

READING 3

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Abstract: Conversion of China's monetary and fiscal systems to a silver standard led to a doubling in the value of silver in China vis-à-vis the rest of the world by the early sixteenth century. Heightened profit opportunities induced an unprecedented surge in silver production in Spanish America and in Japan. Destined ultimately for China, tens of thousands of tons of silver passed through Europe via long-distance maritime and overland trade routes. Fifty tons of silver annually also reached China via the Pacific Ocean after the founding of the Spanish city of Manila in 1571. Japan exported huge quantities of silver to China until the late seventeenth century. New American crops were also introduced to Chinese agriculture via the Manila galleons, contributing to a doubling or more of Chinese population in the eighteenth century. Silver demand grew along with China's population, which in turn led to a fifty percent silver price premium in China. Largely in response to buoyant demand, more Mexican silver was produced during the eighteenth century than had been produced by all of Spanish America during the sixteenth and seventeenth centuries combined. Subsequently, during the second half of the eighteenth century, a "tea and opium cycle" propelled British fortunes in Asia. Economic, environmental, and demographic histories must not be viewed as independent phenomena. It is a mistake to view societies around the world as independent of or weakly connected to global forces. All heavily populated continents have been deeply connected since the sixteenth century.

Monetary Disaggregation and the Birth of World Trade

Conventional wisdom tells us that economic modernity emerged inevitably from a dynamic west European foundation, which furnished an ideal model that aspiring non-Westerners wish to copy to this day. ¹ Many scholars now argue that Western Europe was, on the contrary, a relative late bloomer. In particular, certain Asian economies were more advanced than their European counterparts until the Industrial Revolution finally propelled portions of Europe to the economic forefront. ² [End Page 391]

This high-stakes historical debate carries serious intellectual implications and opportunities. We are concerned, however, that an otherwise constructive debate may inadvertently reinforce a common and misleading Europe/non-Europe dichotomy. Our contention is that a highly integrated global economy has existed since the sixteenth century. While specific regions of the world have certainly risen and declined economically and politically since the

sixteenth century, we nonetheless contend that it is a mistake to visualize specific geographical regions as if they rose/declined in isolation or were weakly connected with the rest of the world. Comparative history is crucial, in other words, but it is imperative that comparisons acknowledge the global context within which constituent regions operated.

Global monetary history provides a useful vantage from which to show linkages among regions of an interconnected world economy. This essay focuses on two significant cycles in the evolution of the global silver market. The first phase – the Potosí/Japan Cycle – spans the 1540s to the 1640s and generated the birth of global trade (as defined below). A second silver phase – the Mexican Cycle – covered the first half of the eighteenth century and was related to significant demographic growth in China that was partly attributable to the introduction of new crops from America. Analysis of these two silver cycles bolsters our dual contention (1) that a highly integrated global economy has existed since the sixteenth century, and (2) that all analyses of world regions must recognize powerful, interconnected economic, demographic, and ecological forces that have been operating at the global level for several centuries.

In a previous article in the *Journal of World History* (Flynn and Giráldez 1995a, 201), we quoted C. R. Boxer's (1969, 17) description of the birth of world trade:

Only after the Portuguese had worked their way down the West African coast, rounded the Cape of Good Hope, crossed the Indian Ocean and established themselves in the Spice Islands of Indonesia and on the shore of the South China Sea; only after the Spaniards had attained the same goal by way of Patagonia, the Pacific Ocean and the Philippines – then and only then was a regular and lasting maritime connection established between the four great continents. [End Page 392]

Based on Boxer's logic, we chose 1571 – the year the city of Manila was founded as a Spanish entrepôt – as the specific year during which global trade was born.³ Manila initiated substantial and continuous trade across the Pacific Ocean for the first time in history. To understand the larger significance of direct transoceanic trade between American and Asia, it is necessary to understand underlying economic forces that motivated profitable global trade at this time. Silver played a pivotal role.

China was the primary end-market for world silver for several centuries. This primacy becomes obvious when we consider the spectacular price premiums that emerged within Chinese marketplaces during the 1540–1640 silver cycle, and then again during the 1700–1750 silver cycle. That is, truly historic surges in global silver flows toward China occurred during these specific periods because silver prices were significantly higher in China than elsewhere in the world. Divergent bimetallic ratios provide the clearest indicators of the

elevated value of silver in China vis-à-vis the rest of the world. In the early sixteenth century, for example, the gold/silver ratio in China stood at 1:6, while in “contrast the gold/silver ratio hovered around 1:12 in Europe, 1:10 in Persia, and 1:8 in India” (von Glahn 1996a, 127); this means that 6 ounces of silver could purchase a full ounce of gold in China, while the same 6 ounces of silver could simultaneously purchase only one-half ounce of gold in Europe. Later in the 1590s, silver exchanged for gold at a ratio of 5.5:1 or 7:1 in Canton, while in Spain the exchange rate was 12.5:1 or 14:1, “thus indicating that the value of silver was twice as high in China as in Spain” (Chuan 1969, 2). Bimetallic ratios were about 10:1 in Japan and 9:1 in Moghul India at that time (Boxer 1970, 461). Archival sources contain innumerable references to merchant awareness, the world over, that silver’s value within China was much greater than elsewhere. ⁴ A Dominican priest by the name of [End Page 393] Gaspar de Cruz, for example, writes in 1569 that “there is no gold or silver money in China, but only current weight of gold and silver, and everything is bought and sold by weight... He who make good market in the country of China ... carrieth silver rather than goods” (translation in Boxer 1953, 129–130). Pedro de Baeza, a merchant from Madrid with 25 years of business experience in Asia, stated in 1609:

Commonly a peso of gold is worth five and a half silver pesos, and if there is a shortage of silver [in China], it is brought from other parts and the price rises to six or six and a half silver pesos for one peso of gold; and the most expensive that I have seen and bought gold in the city of Canton in China was seven pesos of silver for one of gold, and I never saw it go beyond this price, and here in Spain a peso of gold is commonly worth twelve of silver; therefore it is easy to see that bringing gold from China means a gain of more than seventy-five or eighty percent. (quoted in Boxer 1970, 461)

The abundance of such archival accounts has prompted leading historians such as Herman Van der Wee (1977, 297) to state unequivocally that “in the Far East, silver was valued much more highly than gold in comparison with western Europe, so the western merchant had everything to gain from paying for his purchases in the east in silver.” Similarly, John Richards (1983, 23) describes Dutch East India Company activities in the following way:

From one perspective, at least, the Dutch East Indian simply acted as a European way station for the flow of New World silver and pumped this out to its trading stations in the east as a commodity. More often than not reales valued by weight remained in their original boxes packed at the Mexican or Peruvian mints set up adjacent to the mines. Only after arrival at Batavia or any of the other Dutch trading stations did the reales pass into circulation or bullion enter local mints. In other words, at least part of the copious New World treasure flow was a direct transfer from the point of production and working to its eventual, far distant, point of monetary circulation in Asia.

Economists are accustomed to thinking about temporary disequilibria, of course, but many might be surprised to discover that the process of global equilibration during the first great silver cycle lasted a **[End Page 394]** century. It was not until around 1640 that bimetallic ratios converged worldwide.⁵ In other words, the price of silver in China had finally subsided to its price in the rest of the world by the 1640s. Lesser (but still huge) quantities of silver continued to flow into China during the second half of the seventeenth century, during a time of relative stability of silver prices around the world, but global shipments of silver were no longer motivated strictly by arbitrage considerations.⁶ By the beginning of the eighteenth century, however, another arbitrage phase emerged when the value of silver within China once again surged above its value in the rest of the world; a 50 percent premium existed this time, rather than the 100 percent premium during the 1540–1640 period. As had occurred by the middle of the seventeenth century, silver prices once again converged globally by the middle of the eighteenth century. But this second time around, the equilibration process took only 50 years (half as long as during the previous cycle): “In the first half of the eighteenth century the gold:silver ratio in China remained fairly constant at 1:10–11, in contrast to a ratio of 1:15 in Europe, but from 1750 onward the gold:silver ratio in China leapt above 1:15, while in Europe it declined to 1:14.5–14.8” (von Glahn 1998, 57).⁷ Well-known contemporary observers were aware of the phenomenon alluded to by Dermigny and von Glahn. Sir Isaac Newton, in *Representation to the Lords of the Treasury* (1717), says that “in China... the [silver:gold] ratio is 9 or 10 to 1 and in India 12 to 1, and this carries away the silver from all Europe”; Magens’ notation to this passage by Newton, states that “such quantities of silver went to China to fetch back gold that the price of gold in China rose and it became no longer profitable to send silver there.”⁸ Magens’ statement is clearly true for the middle of the eighteenth century; indeed, between 1776 and 1779 bimetallic ratios indicate a *lower* value of silver in China than in Europe (Carriere 1975, 17). China soon thereafter regained leadership as the world’s greatest importer of silver, but these data do clearly indicate that what **[End Page 395]** we call silver’s Mexican Cycle had indeed ended by the middle of the eighteenth century.

Two issues surface immediately when confronting these trends. The first issue—having to do with forces responsible for such high values of silver in China relative to the rest of the world—is discussed in the next section of this essay. The second issue concerns global market reactions to these unusually high values of silver within China—thus propelling us into the topic of arbitrage trade. Since arbitrage trade simply involves the purchase of an item cheaply in one area and subsequent sale of the same item at a higher price in another area, it may initially seem a trivial matter. But this arbitrage issue is crucial and nontrivial when placed in the context of monetary and trade history at the global level. Indeed, application of arbitrage reasoning to the

global history of silver has forced us to reject a fundamental tenet of modern monetary theory.

Arbitrage reasoning wreaks havoc with the conventional explanation for the flow of “precious metals” from Europe to Asia throughout the period under discussion. We are normally told that thriving European demand for Asian exports, in combination with languid Asian demand for European wares, was responsible for a substantial European trade deficit vis-à-vis Asia. Thus, precious metals (as monetary items) had to flow to Asia in order to pay for Europe’s trade deficit with Asia. “Europe tended to import more from Asia, in the form of spices, silk, textiles, and other goods, then it exported to the east. The difference was paid in the form of specie... They [the Ottomans] could not prevent the outflow of specie to the East arising from the trade deficits in that direction” (Pamuk 2000, 132–134).⁹

We have argued elsewhere that this conventional trade-deficit explanation for East-West monetary relations is contradicted by historical facts, however, because it was only silver – not “money” in the abstract – that consistently flowed eastward through Europe (e.g., Flynn and Giráldez 1997). Gold – also an important monetary substance [End Page 396] – flowed persistently from China to Europe, on the other hand, in exchange for silver during the world’s Potosí/Japan Cycle (mid-sixteenth to mid-seventeenth century) and again during the Mexican Cycle (1700–1750).¹⁰ Moreover, large quantities of copper – another monetary substance – were also shipped from Japan to Europe later in the seventeenth century. And for centuries cowries from the Indian Ocean were transferred to the Asian mainland, as well as via Europe (among other routes) to African markets. The world’s leading producer of cowrie money, the Maldives, indeed itself imported the silver *larin* to serve as its monetary standard. The analytical point is this: If a European trade deficit were to have caused the eastward flow of monies out of Europe – as is conventionally alleged – then a variety of European monetary substances should have convoyed in tandem to abstract “Asia.” The historical record contradicts this theoretical proposition. The world’s four main monetary substances – silver, gold, copper, and cowries – never flowed in tandem anywhere during the sixteenth- through eighteenth-century period. Rather, each of the world’s major monetary substances flowed independently to distinct regional markets that offered the best prospects for profit at particular times. The practice of aggregating various coins together into an analytical category labeled “money” has precluded understanding of patterns of production and distribution of individual monies the world over (Flynn and Giráldez 1997). It is for this reason that we have been forced to adopt a microeconomic model of individual monies; it is clear from historical evidence around the world that conceptual disaggregation of monies is required in order to achieve theoretical compatibility with historical

information concerning movements of individual monetary substances.¹¹
[End Page 397]

Throughout the seventeenth century, Pacific galleons carried two million pesos in silver annually (i.e., more than 50 tons) from Acapulco to Manila, whereupon Chinese merchants quickly transshipped it to China¹² (Chuan 1969, 79; Flynn and Giráldez 1995b, 82). Why has no one argued that the direct, Pacific flow of American treasure to China was caused by a Mexican balance-of-trade deficit with “Asia”? That is, why does no one maintain that this Pacific drain of silver was caused by dynamic Mexican demand for Asian products (in the face of stagnant Asian demand for Spanish-American output)? There is no theoretical justification for treatment of Latin America differently from Europe in terms of demand-and-supply mechanisms, yet exports of the exact same product to “Asia” (i.e., China) – silver – are not portrayed similarly in the literature.

Historical evidence also forces us to reject the conventional depiction of early-modern monetary flows in East-West terms. Japan was the source of a substantial fraction of world silver production during the 1540–1640 silver cycle, for instance, and the vast majority of Japanese silver was also exported to China (for the same profit-motivated reasons that attracted American silver) (Flynn 1991). Chinese gold counterflowed to Japan from the mid-sixteenth to the mid-seventeenth centuries (just as Chinese gold counterflowed to Europe and America simultaneously).¹³

Japan’s production of precious metals is therefore closely related with the history of colonization and the Far Eastern trade of Europeans. It is probable that the bringing of huge amounts of silver from Mexico for the China trade, the similar import of silver from India, and the carrying of gold from Southeast Asia to Europe were also basic factors in the development of relationships between the values of precious metals in the sphere of Far Eastern trade. (Kobata 1965, 247) [End Page 398]

Once Japanese silver mines played out during the last third of the seventeenth century, however, then Japan became an important *exporter* of gold and also (as previously mentioned) of copper as well. (Recall that Japan imported gold from China during the 1540–1640 cycle!) The point once again is that each monetary substance clearly responded to distinct supply and demand forces around the globe. The theoretical practice of aggregating diverse monetary substances into a category called “money” has shackled attempts to understand the histories of individual monetary substances in global (as opposed to a nation-state) perspective. Moreover, sweeping statements about intercontinental flows of monetary substances over the centuries are fraught with danger. In addition to specification of the particular monetary substance under discussion, the analyst must state

explicitly the time period under consideration. As mentioned above, for example, Japan was an importer of gold up to the middle of the seventeenth century, but an exporter of gold late in the seventeenth century. Failure to pay attention to periodization has led to widespread misunderstanding in global monetary history.

The Potosi/Japan Silver Cycle (1540s to 1640s) and Demand-Side Forces Within China¹⁴

Between 1514 and 1662, the people and government of China were involved in, and affected by, the first stages of the development of a “modern world system.” This involvement was implemented via the sea routes linking all continents except Antarctica and Australia in exchange of trade goods, food plants, diseases, people, and ideas. (Wills 1998, 333)

The deterioration of Ming China’s paper money system by the middle of the fifteenth century led to a protracted conversion to silver-money and silver-taxation systems in China during ensuing centuries. China contained a substantial fraction of world population, with cities many times the size of London or Paris, so it is not surprising that China’s [End Page 399] “silverization” fostered immense global repercussions.¹⁵ F. W. Mote (1999, 745) cites Chinese population at 155 million in 1500, 231 million in 1600, and 268 million in 1650, the latter amounting to something over one-third of world population at that time.¹⁶ It was demand-side pressure within China that caused silver’s value in China to double its value in the rest of the world during the first half of the Potosí/Japan silver cycle.¹⁷ Lofty prices in China in turn attracted silver from all corners of the world. The 1540s witnessed discovery of rich silver mines in Japan as well as the justifiably world-famous “silver mountain” of Potosí (1545, in modern-day Bolivia).

Since silver was durable, of high-value, and familiar to market participants throughout the world, merchants could acquire silver stocks relatively easily. Silver was simply purchased cheaply in markets such as Amsterdam and sold at successively higher prices the closer the market proximity to China. There is ample evidence that American silver flowing into India was reexported to China and Southeast Asia in exchange for exports from these regions (Chaudhuri 1978, 160); and the purchasing power of silver within India was influenced, not only by inflows via Eurasian trade routes, but also by flows of silver through the Pacific trade route (Chaudhuri 1978, 180). When trade between European and Asian centers is viewed in a product-by-product context – as opposed to the monetary aggregation inherent in the trade-deficit orthodoxy outlined above – it becomes clear that production issues were more complex on the Chinese side of the trading relationship than on the European side.

China's importation of seemingly endless quantities of silver necessitated Chinese exports of an equivalent value in nonsilver products. But Chinese exports of silks and ceramics, for example, involved greater complexity than did European silver exports. The production of raw silk was relatively inelastic in the short run, according to Elvin (1973, 283), because increases in output required bringing new mulberry [End Page 400] trees to maturity. And while it is true that for "more than a thousand years Chinese porcelain was the most universally admired and most widely imitated product in the world" (Finlay 1998, 143), distant markets could be temporarily glutted with imports from China, creating severe commercial problems for merchants. Silver did not face the same level of uncertainty when entering China, on the other hand, because China's vast reservoir of silver could not normally be disrupted so violently by the presence or absence of a few shipments of the white metal (although individual merchants could certainly be devastated by interruptions of silver shipments). Essentially, European (and other) merchants only had to ship standard forms of the white metal to markets that offered higher prices the closer the proximity to China. ¹⁸

Scholars of European commerce in Asia understandably emphasize the fact that European ventures in Asia were exceedingly profitable at times. And the existence of lively European profits indeed makes perfect sense in light of silver's unusually high price in China relative to anywhere else. But we should keep in mind that massive Chinese silk exports were swapped directly for China's silver imports, and these Chinese silks also commanded exceedingly high prices in foreign markets compared with China's domestic market. ¹⁹

For the Chinese, European-controlled ports held a twofold attraction. They were convenient new centres of international trade, particularly as sources of the American and Japanese silver much needed in China. And they provided a relatively stable environment in which Chinese could grow wealthy and even influential without ceasing to be Chinese. Batavia, Manila, and their satellite cities (Dutch Malaka, Makassar, and Samarang; Spanish Ilo-Ilo and Zamboanga) became centres of Chinese commercial networks, which encouraged even those Chinese [End Page 401] living in Asian-ruled states to maintain their Chinese identity. (Reid 1993, 318)

Our point is simply that we know of no evidence to suggest that European traders in Asian waters achieved profit rates higher than those gained by Asian merchants involved in intra-Asian or intercontinental trade. ²⁰ In the second half of the sixteenth century, for example, merchants from Fujian prospered: "... in ordinary years gross profits on trade between China and Japan or Southeast Asia were about 100 to 150 percent for high-value bulk goods such as silk and silk wovens, and 200 to 300 percent on low-value bulk goods such as sugar... One might expect annual net returns on capital to have been at least 30 to 40 percent in ordinary years" (Vermeer 1999, 75-76).

In other words, the 1540s-1640s period of heavy arbitrage profits in the world silver market coexisted with heavy arbitrage profits in the markets for silks, ceramics, and other nonsilver products as well. ²¹

For want of a better phrase, it may be more accurate to think of the 1540s-1640s phase as one of “multiple arbitrage” rather than simply “arbitrage.” Silver did indeed flow relentlessly toward its high market in China in search of arbitrage gains, but Chinese exporters sought out (with equal relentlessness) lucrative foreign markets for silks and other Chinese exports.

What should be emphasized is the fact that by 1500 the population of the Ming empire probably exceeded 100,000,000 and the Ming economy was once again beginning to expand with some vigor. With domestic production of bullion clearly insufficient to meet that economy’s monetary needs, it is hardly surprising that foreign traders found Chinese demand for silver almost insatiable when they appeared off the country’s southeastern coast during the sixteenth century. Fortunately for the Chinese, of course, foreign demand for Chinese goods was equally intense and an extraordinary expansion in commercial activity ensued. (Atwell 1982, 79) **[End Page 402]**

We focus on the silver component of the arbitrage process, not because silver was the only product purchased cheaply in one market and sold dearly in another, but because monetary history in general (and the silver market in particular) provides clear evidence of global market linkages over the past five centuries.

Equilibration in the silver market occurred by 1640 in two senses. First, the accumulation of tens of thousands of tons of American and Japanese silver on world markets had finally depressed silver’s price – despite buoyant Chinese demand-side pressure – to its cost of production. ²² This phenomenon was emphasized in Adam Smith’s *The Wealth of Nations* in 1776: “Between 1630 and 1640, or about 1636, the effect of the discovery of the mines of America in reducing the value of silver, appears to have been completed, and the value of that metal seems never to have sunk lower in proportion to that of corn than it was about that time” (Smith 1776, 192).

Second, the transshipment of a high percentage of this silver to China was responsible for eventually lowering the price of silver within China to the price level existing elsewhere in the world. The clearest evidence in support of this elimination of silver arbitrage is the convergence of bimetallic ratios globally by the 1640s. Convergence of bimetallic ratios occurred because even China’s vast demand for silver was eventually offset by immense imports of the white metal. About ten thousand tons in silver were exported out of Japan and into China in the late sixteenth and early seventeenth centuries, according to Yamamura and Kamiki (1983, 351). And the Manila galleons alone carried over 50 tons of silver annually to China throughout the

seventeenth century (including the last third of that century, after Japanese silver-mine production subsided).²³ Even larger quantities of silver had reached China via the Atlantic and through European intermediaries. The portion passing through the Baltic on its way to the Far East [End Page 403] amounted to over 50 tons of silver annually during the seventeenth century, according to Attman's (1983, 12, 103) conservative estimate.²⁴ Large volumes also passed through the Mediterranean and the Ottoman Empire by land and sea en route to China (Flynn and Giráldez, forthcoming). And of course large quantities of silver rounded the Cape of Good Hope en route to China.²⁵ The end result of many generations of Chinese accumulation of silver stocks was that the value of silver in China finally descended to its value in the rest of the world by the 1640s.²⁶

Market equilibration from the 1540s to 1640s involved serious repercussions for private traders and governments the world over. The long-term fall in silver's price (at a rate of a little over one percent per annum) – in conjunction with rising mining costs – gradually squeezed profits in the private sector. Since direct and indirect taxation of the silver industry financed the Spanish Empire, efforts to maintain (and increase) Crown revenues forced private traders to intensify smuggling activity in order to survive.²⁷ By the time silver's value had finally declined to its cost of American production around 1640, silver mining profits had been reduced to a level no greater than those common in other sectors. Since extraordinary silver profits from America had provided the fiscal foundation of the Spanish Empire, elimination of excess profits from silver mines necessarily implied a decline in Spanish power (Flynn and Giráldez 1996b). China's immense demand-side [End Page 404] "silver sink" had supported Spain's rise as a world power, in other words, but even the world's greatest demand-side force could not prevent the eventual fall of silver's price to its cost of production.

The entire world economy was entangled in a global silver web. Millions of pesos in Peruvian silver were smuggled annually down the so-called "back door" of the Andes to the Atlantic ports of Buenos Aires and Sacramento during the Potosí/Japan silver cycle. This smuggled silver – eventually destined for the Chinese marketplace, of course – was exchanged mainly for (smuggled) African slaves; evidently something far more complex than "triangular trade" was at work here. Even the transatlantic slave trade was connected to monetary events within China.

In addition to the deleterious effects of falling silver-trading profits throughout the world – forcing merchant entities to battle over shrinking trade profits – Goldstone (1991, Chapter 4) suggests that the fall in silver's purchasing power also contributed to decline of both the Ottoman and Ming empires. As was true for the Spanish crown itself, sixteenth-century Ottoman and Ming governments had converted tax receipts to a fixed quantity of silver

(away from tax systems based upon a percentage of market activity). Perhaps an effective expedient in the short run, this conversion to fixed silver receipts was disastrous in the long run. The slow but relentless decline in silver's value (up to the 1640s) implied reduced real purchasing power for governments that collected taxes in terms of fixed quantities of silver. In short, the declines of Imperial Spain, the Ottoman Empire, and the Ming dynasty by the 1640s were all linked to the global silver market. The rest of the world (including Africa) was likewise directly and indirectly affected by global marketplace connections, but exploration of the nature of these connections must await another occasion. The point we wish to emphasize here is that virtually everyone was in the game in some way – including miners, merchants, slaves, governments, ranchers in Argentina, religious leaders, peasants throughout the world, and many others. Indeed, legacies of global economic linkages that emerged by the end of the sixteenth century are visible yet today.

The Mexican Silver Cycle (1700–1750) and American Crops

Three changes occurred in the eighteenth century that set the course of China's subsequent history. The change that has received the most scholarly attention is the solid establishment of Europe's presence. But two other changes may prove to have been of greater significance in the long run. One of these was a doubling of the territorial size of the [End Page 405] Chinese empire. The other was a doubling of the Han Chinese population. The interplay of these three factors has set the direction of China's history in modern times. (Fairbank 1978, 35)

The eighteenth-century silver cycle followed the formula established by its 1540s–1640s predecessor, but it also involved shocking environmental dynamics. China's population increased dramatically during the eighteenth century at a time when its cultivated acreage expanded by perhaps half (Wang 1992, 65).²⁸ According to Spence (1990, 95), much of China's "population growth in the eighteenth century was speeded up by a massive ecological change: the introduction of new crops into China from the New World" (sweet potatoes, peanuts, and maize). Bray (1984, 532) stresses the "rapidity with which the sweet potato spread throughout China in the seventeenth and eighteenth centuries... By the eighteenth century it was grown in all the Yangzi provinces, and Sichuan had become the leading producer; by 1800 it accounted for almost half the year's food supply of poor Shantung." In terms of American crops generally: "Most were introduced first to the eastern coast provinces, especially Fukien, probably through the intermediary of Chinese settlers in the Philippines and other Pacific islands, and spread rapidly inland from the coast. Another route was overland

through Burma and Yunnan by the mid sixteenth century. Peanuts were already listed as a local product of Chang-shu county near Suchou in 1538, while sweet potatoes were in cultivation in Fukien and Yunnan by the mid sixteenth century” (Bray 1984, 427–428). New World crops spread into northern Fujian before 1700. Adshead (1988, 284) argues that the Philippines comprised a major vector for the spread of these revolutionary New World crops: “As this area [northern Fujian] was in contact with Manila, and the Cape route had not yet established its pre-eminence, the Pacific seems the most likely course for it to have followed. Where maize grew on sunny hillsides, sweet potatoes on shady, and peanuts on sandy bottomland...”²⁹
[End Page 406]

So it is known that American crops – at least partly introduced through the Philippines trade vector – helped create a demographic surge in eighteenth-century China. This population surge involved interregional migration on a grand scale spurred by cultivation of new regions like Sichuan, the Yangzi highlands, the Han River region, and elsewhere (Ping-Ti Ho 1959, 268). These population dynamics were related to increased commercialization of the economy and further ecological changes. New World crops also created important demographic consequences in other parts of the world, including Africa, Europe, as well as Pacific islands such as New Guinea (Diamond 1997, 149), so why focus on China? We emphasize China’s demographic and economic growth because the Chinese economy had been “silverized” long before its eighteenth-century surge in population. In simple terms, China’s eighteenth-century population and market growth implied yet another immense increase in China’s demand for silver. It was this resultant demand-side pressure that caused the value of silver within China to spike some 50 percent above silver’s price in the rest of the world. Along with supply-side dynamics within Mexico’s mining industry, China’s demographic revolution was responsible for the world’s second silver boom during the first half of the eighteenth century.

More Spanish American silver was produced in the eighteenth century than in the sixteenth and seventeenth centuries combined (Fisher, 1998).

Mexican [silver] industry experienced a boom in the first quarter of the [eighteenth] century that was followed by successive spurts of growth that propelled registered output between 1801 and 1810 to over 200 million pesos, more than four times the amount for 1701–10. Although Peru’s production more than tripled in the eighteenth century and even surpassed its seventeenth-century apogee, Mexico’s production was well over twice as large as Peru’s for most of the 1700s. (Burkholder and Johnson 1998, 140)

There has been vigorous debate over the supply-side cause of this mining resurgence. Some attribute the mining surge to spontaneous market forces,

while others emphasize deliberate attempts by the Crown to promote the mining sector (Fisher 1998). Without wishing to diminish in any way explanations based on Mexican supply-side considerations, we wish to also focus attention on the Chinese demand side of the silver market. When viewed from a global perspective, in other words, demographic and economic changes in China must be integrated into the story. Already huge and silverized, the Chinese market for silver must have increased dramatically in size during its population expansion [End Page 407] during the eighteenth century.³⁰ Whatever the exact magnitude of the increase in silver demand, it was evidently sufficient to raise the value of silver in China above the level existing in the rest of the world. Reference has already been made to von Glahn's (1998, 57) review of Chinese sources: "In the first half of the eighteenth century the gold:silver ratio in China remained fairly constant at 1:10-11, in contrast to a ratio of 1:15 in Europe..." These ratios indicate that early eighteenth-century growth in demand for silver in China was sufficiently powerful to propel silver's value 50 percent above its European counterpart. Reminiscent of the Potosí Cycle of the 1540s-1640s – when the value of silver in China was (at times) 100 percent higher than that of the rest of the world – the premium price within China this time induced a Mexican (and Peruvian) silver-production boom in the eighteenth century. And once again, there was a worldwide scramble to transport massive quantities of the white metal to China. Arbitrage profits *per ounce of silver* must have been smaller during the eighteenth-century Mexican Cycle than had been the case during the earlier Potosí/Japan Cycle, but quantities shipped were much greater the second time around. Overall profit per ounce of silver was likewise no doubt smaller in the eighteenth century than in the earlier period, but, again, the quantity of silver produced was far greater.³¹ It is not clear to us at this point which cycle produced the richer boom in terms of total profits. [End Page 408]

Predictably, the Spanish economy flourished during the eighteenth century. Rather than attempt to reestablish the vast empire of its prior "golden era" (a misnomer, since it was actually a "silver era"), Spain was content the second time around to, for the most part, simply sell its New World silver on world markets. Much of the eighteenth-century silver was again destined for China. India played an important role in this trade, but often as a transit route for silver traveling to China during the first half of the eighteenth century:³² "The inflow of silver into India from the Middle East and the Philippines and its re-export to the Far East, where it was exchanged for both commodities and gold were perhaps a perfect example of the bimetallic flows in world trade during this period" (Chaudhuri 1978, 181). Specifically, eighteenth-century silver flowed to Asia in the form of perhaps the most successful global monies in history – Mexican pesos. Half a billion *Dos Mundos* pesos were struck during the years 1732-72, according to Mexican Mint records,

while nearly 900 million Mexican “bustos” pesos were minted between 1772 and 1822 (Lopez Rosado 1975, 27). Among myriad coins competing for acceptance in the Chinese marketplace, the *Dos Mundos* and *bustos* pesos reigned supreme because of the quality and integrity of these coins. Altogether, well over a billion pesos were minted during the eighteenth century alone. Since the Crown mint normally collected one peso in eight in the form of seigniorage fees (not to mention myriad other taxes based upon the silver trade),³³ distant Chinese demand for pesos clearly stimulated Spanish Crown finances. It is no coincidence that the extensive royal buildings that grace Madrid today were constructed during the eighteenth-century Mexican Cycle of silver production. It is likewise no accident that Asian-European trade flourished once again during the eighteenth century, characterized in part this time by a European craze for *chinoiserie* and Chinese tea. Unprecedented quantities of silver again poured into China, at an even faster rate than during the Potosí/Japan silver cycle. Spain profited immensely from this trade, as did innumerable other European, Asian, American, and African entities that participated. [End Page 409] Importation of hundreds of millions of pesos in silver once again eventually saturated the Chinese marketplace, as before, to the extent that “from 1750 onward the gold:silver ratio in China leapt above 1:15, while in Europe it declined to 1:14.5–14.8” (von Glahn 1998, 57). China continued to import silver during the second half of the eighteenth century (as had been the case during the second half of the seventeenth century), but the profit rate per ounce of silver was modest compared with per-ounce profit rates during either the Potosí/Japan or Mexican boom cycles. The rapidity of the global business community’s response during the eighteenth century limited the tenure of the Mexican silver cycle to but half a century, but substantial *ordinary* profits continued to be generated while Mexican mines produced prodigious quantities of silver after the middle of the eighteenth century.

We ask readers to indulge a rather lengthy quote from Adam Smith, a contemporary observer who we believe understood well the process we are attempting to describe:

For some time after the first discovery of America, silver would continue to sell at its former, or not much below its former price. The profits of mining would for some time be very great, and much above their natural rate... Silver would gradually exchange for a smaller and smaller quantity of goods. Its price would sink lower and lower till it fell to its natural price; or to what was just sufficient to pay... [costs] in order to bring it from the mine to the market. In the greater part of the silver mines of Peru, the tax of the king of Spain, amounting to a tenth of the gross produce, eats up ... the whole rent of the land. This tax was originally a half; it soon afterwards fell to a third, then to a fifth, and at last to a tenth, at which rate it still continues. In the greater part of the silver mines of Peru, this, it seems, is all that remains, after replacing the stock of the undertaker of the work, together with

its ordinary profits; and it seems to be universally acknowledged that these profits, which were once very high, are now as low as they can well be, consistent with carrying on the works. (Smith 1776, 201)

By the middle of the eighteenth century, the vanishing of spectacular mining profits marked the end of the Mexican silver cycle.³⁴ But even [End Page 410] Adam Smith was perhaps too close to perceive a subsequent cycle that began unfolding during his lifetime.

The Tea and Opium Cycle

The trends outlined above help to clarify a sea change in foreign commerce in the middle of the eighteenth century in Asia. Silver-based trade at the global level was in trouble, while subsequently British entrepreneurship in Asia became increasingly influential in the global marketplace.

The western trade was thought to be in serious decline by the 1740s... The shift from west to east is perhaps an indication of the importance which the British were beginning to acquire in Asian trade at the end of the eighteenth century... After the conquest of Bengal, the wealth which the British acquired and the control which they won over some of Bengal's commodities, such as opium, enabled them to begin to carve out routes of their own. (Marshall 1976, 105)

The Battle of Plassey in 1757 led to British control of Bengal and represents a fundamental change in Asian trade patterns. British profits from the China trade solidified Britain's position "in the East during the three decades of the 1750s, 1760s, and 1770s," according to Furber (1976, 176), "decades of rising British power and of French and Dutch decline." The point we wish to emphasize is simply that so much silver had flooded into China by the middle of the eighteenth century, that super-profits had been (once again) eliminated. Traditional long-distance trade based upon silver suffered relative decline. Meanwhile, the British managed to gain control of a new, rapidly growing market involving the importation of Bengali opium into China in exchange, in part, for Chinese exports of tea. The point is not that silver discontinued its journey into China during the second half of the eighteenth century – it did not – but rather that opium and tea became the high-profit markets, with silver playing a complementary role in terms of profitability. According to Dermigny (1964, Vol. II, 688–689), during the first half of the eighteenth century silver comprised 90 percent of [End Page 411] the value of British exports to Canton, whereas for the 1775–95 period 35 percent of British exports to Canton were in the form of merchandise and only 65 percent in silver.

Dermigny (1964, Vol. 1, 432–433) refers to a "cycle of tea" in describing British trade in Canton from 1760 on. Furber (1976, 257) adds that "[t]raffic in opium did not greatly influence the course of the East India trade until it began to replace silver as the means of buying tea at Canton in the eighteenth

century." Furber (1976, 175) also states that the "key to all these developments lies in the ever-rising European demand, especially the British demand, for tea from the 1750s onward"; he specifies on the same page that London tea imports reached 2.5 million pounds by 1760, 9 million pounds by 1769-70, 14 million pounds in 1785-86, and 23 million pounds by the end of the century.

But in exchange for what was Chinese tea to be exported? We have already discussed the decline in profits associated with importing silver into China by the middle of the eighteenth century, and the fact that opium became an increasingly profitable Bengali export to China: ³⁵ "This [opium] traffic grew more than twentyfold between 1729 and 1800, which helped stanch the flow of bullion from Britain to China" (Pomeranz and Topik 1999, 103). But the Chinese history of opium consumption was itself linked to American tobacco introduced via the Philippines in the sixteenth century (Heijdra 1998, 552). Crude opium mixed with shredded leaves called *madak* was smoked, as was tobacco dipped in opium solution; Spence (1992, 233) considers "plausible" the suggestion that the smoking of pure opium in China began around the 1760s. Once again, an important biological exchange involved an American crop. This time, tobacco was tied to the consumption of opium, a more lucrative Chinese import (for the British) than was (complementary) American silver during the second half of the eighteenth century. It was Britain that took the lead this time around, squeezing out European competitors in the process:

[The Dutch East India Company, the VOC] was denied the profits the British company gained because they had to export silver from Europe to pay for their tea and porcelain purchases... The British had found a way of overcoming this problem by virtue of their [opium] position in India. (Trocki 1999, 42) [End Page 412]

So profitable was the British opium monopoly, according to Trocki (1999, 54), that the East India Company earned clear profit of at least 100 percent even on its sales in Calcutta to the Dutch. So significant were opium revenues in supporting the Indian state that they "ultimately constituted nearly 20 percent of the annual revenue of the Indian government" (Trocki 1999, 51). ³⁶ The British tea-and-opium connection itself was part and parcel of complex trade connections at a global level. English people consumed sugar with tea during this period, for example, which required importation of prodigious quantities of slave-produced sugar from the Americas (e.g., Sheridan 1974, Chapter 2).

The Brazilian gold discoveries of the 1690s also depended upon slavery. Passing through Portugal, Brazilian gold facilitated England's transition to a bimetallic gold-silver monetary standard after the 1717 reforms of Isaac Newton. English gold holdings partially supplanted British silver holdings, which facilitated the exportation of British silver to the rest of the world. Once again, the point is that complex global interconnections have existed for many centuries. Monetary history furnishes one useful vantage from which to view

such linkages, but commodity monies were exchanged for all of the nonmonetary commodities mentioned in this essay.

Conclusions

By the conclusion of the sixteenth century, use of the Mexican peso had become generalized in southern China, where more Mexican money circulated than in Mexico. The principal cause of this demand, without doubt, was that the Mexican peso contained a known content of silver; for this reason the captains of North American business employed Mexican pesos to purchase slaves on the west coast of Africa and to bring tea from China to the United States. The Mexican peso was utilized in all islands of the Pacific and the length of the coast of Asia, from Siberia to Bombay. Along the British coast of North America, the Mexican peso was the only money that the colonists accepted in exchange; this peso also inundated Europe, replacing the florin and other monies in current usage. (Lopez Rosado 1975, 32) **[End Page 413]**

It is useful to distinguish three interrelated strands in the argument of this essay: (1) silver quantities, (2) silver values, and (3) biological/ecological exchanges. While silver production quantities – in conjunction with demand-side considerations – influenced silver values, one must be careful to distinguish quantities from values. They are related, but distinct.

Progress in the quantification of precious metals and monetary history has been encouraging (e.g., see Nuñez 1998). Garner (1988, 900) estimates total Spanish-American mine output at over 3 billion pesos from the middle of the sixteenth century until the end of the eighteenth century. Interpretation of the significance of production numbers has been hampered, however, by a general failure to distinguish product quantities from product values. An important lesson from Adam Smith and other classical economists has been largely forgotten: “By the abundance of the American mines, those metals have become cheaper. A service of plate can now be purchased for about a third part of the corn, or a third part of the labour, which it would have cost in the fifteenth century” (Smith 1776, 415).

The massive silver production of Japan, Upper Peru, and Mexico caused a given quantity of silver production in one period to possess a lower purchasing power than that same quantity had possessed at an earlier time. The purchasing power of silver declined continuously during silver’s 1540s-1640s Potosí/Japan Cycle. As mentioned in the Adam Smith quote above, silver lost about two-thirds of its purchasing power during that period. In other words, there was a general price inflation of about 300 percent in silver-content terms during the Price Revolution. Therefore, when the value of silver did greatly exceed the cost of producing silver in the middle of the sixteenth century – thanks in large part to demand emanating out of China – per-unit profits in the silver industry were immense for many decades.

Entrepreneurs and government bureaucrats worldwide immediately recognized commercial opportunities, which caused silver production and its transshipment to explode on a scale never before experienced in human history. The mining boom depressed silver's value eventually, of course, whereupon excess per-unit profits were slowly squeezed out over time. Profit levels were maintained by raising production rates in some cases, but this response simply raised global output and exacerbated downward pressure on silver's price (thus reducing per-unit profits). Governments and companies were thereby forced to alter strategies when confronted by market dynamics, depending upon the extent to which per-unit silver profits had declined at a particular time. Elimination of "economic profit" by around 1640 caused tremendous stress for a multitude of entities [End Page 414] engaged in the silver trade worldwide.³⁷ The same profit-decline argument applies during the 1700–1750 Mexican Cycle. This is one of the reasons that periodization of silver's history into profit/arbitrage cycles is a useful organizational device.

Assuming for the moment that the reader accepts the general outlines of our argument thus far, s/he might still object that we are overstating the importance of global trade during these centuries. Several authors state that foreign trade comprised a small fraction of individual countries' Gross Domestic Products (GDP) during these centuries; foreign sectors therefore could not have decisively influenced domestic developments on the scale suggested herein. O'Brien (1997, 77), for example, states:³⁸

... the interconnections across continents and countries down to the middle of the nineteenth century seem limited. Before 1846 ratios of exports to production and imports to national consumption probably remained in the 1–2 percent range for the majority of European countries. Even for small maritime powers, such as Britain, Portugal, and Holland, ratios of trade to income fell below 15 percent.

... Producers and traders the world over remained not merely insulated from foreign rivals but also protected by transportation costs and barriers of many kinds from competition even within national boundaries. Local and regional price structures survived well into the second half of the nineteenth century.

On the contrary, there were highly developed global trade networks for silver, gold, copper, cowries (e.g., Flynn and Giráldez 1997), as well as for porcelain (e.g., Finlay 1998), silks (e.g., Ma 1999), and many other products. This is not the place to continue this argument, but our allusion above to the interchange between intercontinental trade and ecological exchanges alone forces us to reject the trade-GDP-ratio line of reasoning advanced by O'Brien and other economic historians.³⁹ Trade [End Page 415] and ecological activities are components of a single global network. It is dangerous and misleading to analytically bifurcate this global network into separate economic and ecological components because in doing so one risks losing sight of the global unity of the general system.

The introduction of American crops into China furnishes a good example of how convoluted are some mixtures of international trade and domestic environmental conditions. Previously unavailable American crops fundamentally and permanently altered the basic structure of China's economy and society. Not only did these crops promote significant growth in China's population, but they also generated heavy internal migration into non-rice-producing regions of China previously considered to be remote areas. Thus, ecological byproducts of international trade were responsible for literally transforming the Chinese landscape. Moreover, introduction of American crops into Europe, Africa, Southeast Asia, Pacific Islands,⁴⁰ and elsewhere also caused permanent alterations in the landscapes of societies around the globe. We concentrate here on the world's largest economy in China, but are aware that global trade was simultaneously connected to many structural changes worldwide that lie beyond the scope of this essay.

It is important to also keep in mind that China's importation of hundreds of millions, indeed billions, of pesos in silver during the past five centuries implied Chinese exports of an equivalent value of silks, ceramics, tea, and other products. Such massive exports forced additional restructuring of the Chinese economy. Marks (1997, 1999) has recently documented how long-distance trade (both domestic and international) caused specialization of production by region throughout China. That is to say, the full story is much more complex than simply exporting silks and other products in exchange for Japanese/ Spanish-American silver imports. These global circuits of exchange interacted with circuits normally considered local or regional in scope. Augmented silk exports from Jiangnan, for instance, implied the devotion of more land there to mulberries, which means increased rice coming [End Page 416] down river from Hunan to feed mulberry growers. The point is, global trade transforms local ecologies, a central message in the work of Marks and others. China was transformed as a result of interaction with a global network; international trade as a percentage of GDP alone is a poor indicator of the complex global relationships involved.

Crosby's (1972, 1986) pioneering works on biological exchanges at the global level imply trade-and-ecology interactions all over the world. It must be true, for example, that the small number of cattle first introduced to the Americas comprised but a fraction of any European or American GDP, but it is difficult to imagine the landscape of, say, Argentina subsequently in the absence of these nonnative animals. The value of sugar plants first introduced into the Americas was no doubt a negligible fraction of any country's GDP, yet we doubt that anyone would argue that sugar cultivation was unimportant in the economic history of the Americas. The same could be said about the introduction of oranges into the Americas by Spaniards, or the spread of innumerable crops and diseases accompanying the explosion of global trade

networks since the sixteenth century. Smallpox may have been transmitted by an individual (or small number of individuals) from Europe into the Americas, yet its demographic and economic impacts were both catastrophic and immense. The global economy is inextricably intertwined with ecological and epidemiological factors with important feedback mechanisms into economic spheres.

It may be tempting to view a remote mining center like Potosí – at an altitude above 13,000 feet and a thousand miles (2.5 months by pack animal) distance from Lima on the Pacific – to have been relatively detached from other areas of South America. Helmer (1953, 206) informs us, however, that around 1610 Tucuman in Argentina sent timber, 4,000 cattle, and 60,000 mules *per year* to Potosí (some 600 mountainous miles away) in support of that mining city of 160,000 people. The fact is that the economies of most of South America, Central America, and Mexico were deeply affected by the silver industry, an industry with economic tentacles penetrating into the social fabric of all populated continents.

The intercontinental trade in monies – silver, gold, copper, and cowrie shells – involved people of all classes, not just the rich. The Single Whip tax reform in China during the 1570s, for example, replaced numerous taxes with a single tax, while also specifying that most Chinese (including peasants) must pay taxes annually in silver. Conversion to a silver system was also strong in relatively sparsely populated Southeast Asia: **[End Page 417]**

One way or another silver had become irresistible as the effective international currency of Southeast Asia by about 1630, whether in rials, as in most of the island world, or in weight. In spite of the status the royal gold coins had, the rulers themselves came to expect taxes and fines to be paid in silver. The triumph of silver undoubtedly furthered the integration of Southeast Asia into a world economy. (Reid 1993, 107)

Southeast Asia also imported volumes of Chinese copper cash as well as lead *picis* as local media of exchange (Kathirithamby-Wells 1993, 133); most of the silver gravitated to the giant Chinese marketplace.

The seventeenth century is sometimes referred to as the “copper century” in European monetary history because copper monies played such a prominent role. Yet Japanese copper was shipped to Europe as a tax-free ballast item. Vast quantities of cowries were likewise shipped to Asia, and also to Europe as ballast at tremendous profit. Europeans transshipped cowries to Africa where they served as money for common people all the way into the twentieth century. By 1720, Europeans were importing and reexporting around a million pounds weight in cowries per year, equal to approximately one-third of the value of the 20,000 African slaves exported annually at that time (Johnson 1970, 21). And none of the four main global monies was used

exclusively by one social class; the mutinous Spanish army in Flanders, for example, insisted on payment in gold during Spain's 80-year war with the Dutch in the late sixteenth and early seventeenth centuries (Parker 1975, 154). According to Reid (1988, 96), neither was gold used exclusively by the rich in Southeast Asia:

With some exceptions Southeast Asian states did not mint gold or silver coins as currency. The cost of a purchase was instead weighed out very carefully in gold and silver... Every Filipino carried a small scale for this purpose, and Tagalogs surprised the early Spaniards by taking out their touchstones and checking the quality of the gold offered for even a small purchase of food.

A comment by Wallerstein (1980, 109) some two decades ago seems prescient in terms of the subsequent work in monetary history outlined above: ⁴¹ "Had the bullion of the Americas *all* flowed out to Asia, the Americas would have been just another external area [i.e., not periphery] [End Page 418] and Europe would have been merely an axis of three arenas – America, Europe, and Asia – obtaining its Asian luxuries at the price of goods sent to the Americas." It turns out that most New World silver did in fact gravitate to end-markets in Asia. And Europe was one axis of four arenas, not three, if African imports and exports are properly integrated into the story. The fact is, division of the world into independent cores with their exclusive peripheries simply does not correspond with global trade evidence. Nor is Wallerstein's labeling of Asian exports as "luxuries" accurate; it is misleading to label cowries, copper, low-quality silks, teas, and many ceramics as luxury items. ⁴² Indeed, Wallerstein's (1974, 302) exclusion of Asia from his isolated European world system contrasts sharply with the singular global trade system outlined in this essay. Our research suggests (a) that global trade networks involved Europeans as important middlemen in the trade of American and Japanese silver destined mainly for China, and (b) that deeply integrated trading relationships involved biological exchanges that led to fundamental restructuring of societies throughout the world.

Our analysis is mostly compatible with the vision proposed in Andre Gunder Frank's controversial *ReORIENT* (1998). Yet, we disagree with Frank's contention that China was *enriched* as a result of its importation of silver. We argue (Flynn and Giráldez 2000) that China's multicentury absorption of tens of thousands of tons of foreign silver involved an immense *drain of wealth* from Chinese society. ⁴³ Our argument essentially states that the multicentury "silverization" of China involved substitution of a resource-using money (silver) in place of a money that had been nearly costless to produce (paper); China's immense exports (of mainly nonmonetary items in exchange for silver imports) can be viewed as a measure of the social cost of maintaining a silver-based economy. Ironically, acceptance of our position that China's silver imports involved immense social costs, rather than social benefits,

actually supports Frank's main emphasis on the global economic significance of China prior to the nineteenth century. China's ability to absorb the immense cost of converting its monetary and fiscal [End Page 419] systems from paper to silver – while nonetheless remaining the world's dominant economy for centuries – underscores the scale of the Chinese economy as global juggernaut.

This essay eschews discussion of the Industrial Revolution, yet one aspect does relate indirectly to Kenneth Pomeranz's *The Great Divergence* (2000). A central argument of *The Great Divergence* is that all advanced societies across the Eurasian landmass faced severe resource depletion during the eighteenth century. It was unclear that any of them could have managed to even maintain existing living standards in the absence of ecological relief. England found relief from its resource bottlenecks due to access to crucial resources of the Americas. No comparable reserve of untapped resources was available for advanced regions elsewhere, including East Asia. A "great economic divergence" resulted. Our essay pertains to the resource constraint portion of Pomeranz's argument in that East Asia (and the rest of the world) did, in a sense, have access to American resources. Rather than importing sugar, timber, and other colonial products – as did England – China instead imported seeds that transformed its domestic economy. The importation of American foodstuffs – not in the form of final products, but as self-replicating productive inputs – relaxed resource constraints within China; formerly unproductive domestic lands became productive. Pomeranz goes on to argue that the availability of maize (of American origin) permitted extensive logging in remote areas of China, on the other hand, and therefore facilitated further deforestation there. Some Chinese resources were augmented, in other words, while other resources were further depleted in the process. We leave it to Pomeranz and other experts to elucidate the net effects of global trade on the resource bases of specific societies. Our work in global monetary history, however, suggests that world trade history should be viewed as a component of a vast, complex, and organic world system. It is difficult to make sense of regional comparisons without first recognizing that global interconnections continue to alter the underlying characteristics of specific regions; simultaneously, global connections depend upon regional distinctiveness.

Notes

- * An early version of this paper was presented at a conference in October 1999 at the University of California (UC), Davis – "On the Origins of the Modern World: Comparative Perspectives from the Edge of the Millennium" – organized by Jack Goldstone, and sponsored by the All-UC Group in Economic History, the Division of Social Sciences, and the

Center for History, Society, and Culture at UC Davis. A subsequent version was presented in Boston at the Ninth International Conference of the World History Association in June 2000. We are grateful to a number of scholars who criticized versions of this essay, including Sushil Chaudhury, David Christian, Jan de Vries, Oscar Geldenblom, Jack Goldstone, Seong-ho Jun, Akinobu Kuroda, Jay Lewis, Brian Moloughney, John Marino, Robert Marks, John R. McNeill, Ken Pomeranz, Fred Spier, Kaoru Sugihara, Richard von Glahn, and an anonymous referee. The authors alone are responsible for remaining errors.

1. Terms like “Western,” “European,” and “Asian” are used here in conventional – although logically questionable – ways. See Lewis and Wigen (1997) for criticism of unscientific geographical terminology in numerous scholarly fields.
2. Emphasis on early Asian development was proposed by prominent scholars of Asian history, such as Balazs (1964), Elvin (1973), Needham (1955–86), and others, as well as world historians like Abu-Lughod (1989) and McNeill (1982). The recent wave of revisionism includes Blaut (1993), Frank (1998), Goldstone (1998), Marks (1997), Pomeranz (2000), Sugihara (1996), von Glahn (1996a), Wong (1997), and many others. Goldstone (2000, 178–180) labels a subset of the new wave of revisionism the “California School.” See Landes (1998) for a recent restatement of the conventional “European exceptionalism” argument.
3. Our logic for specifying 1571 as the birth of global trade is contained in the following excerpt (Flynn and Giráldez 1995a, 201): “For our purposes, global trade emerged when all important populated continents began to exchange products continuously-both with each other directly and indirectly via other continents – and in values sufficient to generate crucial impacts on all the trading partners. It is true that there was important intercontinental trade before 1571, but there was no direct link between America and Asia, so the world market was not yet fully coherent or complete.”
4. A look at gold and silver prices today helps clarify the usefulness of bimetallic ratios as indicators of the value of silver. Assume that the price of gold today is \$300/oz and the price of silver is \$5/oz. This means that gold is fifty times more valuable than silver; the bimetallic ratio would therefore be 60:1. If the price of silver were to double to \$10/oz, however, while the price of gold remained the same, then gold would only be 30 times more valuable than silver; the bimetallic ratio would fall to 30:1. Clearly, a fall in the bimetallic ratio implies a higher value of silver relative to gold. Therefore, a 6:1 bimetallic ratio in sixteenth-century China

does indeed imply that silver was twice as valuable there as in Europe (and elsewhere) where the bimetallic ratio was 12:1.

5. See, for example, Yamamura and Kamiki (1983, 352). Atwell (1982, 82) shows clearly that bimetallic ratios in China, Japan, and Spain had converged by 1644.
6. See Flynn (1991) for discussion of the arbitrage versus nonarbitrage phases of the global silver trade. Essentially, the silver trade yielded unusually high profits between 1540 and 1640 and again between 1700 and 1750, compared with more pedestrian profit rates before and after these two silver cycles.
7. These figures are consistent with those reported by Dermigny (1964, Vol. 1, 431), whose bimetallic ratios for China are 1:9.5–10 from 1700 to 1720, 1:11.83 around 1740, 1:14.15 around 1750, and 1:15.20 in 1775.
8. Both of these statements can be found in Edwin Cannan's note 142 in Adam Smith, *An Inquiry into the Nature and Causes of The Wealth of Nations* (1994 [1776]), 238.
9. The same type of reasoning can be found in Landes (1998, 155), who says the eighteenth-century "European appetite for Chinese goods grew rapidly... [which] posed a payments problem. The Europeans would like to pay with their own manufactures, but the Chinese wanted almost nothing they made... So the Europeans paid in bullion and specie..." Similarly, Spence (1990, 129) states that "the growing demand in Europe and America for Chinese ... goods had not been matched by any growth in Chinese demand for Western exports... The result was a serious balance-of-payments problem for the West." We cite these particular authors, not to single them out for criticism, but because the words of these prominent historians represent received thinking on the subject of global monetary flows.
10. Another example of gold flowing in the opposite direction of silver involves Asian gold flowing via the Acapulco-Manila galleons to America: "Cavendish found to the value of 658,00 livres of it [gold] upon the galleon that was sailing toward Mexico" (Raynal 1772, 205). K. N. Chaudhuri (1978, 156) has long recognized the need to conceptually separate intercontinental movements of gold from intercontinental movements of silver. Chaudhuri urged a return to the reasoning of Classical economists like David Ricardo; the model presented in Doherty and Flynn (1989) follows in this Classical tradition.
11. In a recent issue of this journal, Vries (2001, 415) mischaracterizes us in saying that "Pomeranz ... subscribes to the thesis of Flynn and Giráldez that the silver that the Europeans exported should not be regarded as

- money but as just some economic good, one that many Asians, especially Chinese, wanted desperately and that the Europeans were glad to sell, as it earned them huge arbitrage profits.” In fact, silver flowed to China in both monetary and nonmonetary forms. We have never claimed that silver should not be considered money; rather, we insist that silver responded to demand and supply pressures both in its nonmonetary – *as well as* its commodity-money – forms.
12. It is worth noting that 2 million pesos in silver per year equals the combined quantity of silver shipped from Europe to Asia by the Portuguese *Estado da India*, the Dutch VOC, and the English East India Company *combined* during the seventeenth century. (See Flynn and Giráldez, 1995b, for calculations.) Scholarly neglect of this vast trade across the Pacific for centuries is yet another example of a systematic failure to view economic events in global terms.
 13. Note that Chinese exports of gold were small relative to Chinese silk and ceramic exports. We call attention to the direct and protracted exchange of gold for silver in order to emphasize the futility of conceptually combining gold and silver as a singular product called “money.”
 14. Although Japanese silver production was exceedingly important during the 1540s- 1640s global cycle, we refer to this period as the “Potosí-Japan cycle” simply to indicate that Upper Peru (Bolivia today) was unquestionably the leading silver producer in the world at that time. See Barrett (1990) for a survey of works on world bullion flows from 1450 to 1800.
 15. Because of China’s extensive tributary system, domestic silverization created a ripple effect reaching far beyond Chinese borders. Hamashita (1994, 97) summarizes this relationship: “The entire tribute and interregional trade zone had its own structural rules which exercised a systematic control through silver circulation and with the Chinese tribute trade at the center. This system, encompassing East and Southeast Asia was articulated with neighboring trade zones such as India, the Islamic region and Europe.”
 16. Although Mote’s population estimates are probably as good as any, other scholars furnish quite different numbers. Uncertainty about such demographic matters suggests caution here.
 17. See von Glahn (1996a) for a classic explanation of Chinese monetary history between 1000 and 1700.
 18. Silver was not itself homogenous, of course, and particular types of silver dominated trade circuits ending in China. Probably the single most successful money in history, for example, were the Mexican *Dos Mundos*

- and *bustos* pesos, by far the dominant form of silver entering China during the eighteenth century (Perez, 1955). Flynn and Giráldez (2000) state that Spain's global monetary policy was rational from the sixteenth through the eighteenth centuries; the Crown profited both by debasing its domestic currency and by refusing to debase the most successful of all global monies, its peso. Combined seigniorage profits were immense.
19. Borah (1954, 122), for example, cites a letter written to Philip II in 1594 from Lima that claims that Chinese silks were sold for one-eighth the price of comparable Spanish silks in Peru. This price disparity is probably an exaggeration (but 3-to-1 price advantages are common in the literature), especially in view of the fact that Chinese silk prices in Spanish America were high compared with Chinese silk prices in Manila (which, in turn, were high compared with Chinese silk prices in China itself).
 20. According to Sugihara (2001, 61), "recent literature generally confirms that monetization, commercialization of agriculture and the development of proto-industry were all present in India and China. Feudal restrictions are likely to have been more severe in Continental Europe and Japan than in China and India. It was much easier for the Chinese peasant to become a merchant than the German or Japanese peasant, while Indian capital appears to have traveled long distance just as freely as its most mobile European counterpart."
 21. Anthony Reid (1993, 16) describes the Southeast Asian "boom years, 1570-1630" as "the most rapid period of expansion of tropical Asian exports; Europe and Japan joined China and India as the major external catalysts for growth."
 22. The Doherty and Flynn (1989) microeconomic model shows the mechanisms through which accumulated silver stocks drove its world price down to its cost of production by 1640. This fall in the purchasing power of silver implies price inflation (the Price Revolution) for silver-standard regions worldwide up to about 1640.
 23. Even larger quantities of silver reached China via the Philippines during the eighteenth century. Writing in the 1770s, Guillaume Raynal (1971, 206-207) points to advantages involved in sending silver via the Pacific route: "All the nations in Europe use the silver they get from America to trade with India. Before this precious metal can reach the place of its destination, it must have paid considerable duties, taken a prodigious compass, and have been exposed to great risks; whereas Spaniards by sending it directly from America to the Philippines would save duties, time, and insurance; so that while they furnished the same sum as the rival nations, they would in reality make their purchases at a cheaper rate."

24. Attman's (1983) estimates had to be restricted to European port shipments of specie – rather than total land/sea shipments of specie and bullion – for two reasons. First no documents recorded most overland shipments of bullion or specie (Attman 1983, 10). Second, bullion was normally considered a special tax-exempt commodity; its flows were therefore unrecorded even at major ports (Attman 1983, 21–22). Thus, Attman does not claim to provide estimates of East-West flows of precious metals. Evidence on the value of net commodity imports into the principal European ports is used to estimate the efflux of *specie* from European ports over time.
25. See de Vries (forthcoming) for a comprehensive review of shipping volumes between Europe and Asia via the Cape route from the sixteenth through the eighteenth centuries.
26. It is frequently asserted that China did not experience a “price revolution” during this period, but Cartier (1981) shows that rice prices in China increased along the same lines as price increases in Europe (once prices have been converted to silver-content prices, that is). More recently Brook (1998, 694) states that “the increase in [Chinese] metals stocks, combined with monetization of the tax system, gave the economy an inflationary boost and, to a considerable extent, may have financed the commercial boom of the late sixteenth and early seventeenth century.”
27. Smuggled silver dominated trade via the Manila galleons (Flynn and Giráldez 1996a). According to Cross (1983, 420): “Quantities of silver left the New World through the ports of Buenos Aires and Sacramento and through the Manila Galleons. At the peak of these activities, perhaps as much as 6 million pesos per year (159,000 kg), or half of the output of Peru, was diverted to these channels from the Seville trade.” See also Moutoukias (1991).
28. Chinese population figures vary widely in the literature. We cannot determine the merits of particular positions within this debate, but all parties seem to agree that Chinese population in the eighteenth century grew significantly. See Ping-Ti Ho (1959, 270), Mote (1999, 744–745), Heijdra (1998, 436–439), and Naquin and Rawski (1987, 25).
29. The importance of American crops in Chinese agriculture is widely acknowledged in, for example, Ping-Ti Ho (1959, 268), and Naquin and Rawski (1987, 23). See Mazumdar (1999) for an insightful contrast between introduction of New World crops into China versus India. Spence (1990, 95) says that “because the crops also grew well in poor, hilly, or sandy soil, they enabled the population to rise rapidly in areas of otherwise marginal productivity, where alternate sources of food or gainful employment were rare.”

30. Von Glahn (1998) states that copper monies made a comeback in demographically expanding noncoastal areas of China from the middle of the eighteenth century; silver monies were thereby proportionately displaced. We are aware that China was on a bimetallic system and that the “prevalence of cash over silver [for tax payments by people in the countryside] was largely due to enormous expansion of copper production in Yunnan in the last two-thirds of the eighteenth century... On the other hand, local officials were obliged by regulation to send to the government at higher levels the part of the tax known as *ch'i-yun* in silver” (Wang 1973, 60). Thus, China remained on a silver standard throughout the eighteenth century. We contend that Chinese demand for silver must have risen dramatically during the eighteenth century, although not as dramatically as would have been the case had copper monies not become so readily available.
31. On Mexico’s dominance in world silver production, see Garner (1988) who documents rising Mexican silver production during the eighteenth century. According to Cross (1983, 403), Mexico alone produced 57 percent of the world’s silver during the eighteenth century. A crucial distinction is made by Coatsworth (1986, 26–27), however, when he says that “Mexico did not experience an unprecedented mining boom at the end of the [eighteenth] century, but at the beginning... In fact, the late colonial mining industry was in such deep trouble that it survived by draining the public treasury and diverting resources from other sectors.” High production levels during the second half of the eighteenth century kept silver prices depressed worldwide; thus, high production was coupled with *bad* times then. Authors too often focus on production quantities, when in fact profit is the central issue.
32. “In 1730 at Canton the price was 10.5 *tales* of dollar silver (94 percent fine) for 1 tale of gold (93 percent fine), and at this rate the coining of gold at the Madras mint could yield a profit of upwards of 30 percent. The Madras records contain many references to the private import and minting of both Sumatran and Chinese gold at the local mints” (Chaudhuri 1978, 181–182).
33. Hamilton (1934, 89–91) estimated that all forms of Crown revenue swallowed up 27.5 percent of the gross volume of legal imports, while Steele (1986, 151–152) estimates an even higher 40 percent during the sixteenth and seventeenth century period.
34. Captain George Anson became a national hero in England in 1743 when (near the Philippines) he captured an Acapulco galleon that contained almost 40 tons of silver (equivalent to 1.5 million pieces of eight). What we find interesting is that this American silver was not swapped for Asian

- products destined for European and American markets; instead, Anson shipped the silver back to London. With great fanfare, the “silver, it was announced, would be melted down into coins bearing the inscription ‘Acapulco’ (when issued by the Mint in 1745 the silver shillings were more appropriately inscribed ‘LIMA’)” (Williams 1999, 206). We assert that a similar silver prize in the year 1700 would have been sold in Chinese markets and certainly not shipped to Europe (because the price of silver in Chinese markets fetched a 50-percent premium vis-à-vis European markets in 1700).
35. Although China was by no means opium’s only destination: “By the end of the eighteenth century, nearly a third of Bengal’s opium production was going to Southeast Asia. Some part of that may have been going on to China via the junk trade, but it is impossible to say exactly how much ...” (Trocki 1999, 56).
 36. By 1836 opium flowed freely from all parts of India to Canton, according to Fairbank (1978, 172), when “total imports came to \$18 million, making it the world’s most valuable single commodity trade of the nineteenth century.”
 37. Note that zero “economic profits” by around 1640 does not mean that silver mines were unprofitable. Zero economic profit implies the existence of “normal profit” in economics jargon. In other words, silver mining profits declined to a level typical of other industries. Various entities (including the Spanish Empire) depended upon above-normal economic profits in order to function, however, so a status of zero economic profit proved devastating for numerous enterprises around the world.
 38. For arguments contrary to O’Brien concerning relationships between global trade/ ecology and the Industrial Revolution, see Frank (1998) and Pomeranz (2000).
 39. On the other hand, we have no quarrel with the arguments of O’Brien and Prados (1999) concerning declining profitability of European empires during the nineteenth century.
 40. “Finally, in former times New Guinea’s available root crops were limiting for calories as well as for protein, because they do not grow well at high elevations where many New Guineans live today. Many centuries ago, however, a new root crop of ultimately South American origin, the sweet potato, reached New Guinea, probably by way of the Philippines, where it had been introduced by the Spaniards. Compared with taro and other presumably older New Guinea root crops, the sweet potato can be grown up to higher elevations, grew more quickly, and gives higher yields per acre cultivated and per hour of labor. The result of the sweet potato’s arrival was a highland population explosion ...” (Diamond 1997, 149).

41. While not couched in fully global terms, as we attempt to do in this essay, much of Flynn's (1984) early criticism of Wallerstein's mistreatment of silver in European history remains valid.
42. Chinese exports were often destined for consumers of modest means. For example, (Ho 1994, 37) reports that the Dutch East India Company (VOC) alone exported 629,759 pieces of Chinese ceramics each year during the seventeenth century, 112,646 pieces of which were destined for the European marketplace.
43. Adam Smith's (1776) famous polemic against "bullionists" ridiculed policies designed to accumulate precious metals within a domestic economy. He reasoned that such policies required expending domestic resources to produce the exports with which foreign bullion was purchased; resources tied up in this manner would then be unavailable for purposes of domestic development. Our argument follows similar logic.

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