procurable at a cheaper rate than the bullion rate, bullion was remitted” (ibid p 111; emphasis and authors’ note added).

Bills were known to private agents trading within the EIC as the company issued bills drawn on the Company in London to be paid in the Canton court, since the 1760s- as means to procure silver in Asia to forward to China. The company used bills (and bonds) in deals with their captains and private country traders (Morse 1926, Marshall 1976, Bowen 2010, Irigoin 2023), who used them to repatriate profits to Britain. During the tight money markets of the “Restriction period”, even bills denominated in Spanish dollars were additionally drawn on Calcutta (Morse 1926, volume V and IV) and in 1810 and 1811 silver was even exported from China and India to London. Private bills boomed (and busted) in Calcutta in the 1830s along with the financial crisis and later recovery in the 1840s.³³ At the same time that US shipment of silver specie ceased in the late 1820s, American traders started drawing private bills on London – not in the US- for their China trade.³⁴ According to the “Bengal Commercial Reports”³⁵ trade started using bills drawn on the government there in the 1830s and from 1832 bills were drawn by the Company Court of Directors and by the Government. The Company accounts shows bills on the government paying for imports from the Coast of Coromandel, Malabar Coast, the Arabian and Persian Gulf and China – and exports to Britain. From 1832 to 1838, bills paying imports into China from India hovered around 8 and 9 million rupees a year to shrink

³³ 1828-29 were years of the “money famine” in Bengal followed by depression in prices between 1833-38 and a recovery only from 1843-47 (Bayly 2012)

³⁴ Irigoin (2009) p 213; Cheong (1978), p 27 US Consul in Canton Sullivan Dorr wrote back to his partners in Rhode Island “For return: take bills in London, buy dollars and take freight home but if possible, buy dollars in Hamburg (1 March 1800) (p. 220) ... (taking) Young Hyson, Gunpowder and Hyson teas on credit is unprofitable ... they are cash goods”. Dorr suggests “loading ships only with dollars. I had rather have and do the business of a ship with dollars for nothing, than meddle with skin ships” (p. 224) ... “there is a “premium on cash” in Canton” (p. 299). (Corning 1945) Morse, 1929 III:336-38 stated (American traders) “only developed the practice of taking bills on London from the US to Canton and selling there to the trader wishing to make remittances to India!”. “Large portions of the US trade with China are *now* done with bills on banks which now work better than dollars at Canton” *Niles Weekly Register*, 5 April 1834, #1176, p 86.

³⁵ India Office Records; Bengal Proceedings /P/174/20: 1795-1802

sharply to 200,000 rupees after 1839. Conversely bills funding Calcutta imports from Britain went from half a million rupees to 22 million in 1840.

In China, some proceeds of Indian opium imports were converted into bills from China to India, and even from India to Britain since the 1830s (Greenberg 1951: pp 156-57, Chaudhuri 1983: pp 871-73). Agency houses in Canton and Calcutta who dealt with consignments from Britain and other Asian cities were exporting or re-exporting Chinese goods to Britain. They drew bills on London with bill of lading on exports and sold them in the exchange market to obtain payment in dollars. As they had to remit to India for the return of opium imports, they purchased bills on London or other Indian cities in the exchange market and sent them to Indian exporters (BPP 1830b: pp 353-54). This working of triangular settlements was likely to support China's multilateral trade growth, or Indian opium imports and tea and silk exports to Britain, under the condition of the lack of sound silver dollars during the 1830s-40s.

The nexus of such multilateral settlements was initially based on the above-mentioned EIC bills drawn on the Court of Directors in London, Bengal government, and Canton factory, which outweighed private bills in circulation. However, since the late 1820s, US merchants bills on London and private bills drawn on Calcutta by merchant bankers began to be used alongside with the EIC bills, leading to the embryonic development of Western-owned exchange banks in Indian cities (Kobayashi 2022). Most of the Anglo-Eastern exchange banks appeared in British Indian cities after the mid-1830s and expanded their branch networks eastward, to Southeast Asia and China, over the 1840s. For example, the most prosperous exchange bank of that period, Oriental Bank that was founded in Bombay in 1842 spread branches in Calcutta (1844), Singapore and Hong Kong (1846), and Shanghai (1851).³⁶ Based on such intra-Asian branch linkages, they started to be chiefly engaged in trade finance using bills of exchange, while their capital-raising met the EIC's objection to their acquisition of a Royal Charter. After 1850, they began to obtain the Royal Charters and

³⁶ The original name of Oriental Bank Corporation was Bank of Western India.

expanded their exchange business based on abundant funds raised in London stock market, replacing the EIC's role of financial intermediary. The post-1850 proliferation of English-chartered banks in Shanghai were key in the resumption of silver influx from Britain or via India.³⁷

To analyse the settlement mechanism among our three economies, this study relies on the silver-points method, as well as econometric analysis of silver prices. The aim of the silver points is to estimate when silver price differences between markets pairs became sufficiently large to imply arbitrage profits and therefore trigger bullion flows. Crucially, unlike the conventional specie-point method (Morgenstern 1959; Officer 1996; Canjels, Canjels, and Taylor 2004), it is not reliant on mint prices (Flandreau 2004; Nogues-Marco 2013; Kobayashi 2022), and therefore it is particularly suited to our context, as mint prices were an impossibility in 19th-century China. As seen in Figure 3c and discussed above, particular silver species and ingots had different valuations depending on Chinese demand for each type of silver, and the difference was reflected on the premium or discount quotations of each one in the market. Therefore, there was no standardized silver price in Chinese market over the nineteenth century. This peculiarity of Chinese silver circulation requires to calculate silver price gaps using prices of different silver coins and ingots. In other words, to compute the gaps, we cannot use the general prices of silver bullion in each market as assumed by the original bullion-points method but need to make a pair of identical silver species and ingots, for instance, Mexican dollar in Hong Kong and same one in London, as expressed in the following equation.

$$(1 - c_s^{LDHK}) \frac{p_{md}^{HK}}{p_{md}^{LD}} \leq X_{LD}^{HK} \leq (1 + c_s^{HKLD}) \frac{p_{md}^{HK}}{p_{md}^{LD}} \quad (\text{Equation 1})$$

Terms p_{md} stands for the price of Mexican dollar, superscript HK for Hong Kong and LD for London, or p_{md}^{HK}/p_{md}^{LD} expresses the silver price ratio calculated using

³⁷ *The Bombay Times and Journal of Commerce (1838-1859)*; Jun 27, 1853; ProQuest Historical Newspapers: The Times of India, pg. 1215

Mexican dollar (md)'s quotations in both markets. The silver points of Mexican dollar are calculated by adding or deducting arbitrage cost (terms c_s^{LDHK} and c_s^{HKLD} for silver shipping, $LDHK$ means shipping from London to Hong Kong, and vice versa) to and from the price ratios, which regulates the variations of exchange rate X_{LD}^{HK} in Hong Kong's dollar against British pound sterling. For the silver points of other species and ingots, their prices (p_i) replace p_{md} in the equation.

The level of arbitrage costs is crucially important for the settlement mechanism because it is one of the determinant factors for bullion trade and market integration. The less silver arbitrage costs are, the more integrated silver markets between two places are, with smaller and smaller differences in silver prices across markets triggering bullion flows. The literature on specie-points analysis estimates the arbitrage costs mainly by two methods: (1) breaking down all components of transaction costs, (2) infer them econometrically from silver price differences. The first calculates a series of necessary costs for bullion arbitrage, such as freight, insurance, and brokerage, using contemporary observations (e.g., Officer 1996). This method is simple and certainly reliable but demands intensive data collection. As such, it is viable to produce only a few snapshots. Moreover, this direct approach is bound to neglect unobservable components of trade costs, which are increasingly emphasised as significant by the international economics literature (eg. Head et al. 2013). We therefore also rely on econometric estimates that infer trade costs from price differences and structural changes in their level (see the Appendix II for details on the estimation strategy).

Following the direct method, we broke down the arbitrage costs into the six components, namely, freight, insurance, brokerage, assay, interest loss, and port duties. We collected the relevant information from contemporary sources between the 1820s and 1860s. However, the dearth of first-hand information regarding some costs obstructs a complete series of estimation, so we estimated them in a rough manner or interpolated them between the actual observations in

different periods. Details on the sources and estimation method are available in Appendix I. The final outcome is summarized in Appendix Tables 1 and 2.

As shown in those tables, overall, ‘Freight’ and ‘Insurance’ accounted for a significant part of total arbitrage costs in every city pair. During the age of sailing vessel, before the 1840s, a larger rate of insurance than that of freight reflects the risk of maritime transport. When transport switched to steam vessels after the 1850s, initially the freight rate increased, but improvements in duration and safety of maritime transport meant that the costs of insurance and interest loss were significantly reduced. Over the 1850s and 60s, freight costs declined dragging overall costs downward. Thus, the cost estimation relying on direct observation finds that (“iceberg”) silver arbitrage costs between our three countries were declining from the mid-1840s onwards, and the cost at every city pair finally converged to the narrower range between 3% and 5% by the mid-1860s.

To check the robustness of estimated costs for silver trade, Figure 4 plots observation-based arbitrage costs and econometrically estimated costs for China’s transactions with Britain and with India. There is mostly a reassuringly close match in the two sets of estimates, with both detecting falling trade costs over time, bar one obvious and one partial exceptions. The obvious exception is Canton/HK-London in the 1830s. In both sets of figures, there were relatively large trade costs in the 1830s, with observation-based costs of 8.6% against data-derived costs of 14.5% in Canton/HK-London, and 7.4% against 6.5%/8% in Canton/HK-India. Because the direct observations of costs were mainly derived from English language documents, its estimation had to be relevant for the arbitrage operations by Western merchants between Britain and China and intra-Asia. However, other non-tariff barriers, such as intermediation costs by Hong merchants (guild of Chinese wholesaler intermediaries) and costs caused by asymmetry of market information, could not be incorporated into the total arbitrage costs. By contrast, the price data series used for the econometric estimate are expected to also reflect those unobservable costs. It is therefore

plausible for the data-derived estimation to be higher than observation-based one.³⁸ The implication is that unobservable trade frictions fell in the aftermath of the Treaties of Nanjing (1842) and Bogue (1843). For example, as mentioned before, these treaties strengthened the hands of foreign merchants in monetary disputes regarding the worth of coins used to settle commercial payments. They also exposed merchants from Canton – hitherto the only Chinese place allowed to engage in foreign trade - to competition from those of the other four newly opened Treaty ports. Furthermore, given that the significance of unobservable trade frictions is expected to increase with distance (Head et al. 2013), it is plausible that these costs before the early 1840s affected the Britain-China silver trade far more than the India-China silver trade. Therefore, as far as the Canton/HK-London arbitrage costs before 1840 are concerned, we judged that the data-derived estimation is more reliable and employed its value, 14.5%, for the reconstruction of silver points over 1828-1839 followed by the application of observation-based rates over 1845-1870, when there is hardly any difference between the two sets of estimates anyway. The only partial exception is the cost of trading with Shanghai in the mid-1850s, before the local price of silver achieved stability (Figure 3d). In this case, too, the econometric estimates are higher than the data-derived ones, signalling that monetary turmoil on the market increased transaction costs.

[FIGURE 4 HERE]

Having presented our estimates of trade costs, we can now turn to the assessment of the “efficiency” of the money market. As before, we rely both on the silver-points method and econometric estimates. The silver-point method offers “thick descriptions”, as it shows the points in time when arbitrage opportunities arose, the direction of arbitrage silver-trade (eg. from Canton/Hong Kong to Calcutta) and the type of silver that had to be traded to exploit such

³⁸ Corroborating evidence comes from EIC’s accounts dated 1815 reproduced in Morse (1926/1929 III:227), show that dollars sent from London were sold in Canton at a large premium, ranging from 17% to 38%, over intrinsic content. Trade costs in India (interest, insurance, freight, packaging and charges) were then estimated at 8.5% over the prime cost of the EIC (5s).

opportunities (eg. Spanish dollars), as well as the size of arbitrage profits enjoyed by silver traders. Econometric estimates are “thin descriptors” that use a summary measure to quantify the efficiency of the market: the half-life, or how long it took to the silver price ratio between a pair of cities (eg. Canton/Hong Kong-London) to be reduced by a half after a shock. Its main advantage lies in ease of comparability, a feature that we shall exploit particularly to analyse trends in market efficiency over time (again see Appendix II for details on the estimation strategy).

First, the silver points method uses our estimated arbitrage costs to reconstruct the import and export points of different types of silver coins and ingots using Equation (1). As illustration, the Spanish and Mexican dollars’ silver points between Canton/HK and London are shown in Figure 5. The interpretation of silver points’ mechanism requires a focus on the position of the exchange rates in relation to the export and import points. Basically, the exchange rate varies depending on the balance of payments’ situation. If the exchange rate violates the bounds of import or export point, silver is likely to be remitted. Conversely, the further away the rate is from the bounds, the less likely silver trade is. Then, the bill of exchange becomes a more efficient means of remittance³⁹. In sum, the position of the exchange rates against the bounds of silver points between any two places indicates when it pays off to ship silver as opposed to rely on cashless means of exchange to settle imbalances.

In Figure 5, the grey-coloured parts represent the range of the exchange rates’ violation to the bounds, or the profit margin for arbitrage. During the pre-1850 period, the exchange rates tended to fluctuate around the Spanish dollar’s import bounds, particularly after 1834, and stay within Mexican dollar’s band. This configuration indicates that the most favourable means of settlements was sending Spanish dollars from London to Chinese cities if the coin was procurable in the former market. Otherwise, the bill of exchange was the most convenient

³⁹Because the silver-points series are estimates, they include measurement errors, and thus silver trade could occur even before the exchange rate hits the estimated bounds.

option. Moreover, it is noticeable that the exchange rates plummeted over 1849-1850 and started to move around the Mexican dollar's import points afterwards. In other words, at the same time as Spanish dollar had become increasingly difficult to procure, it became convenient to settle balances with Mexican dollars. This post-1850 shift of silver import arbitrage from Spanish to Mexican dollars indicates that the settlement mechanism underlay the resurgence of China's silver influx and subsequent silver price stabilization.

[FIGURE 5 HERE]

The reconstructed silver points of other species and ingots in different city pairs are seen in Appendix Figures 6 to 18, and their interpretation in regards with the direction of the silver flows in and out of China is summarized in Table 1. If the exchange rates fluctuated along the import or export bounds and their violation reflected arbitrage profits, the arbitrage pattern is reported as import- or export-orientation, respectively. Even in the case that the exchange rates move within the band, we captured its proximities to import or export bounds, as Table shows 'within band/IM or EX'. The silver points in Shanghai could be reconstructed only after 1850 when bullion and specie quotes started to be printed in newspapers. We distinguish the general patterns of arbitrage in the three periods, the 1830s-40s, the 1850s-65, and 1866-70, corresponding to regimes of low, high, and low silver inflows in China, respectively (Figure 2).

[TABLE 1 HERE]

In Canton/HK-London silver points, Spanish dollars tended to be sent eastward over the 1830s-40s, again, as long as the coins were procurable in London. Meanwhile for Republican dollars (which included both Mexican and other Spanish American dollars before 1850), although there were occasional import profits in the mid-1830s the situation of 'within band' was dominant before 1850. Hence our results agree with the observation that before the 1850s only little silver was imported by China from Britain (Figure 2). However, after the 1850s,

the arbitrage patterns for both Mexican dollar and silver bar changed to the import-orientation.

Concerning silver points in Canton/HK with Indian cities before 1850, while Spanish dollar lay in the import-orientation, Sycee was likely to be exported and Republican dollar's trade was defined as within band/EX. That is, these results predict silver moves from China to India, which is consistent with the silver flows shown in Figure 2. Moreover, they predict that China's silver outflows during the 1830s-40s mainly consisted of Sycee and dollar coins other than Spanish dollars to India. This prediction is supported by documentary evidence. *The Statement of the value of bullion Imported into each of the Indian presidencies* in the period 1830-1845 for the British Parliament reveals that two thirds of Chinese exports to Calcutta was formed by the finest silver, sycee and bars, with the rest made of non-descript coins.⁴⁰ This distinction provides further confirmation that for contemporaries in Asia silver was not any silver. There is also evidence that in the 1840s, the private assay by Chinese shroffs establishing the difference in weight and purity between republican coins and "cut money" or broken dollars and the "shoes of pure sycee" was required when merchants had to pay duties to the government - "in pure sycee silver" or "its equivalent" in the 1840s (Morrison 1848, 212).⁴¹

After 1850, as discussed in the previous section, the Mexican dollar came to define a new silver standard in China at the same time as unprecedentedly large quantities of silver were imported from Britain (Figure 2). Accordingly, while the previous arbitrage pattern for Sycee basically lasted, the Mexican dollar's silver point mechanism in Canton/HK switched to import-orientation not only as just seen in Figure 5 with Britain, but also with India. The post-1850 Shanghai

⁴⁰ BPP (1846), Data for Bengal imports only; imports of Treasure at Madras were negligible; Bombay data combines silver and gold values and represented 2/3 of the total; in the last two years silver rupee went back to India to make a 10% of the total; gold remittances were indeed minimal. As this is a separate report, the context is missing.

⁴¹ The difference (on average) ranged between 9% discount for the new (Company) rupees to 11% for the Chilean or Bolivian coin and 12% for the "cut money" or "broken dollars". Morrison states that "the rates at which foreign coins is taken were negotiated between merchants and the shroffs by the linguists or comprador".

arbitrage pattern also shows the same tendency towards attracting Mexican dollar's imports. Thus, an incentive to import Mexican dollars into Canton/HK and Shanghai from both Britain and India emerged in the settlement system after 1850.⁴²

After 1866, patterns of arbitrage orientation and therefore silver flows were heavily shaped by the new trilateral balance of trade situation, with India's surplus being increasingly no longer offset by any other bilateral commercial relation within the triangle (Figure 1). The cotton boom in Bombay had caused Britain to accumulate a large trade deficit against India in the previous years (1862-1865). Meanwhile, China's trade surplus against Britain started to be balanced while her trade deficit with India caused by opium imports did not decline. As stressed by Sperling (1962: 450), bills of exchange could be the only means to settle multilateral payments when there was an overall balance within a trading area. Else eventually bullion had to be shipped as trade imbalances built up pushing exchange rates beyond the bullion points. Indeed, eventually, from the mid-1860s, China's deficits vis-à-vis India were increasingly settled in specie, as seen, with the resurgence of China's silver outflows to India (Figure 2). Consistent with this perspective, the pattern of Mexican dollar's arbitrage in Canton/HK and Shanghai changed to export-orientation again especially with Bombay after 1866. In addition, arbitrage profits by exporting Sycee from Chinese to Indian cities expanded over 1866-68 (Appendix Figures 8-9).

The exchange rate fluctuations were well regulated by the band overall. In other words, the physical movements of silver between Chinese and counterpart cities not only corrected silver price differences, but also adjusted exchange rate fluctuations. Our last bit of analysis confirms that money markets became increasingly efficient, by showing the evolution of the speed of adjustment after a shock, as measured by the half-life, over rolling windows of 101 months (again see Appendix II for details on the estimation strategy). Figure 6 shows the half-

⁴² Though in Shanghai we find that any types of silver were likely to be imported, from both London and the Indian cities.

lives of silver price differences between China and India (part a) and-Britain (part b). This market-efficiency analysis assumes that traders chose the most favourable means of remittance from bills of exchange and silver species and ingots, in line with the above-explained silver point mechanism.

As with trade costs, we detect a massive improvement in efficiency in Canton/Hong Kong-London with half-lives being slashed from 5.9 months for rolls centred in the 1830s to 1.4 months for rolls centred in the mid-1840s (Figure 6b). Moreover, again matching trends in trade costs, the average half-life became somewhat lower still in the 1860s, particularly in Shanghai where it became just over half a month at the same time as silver money in China found a new stability thanks to the acceptance of the new Mexican dollar.

However, the China-India pattern indicates gains in efficiency rather more substantial than those detected by trade costs. In fact, such gains were comparable in size to those we observe between China and Britain. While market efficiency is co-determined by pair-wise trade costs, it is also affected by indirect arbitrage and the speed of information flows (Federico 2012). A credible driver of efficiency in our context is the development of Anglo-Eastern exchange banks trading in bills of exchange, which kicked in the 1840s, arguably stimulated by the growing demands of international trade at a time when sound money was in short supply in China. As Cheong (1971: p 88) put it: “the collapse of the Spanish dollar engendered and hastened the change to paper finance and credit”. Notably, between China and India, efficiency improvements followed in time those between China and Britain, with a steep fall in adjustment time from the end, rather than the beginning, of the 1840s: between Canton/Hong Kong and Calcutta rolls centred until 1848 find an average half-life of 3.3 months, as compared to less than one month for rolls centred from 1850 onwards. This sequence matches remittance patterns from Chinese to Indian cities: bills of exchange were typically drawn on London in the former and sent to the latter, which remained the centre of the triangular arbitrage system (Kobayashi 2022:

Figure 5). It therefore stands to reason that the expansion of exchange operation and silver market integration of China with Britain preceded that with India.

Even within China, progress was uneven. Closely matching different timings of stabilisation of the local silver markets described before, the integration of Shanghai with the Indian cities initially lagged that of Canton/Hong-Kong: the half-lives between Shanghai and Bombay were significantly higher than those between Canton/Hong-Kong and Bombay for the rolls centred until the later 1850s, but rapidly caught up thereafter, declining from three months to about one month. Either way, the picture emerging in the third quarter of the 19th century is like the one from trade costs discussed before, with increasingly integrated silver markets across our three countries. Half-lives of about one month at the end of our period closely match that between Shanghai and the international silver price in 1905 to 1914, 1.5 months (Jacks et al. 2017: p. 382), suggesting no further improvements between 1870 and the early 20th century and thus underlining the significance of the mid-19th century developments mapped here.⁴³

[FIGURE 6 HERE]

Conclusions

Our newly reconstructed trends of silver and trade flows between China, India and Britain highlight a poor correspondence between the two variables. Notably, contrary to conventional wisdom, imports of opium in China from India turn out to be a poor predictor of silver flows between the two countries: silver flows in

⁴³ Trade costs suggest that by 1870 China's silver market, as expected, given its higher value to weight ratio, was better integrated than the tea market with London: Congou tea trade costs were slashed from 105% in 1819 to 11% in 1835 (vs. 14.5% for silver), after the end of the EIC's trading monopoly, and further declined to 7.5% by 1870 (vs. 4.8% for silver) (Chilosi and Federico 2015; estimates based on trends fitted by their Bai-Perron test). Half-lives of 1/1.5 months remained significantly higher than half-lives of just below a week for gold arbitrage between London and New York in 1879 to 1913 (Canjels et al. 2004). As compared to China's domestic silver market in 1920-1933, our final half-lives were higher than those between major centres, like Shanghai-Tianjin (1 to 2 weeks), but lower than the half-lives between Shanghai and remote cities, like Chongqing (12 to 23 weeks) (Palma and Zhao 2021 p 885, 902).

these years were not closely associated to, and tended to be much smaller than, the value of opium imports. We highlighted that a decoupling between bilateral silver and trade flows can be understood in the context of a roughly balanced trilateral trade (until the 1850s) based on the growing exchange market and Chinese heterogeneous demand for silver.

Our price dataset shows for the first time how Chinese silver prices were systematically different across types of silver. Having largely relied on foreign silver money, since the 1820s Chinese commercial sector suffered from the lack of sound silver currency derived from the collapse of Spanish peso standard following the independence of Spanish American countries (Irigoin 2009a). From 1820s to the 1840s, the vanishing Spanish dollar coins started to be priced with high premium, while newly minted Republican dollars circulated there at discount because of wild variations in aspect, weights, and fineness (Von Glahn, 2007; Irigoin 2009a). Along with a variety of foreign silver coins, sycee, also started circulating with variable premium/discount. In other words, because of a lack of coinage (and mint parities) in Chinese market, silver (species and ingots) was not valued by a standard silver price but by commercial values reflecting the difference of local demand on each type of silver.

Silver problems for foreign traders ceased or diminished greatly once China adopted the new Mexican dollar in the 1850s. Improvements in the Mexican political situation had resulted in more consistent and regular coinage of silver (Irigoin 2010, Kuntz 2022). By then the Mexican coin was a reliable and acceptable standard of value for the foreign trade in Asia. This conversion was relatively easier and expedite in Canton and Hong Kong, which started in 1853 by taking the Mexican coin at par with the Spanish dollar. It took longer in Shanghai, where a more intricate step by the creation of the Shanghai tael in 1856/57, as a unit of account which also ultimately pegged the new Mexican dollar to the value of the Spanish coin and served to anchor prices and exchange rates thereafter. Hence, the Mexican dollars started to be counted - by tale- as well and became the new standard with which silver on China was officially

received at Customs and used to price exports and imports. Similarly, the standardisation in the bullion markets witnessed the replacement of sycee by the bars of English standard as quotes for sycee and Spanish dollar became rarer from news on the bullion and specie markets.

Both direct and econometric estimates of trade costs consistently show that arbitrage costs in the China-Britain and, to a lesser extent, -India trade were first high; but they started to decline from the early 1840s. According to the silver point analysis, while there was constant arbitrage profit by importing (increasingly rare) Spanish dollars into China, other coins (new Republican dollars, rupees, etc) and sycee were likely exported to Indian cities as (partial) return of opium trade deficits during the 1830s-40s. A second econometric test on the speed of adjustment shows marked increases in efficiency also centred in the 1840s, first between China and Britain and then between China and India. The results suggest that during the 1840s, although different types of silver still had distinct values in each market, there was a positive environment for private bills to perform as means of settlement fostering an increasing integration in money markets between China and the other two countries. Silver flows were thus complemented by the circulation of private bills, arguably stimulated by the monetary turmoil in China, to settle the expanding triangular trade.

Similarly, the application of silver points and estimation of arbitrage costs identifies a turning phase of China's settlement system around the early 1850s. The stabilization of silver prices in China is visible in the narrowing of the bands for the silver points across deals with Indian cities and Britain, which went along with the stabilization of the Mexican dollar, first in Canton/Hong Kong and later in Shanghai. Consequently, Mexican dollar's arbitrage pattern reverted from export- to import-orientation corresponding with resumption of silver imports from Britain directly or via India. Additionally, a further significant outcome is that China's exchange rates on both Indian cities and London became increasingly well regulated by the bounds of reconstructed silver points of effectively circulating sycee and Mexican dollar. A relative more stable silver

prices in China made arbitrage more efficient and increased the scope for the settlement of trade deficits arising out of the Britain-Asia triangular trade by means of by bills of exchange, so the spurt in China's silver imports in the 1850s and exports in the late 1860s was relatively short-lived. Monetary issues for China lingered however, thus the foreign "trade dollars" solution repeated after 1870.

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Tables and Figures

Table 1: Summary of arbitrage patterns

City pairs	Specie/Bullion	Arbitrage Pattern		
		The 1830s-40s	The 1850s-65	1866-1870
Canton/HK-London	Spanish dollar	IM	IM	NA
	Republican/Mexican dollar	Within Band	IM	IM
	Silver bar	NA	IM	IM
Canton/HK-Calcutta	Spanish dollar	IM	NA	NA
	Republican/Mexican dollar	Within Band/EX	IM	Within Band
	Sycee	EX	EX	EX
Canton/HK-Bombay	Spanish dollar	IM	NA	NA
	Republican/Mexican dollar	Within Band/EX	IM	EX
	Sycee	EX	EX	EX
Shanghai-London	Mexican dollar	NA	IM	IM
	Silver bar	NA	IM	IM
Shanghai-Calcutta	Mexican dollar	NA	Within Band/IM	Within Band/IM
	Sycee	NA	IM	NA
Shanghai-Bombay	Mexican dollar	NA	Within Band/IM	EX
	Sycee	NA	IM	NA
Import orientation	Export orientation	Within Band = no arbitrage		
Within Band/IM = no arbitrage but closer to import		Within Band/EX = no arbitrage but closer to export		

Notes: N/A no quotes printed in the papers. “Republican/Mexican dollar” indicates Republican dollar before 1850 and Mexican dollar thereafter.

Sources: Figure 5 and Appendix Figures 1-18.

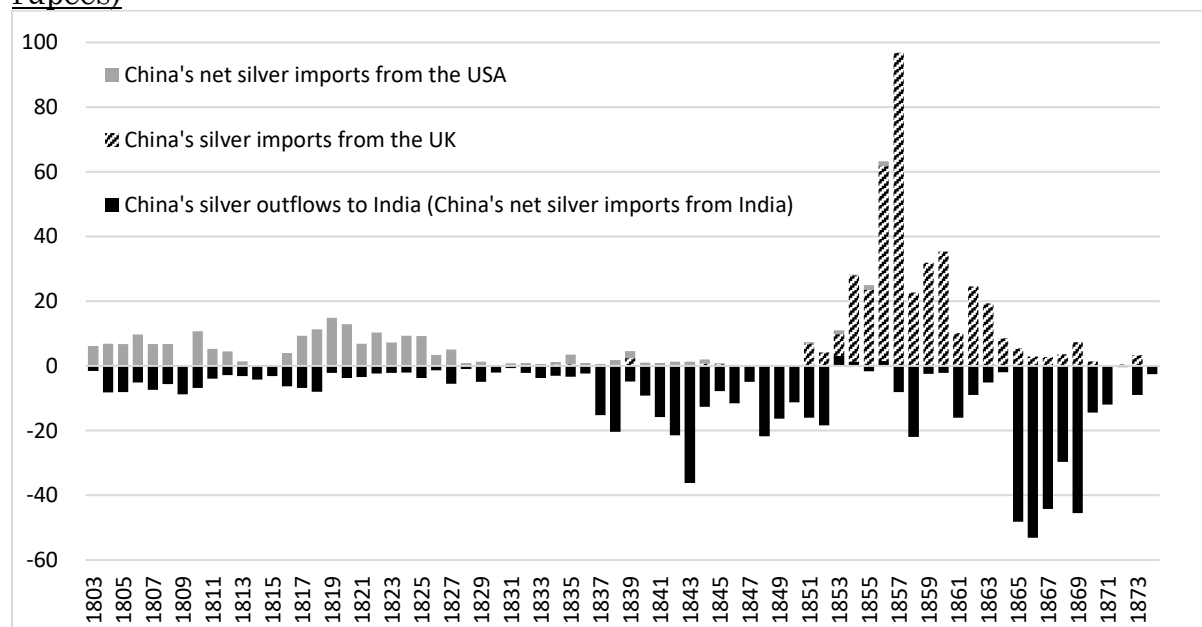
Figure 1: China's net balances of Merchandise trade with India and Britain between 1827 and 1874 (10 million Rupee)



Notes: British India's trade balances represent aggregated values of three presidencies' trade statistics (Bengal, Bombay, and Madras). Original value in Pound sterling (UK's balance with China) converted into Rupee using exchange rates from Denzel (2010).

Sources: see Appendix I.

Figure 2: China's balance of silver trade with Britain & US (1803-1874 million rupees)

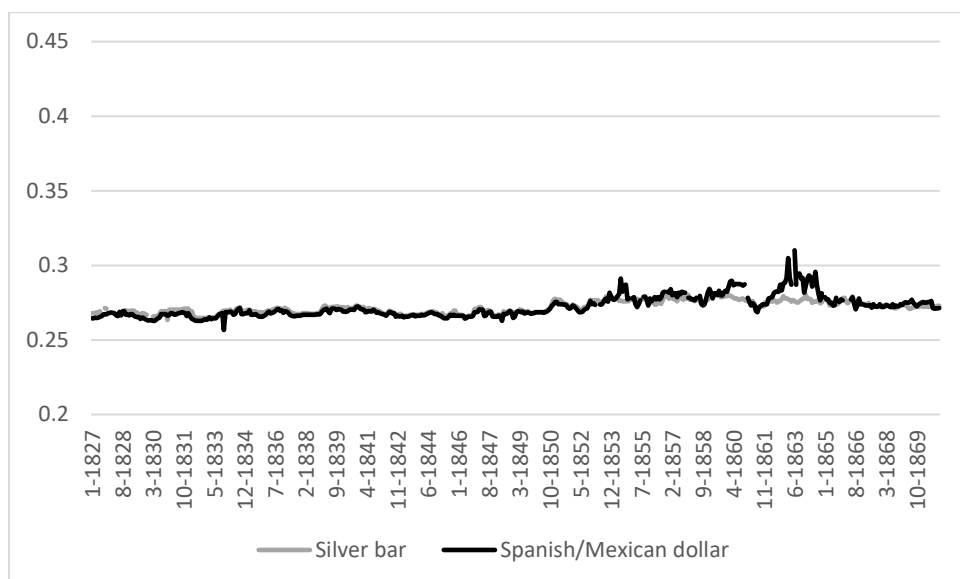


Notes: China's net silver imports from the USA covers until 1856. China's silver imports from the UK (original UK's exports to China) covers after 1828. Original value in Dollar (China net silver imports from USA) from Irigoien (2009a) and Pound Sterling (China's silver imports from UK) were converted into Rupee using exchange rates from Denzel (2010).

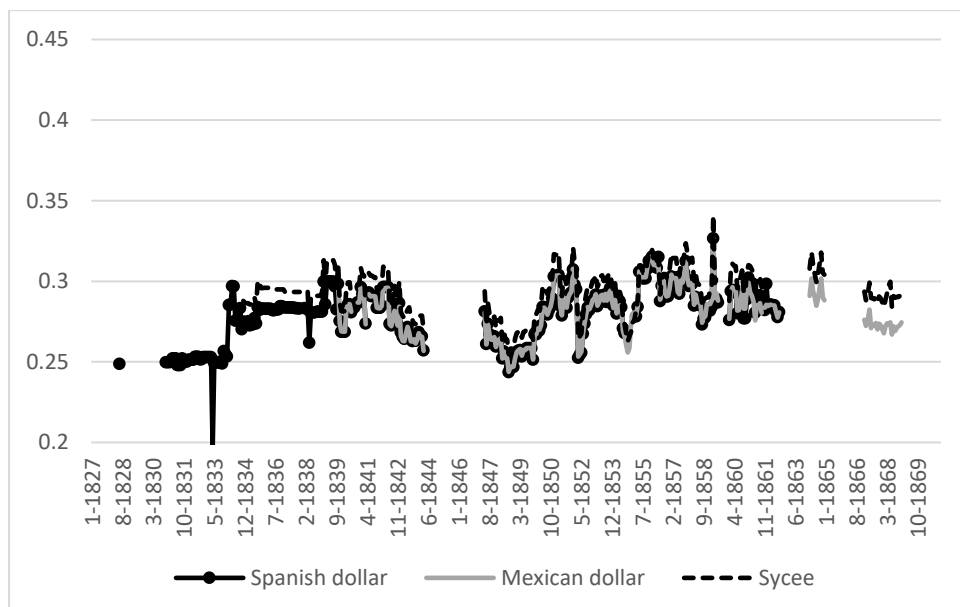
Sources: see Appendix I.

Figure 3: Silver prices in London, Calcutta and Canton/Hong Kong by type, 1827-1870 (£/troy ounce)

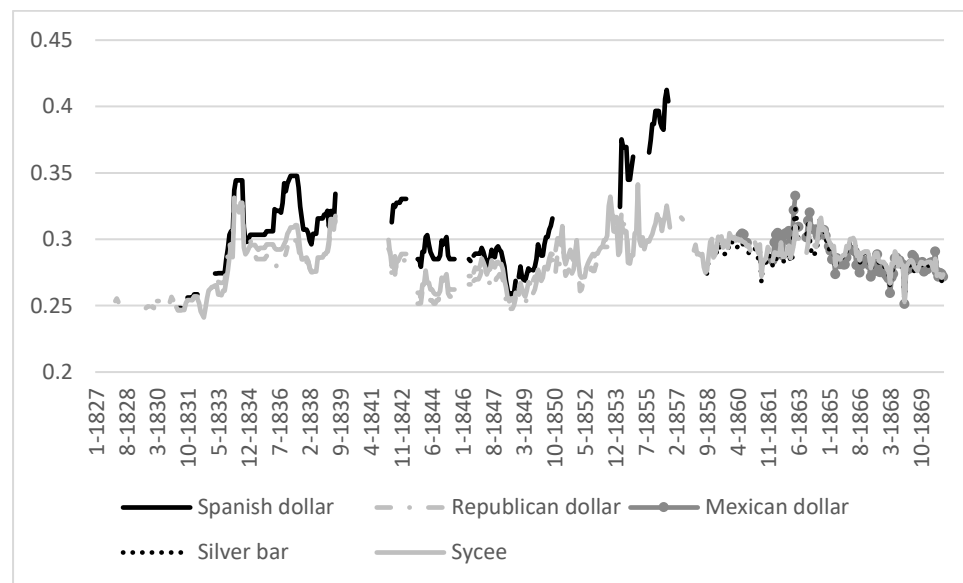
a) London



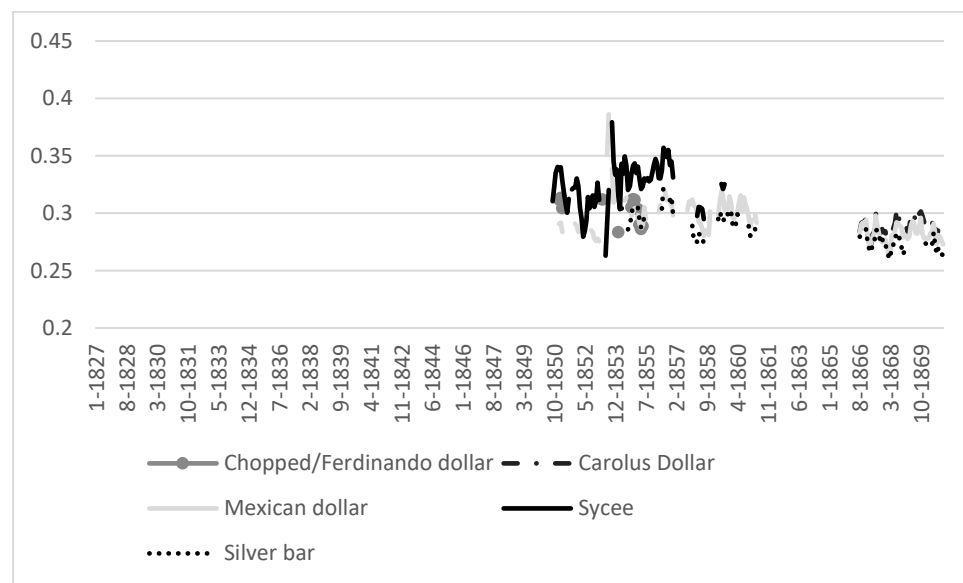
b) Calcutta



c) Canton/Hong-Kong



d) Shanghai

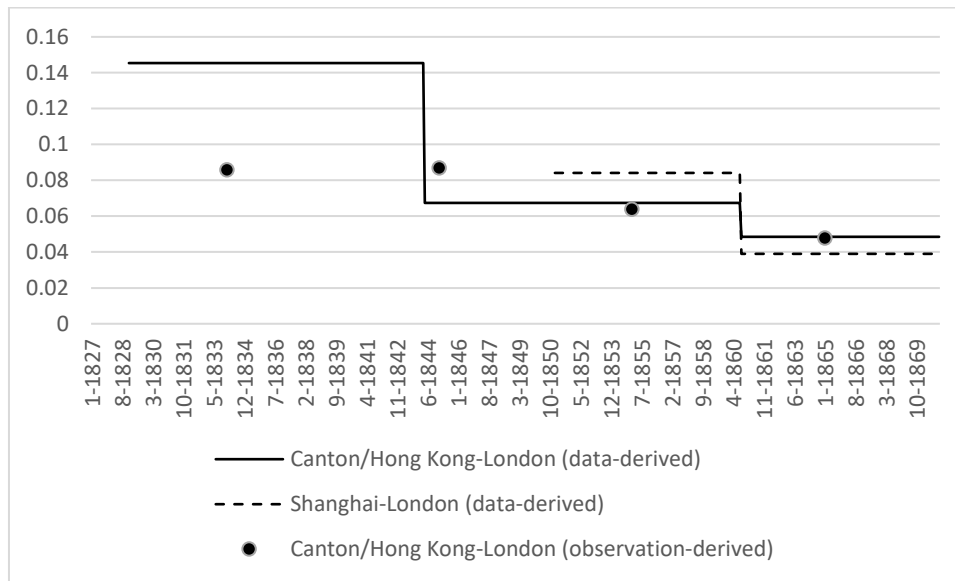


Notes: the distinction between Republican and Mexican dollars in Canton/Hong Kong is in accordance with the actual notations in the newspaper sources.

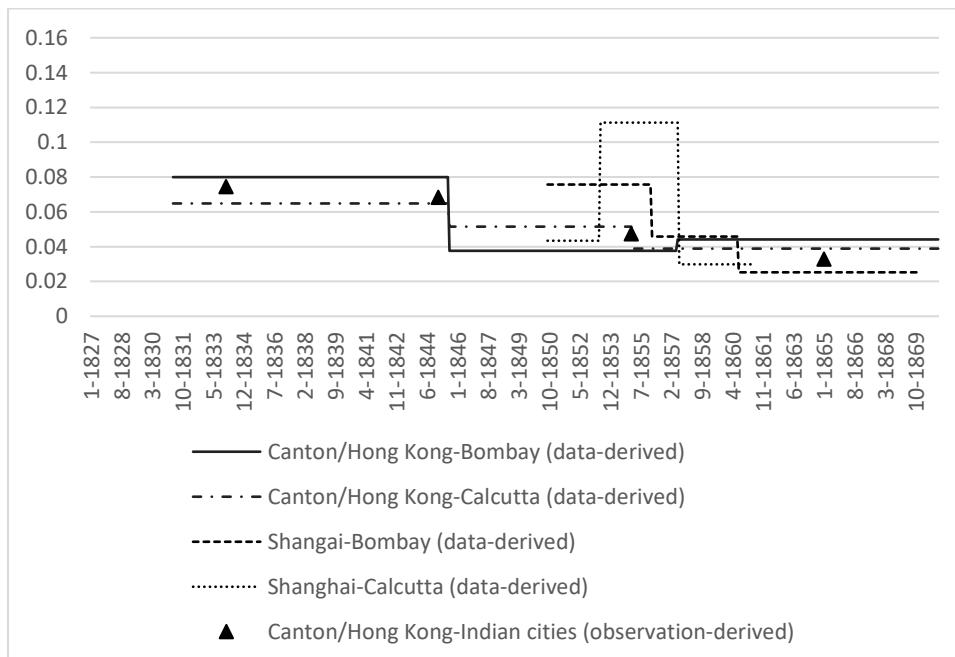
Sources: see the Appendix I.

Figure 4: Arbitrage costs with China.

a) Canton/HK and London



b) Canton/HK and Indian cities

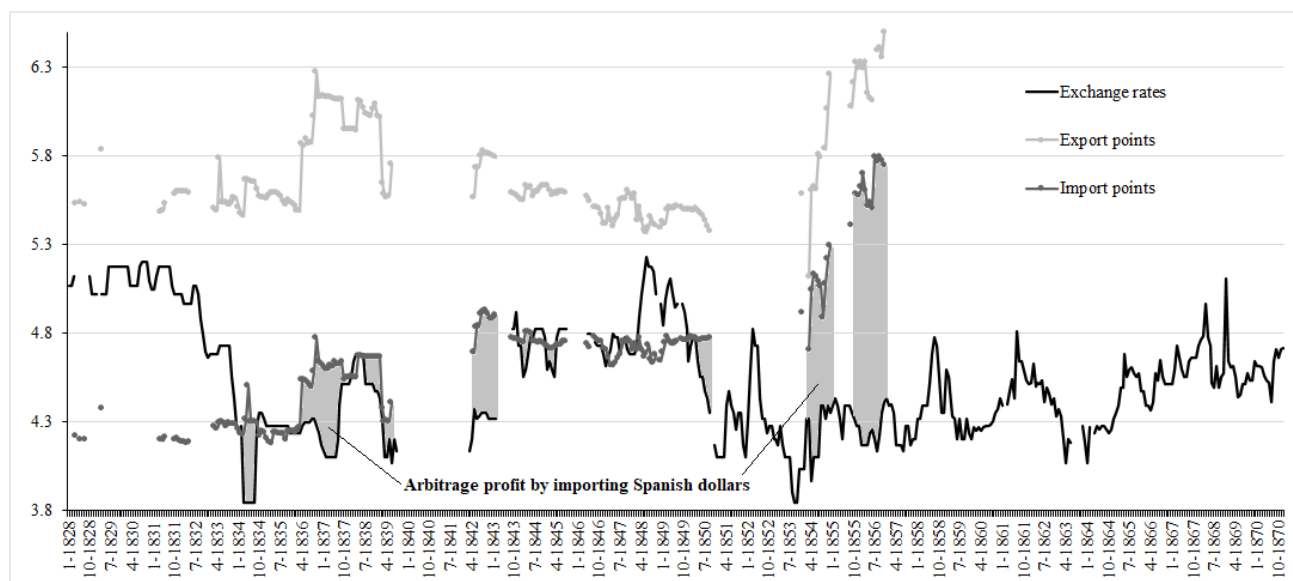


Notes: the observation-based estimation over 1828-1839 is plotted around the mid-month of January 1834; observation-derived costs to London and from Shanghai are nearly identical to the reported ones from London and from Canton/Hong-Kong respectively and are omitted from the Figure for clarity.

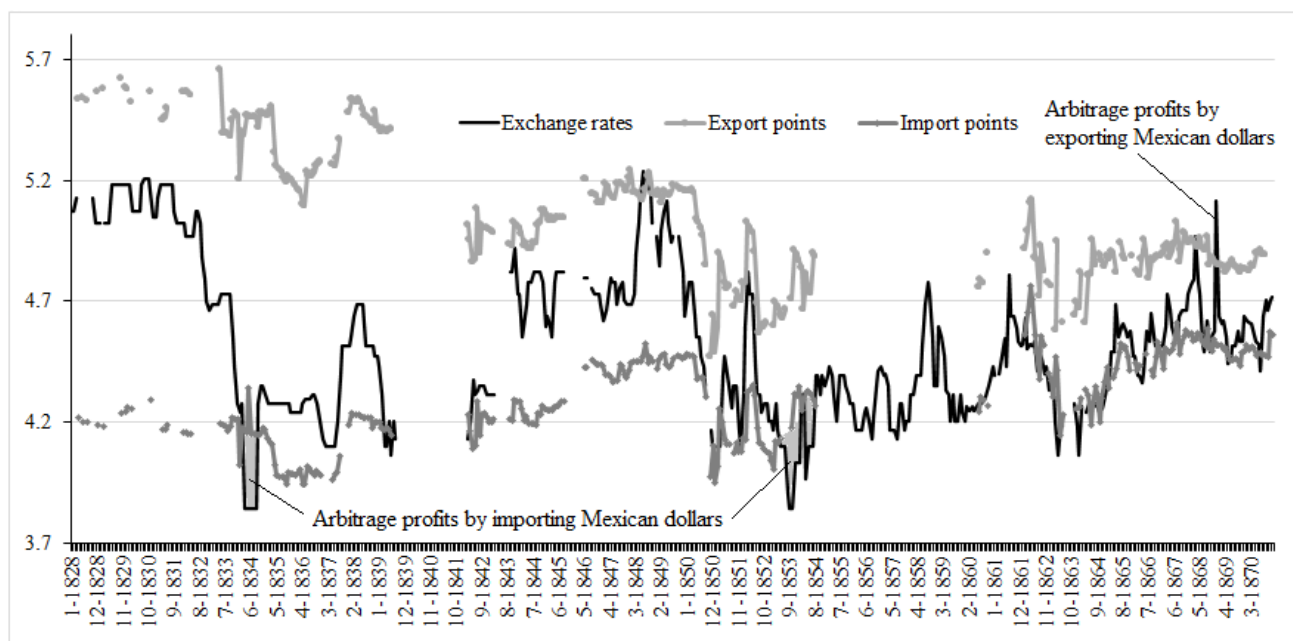
Sources: see Appendix Table 1 and Appendix Figure 19.

Figure 5: Spanish and Republican/Mexican dollars' silver points in Canton/HK with London, Jan. 1828-Dec. 1870 (dollar per pound)

a) Spanish dollars



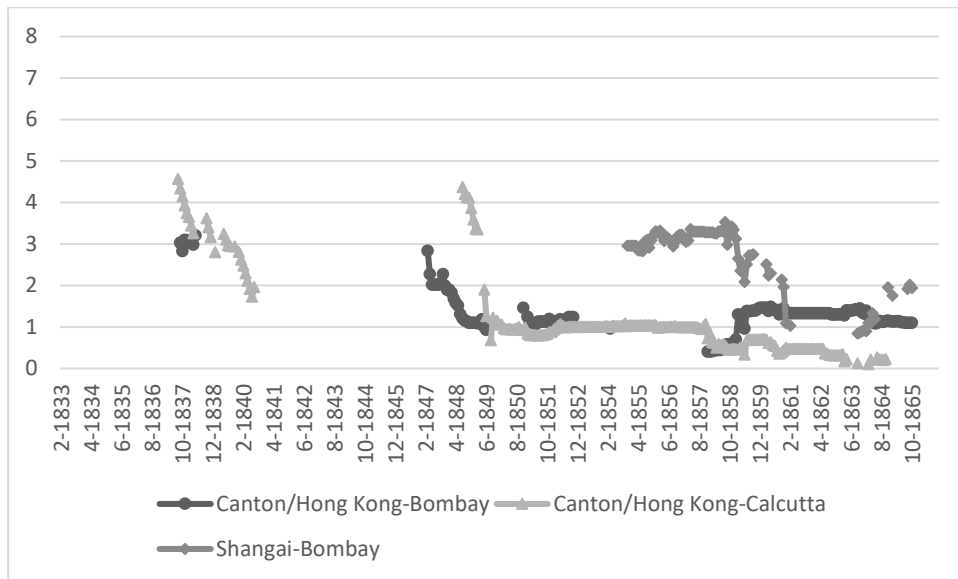
b) Republican/Mexican dollars



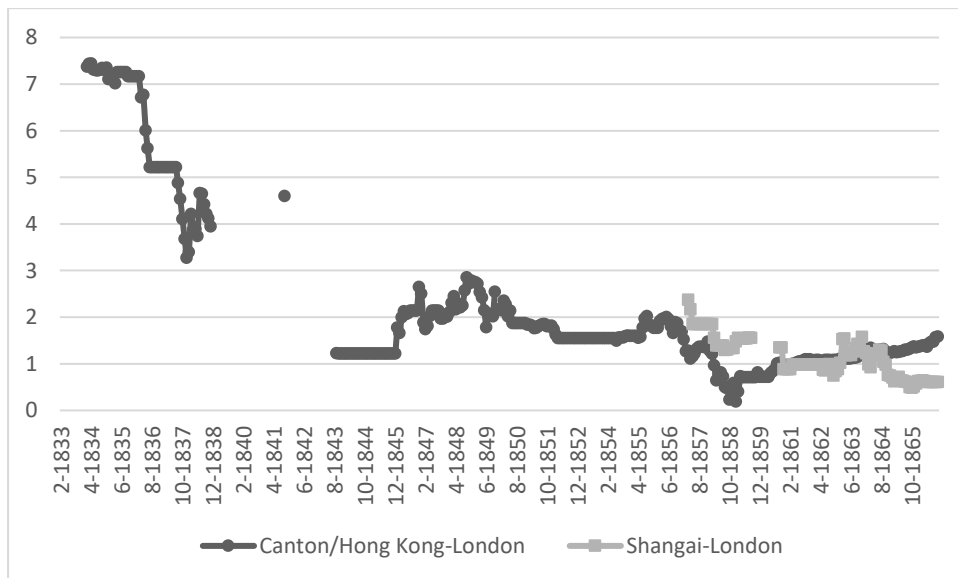
Sources: see the Appendix.

Figure 6: Half-lives (in months) between pairs of cities, January 1827 to December 1870

a) China-India



b) China-Britain



Notes: half-life refers to the time it takes for a price dis-equilibrium to be reduced by half. They have been estimated with Equation A3 in the Technical Appendix applied to rolling windows of 101 months. The dates on the x-axis refer to the 51st month of the window (the mid-month). Only results significant at the 5% level are shown (for this reason Shanghai-Calcutta is not shown in part a).

Sources: see the text and Appendix I and II.