CHAPTER 14

Classical Gold Standard

14.1 International Monetary Regimes: The Gold Standard

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14.1.1 Introduction

The classical gold standard is the most famous monetary system that ever existed, with its heyday lasting a third of a century. By the time World War I began, the gold standard had become the predominant national and international monetary system in the world. Countries may be allocated to different groups, depending on the importance of the country to the working of the gold standard, the type of gold standard to which the country adhered, and the extent to which the country observed the standard. Whether automatic or policy-induced, there are implications for the money supply. The main theme is that the gold standard exhibited both elements that promoted stability and forces that fostered instability. Modern time-series analysis has been used to examine various facets of the gold standard, especially the roles of the core countries (Britain, France, Germany, and the United States). While there is apparent consensus on

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some aspects of the gold standard, controversies continue, and there remains room for further research and reflection.

14.1.2 Countries on Gold Standard

14.1.2.1 Legal Versus Effective Monetary Standard

Countries effectively on the gold standard and the periods during which they were on gold are listed in Table 14.1. The effective monetary standard of a country is distinguished from its legal standard. For example, a country legally on bimetallism usually was on either an effective gold or effective silver monometallic standard, depending on whether the country's "mint-price ratio" (the ratio of its mint price of gold to mint price of silver) was greater or less than the world price ratio. In contrast, a country might be legally on a gold standard, but its banks (and government) have "suspended specie (gold) payments" (refusing to convert their notes into gold), so that the country is in fact on a "paper standard."

Table 14.1 strives to incorporate all time periods (and only time periods) when a country was on an operational, or "effective," gold standard, irrespective of the legal standard; but in some cases only beginning and ending dates on gold can be discerned. The criterion adopted is that a country is deemed on the gold standard if (1) gold was the predominant effective metallic money, (2) specie payments were in force, and (3) there was a limitation on the coinage and/or the legal-tender status of silver (the only practical and historical competitor to gold), thus providing institutional or legal support for the effective gold standard emanating from (1) and (2).

The years 1880–1913 are generally construed as "the heyday of the gold standard," because throughout this period the "core countries" (Britain, France, Germany, United States), along with Scandinavia and several Western European countries, were continuously on gold. To quote (Flandreau et al. 1998, p. 150): "The big players were on gold and this is why economic history, rightly, puts the dates 1880–1913 on the gold standard."

In 1870 only Britain, two of its dependencies (Australia, Canada) and two countries also closely aligned with Britain economically and politically (Argentina and Portugal) were on the gold standard. Of all other countries, only the United States had ever been on an effective gold standard. By 1900, and even more so by 1914 (ironically, just before the gold standard collapsed, with World War I), almost every economically important country in the world had adopted gold. How did gold monometallism

Table 14.1 Countries on gold standard

Country	*Type of standard*	*Period*
Core countries		
Center country		
Britain	Coin	1774–1797, 1821–1914
Other core countries		
United States	Coin	1834–1861, 1879–1917
France	Coin	1878–1914
Germany	Coin	1871–1914
Inner Periphery		
British Colonies and Dominions		
Australia	Coin	1852–1915
Canada	Coin	1854–1914
Ceylon	Coin	1901–1914
India	Exchange (British pound)	1898–1914
Western Europe		
Austria-Hungary	Coin	1892–1914
Belgium	Coin	1878–1914
Italy	Coin	1884–1894
Liechtenstein	Coin	1898–1914
Netherlands	Coin	1875–1914
Portugal	Coin	1854–1891
Switzerland	Coin	1878–1914
Scandinavia		
Denmark	Coin	1872–1914
Finland	Coin	1877–1914
Norway	Coin	1875–1914
Sweden	Coin	1873–1914
Outer Periphery		
Eastern Europe		
Bulgaria	Coin	1906–1912
Greece	Coin	1885, 1910–1914
Montenegro	Coin	1911–1914
Romania	Coin	1890–1914
Russia	Coin	1897–1914
Middle East		
Egypt	Coin	1885–1914

(continued)

Table 14.1 (continued)

Country	*Type of standard*	*Period*
Turkey (Ottoman Empire)	Coin	1881–1914
Asia		
Japan	Coin	1897–1917
Philippines	Exchange (US dollar)	1903–1914
Siam	Exchange (British pound)	1908–1914
Straits Settlements	Exchange (British pound)	1906–1914
Mexico and Central America		
Costa Rica	Coin	1896–1914
Mexico	Coin	1905–1913
South America		
Argentina	Coin	1867–1876, 1883–1885, 1900–1914
Bolivia	Coin	1908–1914
Brazil	Coin	1888–1889, 1906–1914
Chile	Coin	1895–1898
Ecuador	Coin	1898–1914
Peru	Coin	1901–1914
Uruguay	Coin	1876–1914
Africa		
Eritrea	Exchange (Italian lira)	1890–1914
German East Africa	Exchange (German mark)	1885–1914
Italian Somaliland	Exchange (Italian lira)	1889–1914

Source Bulgaria—Dimitrova and Fantacci (2010, pp. 190, 194). Korea and Taiwan—Conant (1915, pp. 566–568). Other countries—Officer (2008, Table 1)

Britain includes colonies (except British Honduras) and possessions without a national currency: New Zealand and certain other Oceanic colonies, South Africa, Guernsey, Jersey, Malta, Gibralter, Cyprus, Bermuda, British West Indies, British Guiana, British Somaliland, Falkland Islands, other South and West African colonies. Britain first limited legal tender of silver in 1774, terminated free coinage of silver in 1798.

Table 14.1 (continued)

For precise dates and internal geographic exceptions for US period on gold standard, see Officer (1996, pp. 16–17). United States includes countries and territories with US dollar as exclusive or predominant currency: British Honduras (from 1894), Cuba (from 1898), Dominican Republic (from 1901), Panama (from 1904), Puerto Rico (from 1900), Alaska, Aleutian Islands, Hawaii, Midway Islands (from 1898), Wake Island, Guam, and American Samoa.
France includes Tunisia (from 1891) and all other colonies except Indochina.
Canada includes Newfoundland (from 1895). India includes British East Africa, Uganda, Zanzibar, Mauritius, and Ceylon (to 1901). Austria-Hungary includes Montenegro (to 1911). Belgium includes Belgian Congo. Netherlands includes Netherlands East Indies. Portugal includes colonies, except Portuguese India. Denmark includes Greenland and Iceland. Japan includes Korea and Taiwan (both from 1904). Straits Settlements includes Borneo. German East Africa and Italian Somaliland; beginning dates are approximate.
For other gold-standard lists, see Bordo and Schwartz (1996, pp. 20–22), Meissner (2005, p. 391), Martin-Aceña (2007, pp. 97–100), Mitchener and Weidenmier (2015, pp. 486, 508).

achieve its primacy? And, in particular, what explains the "scramble for gold" (or "rush to gold") that began in the 1870s?

14.1.2.2 Center Country

The country grouping in Table 14.1 reflects the importance of countries to establishment and maintenance of the standard. Consider a "core country" as a country of high importance to that end. Then Britain was the "center country," and thus the most important core country. It was the earliest country on a gold standard and was indispensable to the spread and functioning of the gold standard. "London was the center for the world's principal gold, commodities and capital markets… [There were] extensive outstanding sterling-denominated assets, and… many countries substituted sterling for gold as an international reserve currency" (Bordo 1993, p. 162).

For centuries, Britain had been on an effective silver standard under legal bimetallism. The country switched to an effective gold standard early in the eighteenth century, solidified by the (mistakenly) gold-overvalued mint-price ratio established by Isaac Newton, Master of the Mint, in 1717. In 1774 the legal-tender property of silver was restricted, and Britain entered the gold standard in the full sense. In 1798 coining of silver was suspended, and in 1816 the gold standard was formally adopted, ironically during a paper-standard regime (the "Bank Restriction Period," of 1797–1821), with the gold standard effectively resuming in 1821 and remaining until 1914.

14.1.2.3 Other Core Countries

Lindert identifies the pound sterling, French franc, and German mark as "key currencies," the most important reserve currencies. "The role of world banker was performed by Britain, France, and Germany in these years [1900–1913] on a scale unmatched either before or since" (Lindert 1969, p. 1). Flandreau and Jobst (2005), using the criterion of international circulation of domestic currencies (measured by number of recorded geographic exchange-market quotations), also place these three currencies in the top tier. The core countries Germany and France switched from bimetallism and silver to gold in 1871 and 1878, respectively.

It is controversial whether the United States should also be considered a core country. If a large circulation of gold coin is the criterion (Gallarotti 1995, p. 23), then the United States belongs in the group. If the existence of a central bank is required, then the United States does not so belong—a judgment also reached according to the Flandreau-Jobst criterion. However, tipping the scales in favor of inclusion is the fact that the United States was a heavyweight in the world economy, with large shares of would output, trade, and investment. Tullio and Wolters (2000, p. 62) state bluntly: "by 1910 US real GDP was three times UK GDP." Indeed, most scholars show revealed preference for inclusion, because their "heyday of the gold standard" begins only after the United States returned to the gold standard in 1879, thus completing the core group.

The United States was on an effective silver standard dating back to colonial times, legally bimetallic from 1786, and on an effective gold standard from 1834. The legal gold standard began in 1873–1874, when Congressional Acts ended silver-dollar coinage and limited legal tender of existing silver coins. Ironically and again, the move from formal bimetallism to a legal gold standard occurred during a paper standard (the "greenback period," of 1861–1878), with a dual legal and effective gold standard from 1879.

14.1.2.4 Periphery

The core countries attracted other countries to adopt the gold standard, in particular, British colonies and Dominions, Western European countries, and Scandinavia. These noncore countries were generally closely aligned with one or more core countries and could be viewed as constituting the "inner periphery." The "rush to the gold standard" began in the 1870s, with the adherence of Germany, France, Scandinavia, and other European countries. Legal bimetallism shifted from effective silver

to effective gold monometallism around 1850, as gold discoveries in the United States and Australia resulted in overvalued gold at the mints. With silver discoveries in Nevada, the gold/silver market situation subsequently reversed itself, and to avoid a huge inflow of silver and stem an outflow of gold, many European countries suspended the coinage of silver and limited its legal-tender property. Some countries (France, Belgium, Switzerland—three founding members of the Latin Monetary Union) adopted a "limping" gold standard, in which existing former-standard silver coin retained full legal tender, permitting the monetary authority to redeem its notes in silver as well as gold.

So, while all noncore countries were in the broadly defined periphery, there is a narrower periphery: Eastern Europe, Middle East, Asia, some colonial Africa, and Latin America. These countries—including, for some purposes, also British colonies and Dominions—were in the "outer" periphery: acted on, rather than actors, in the gold standard, and generally not as committed to the gold standard. Some countries—China, Persia, parts of Latin America—never joined the classical gold standard, instead retaining their silver or bimetallic standards.

Flandreau and Jobst have a different division of noncore countries. The periphery consists of countries the currency of which has exchange-market representation only at home and possibly in one neighboring country: Dominions and colonies, Southeastern Europe, Latin America, and Asia. The periphery could also be defined as the set of countries which could not circulate abroad debt denominated in their own currency (Morys 2013, pp. 206–207).

For Flandreau and Jobst, an intermediate group consists of countries the currencies of which enjoy regional exchange-market quotations: the United States and various European countries. I find questionable the characterization of the United States as noncore. It was simply a matter of historical tradition that "the reach of the dollar-sterling exchange market extended beyond to encompass almost the entirety of American economic transactions…All the while, the balance-of-payments strength of the United States was growing, and along with it resentment of foreign-exchange dependence on London, which financed US trade even with third parties" (Officer 1996, p. 61, 63). Throughout the gold-standard heyday, the United States became more and more economically powerful, and more and more important to the international gold standard—making characterization of the country as noncore incongruous.

14.1.2.5 Why the Scramble to Gold?

The idea of a "scramble" or "rush" to gold has also been named the "monetary chain gang" (Gallarotti 1995). There was a sequential movement to gold driven by network externalities in the form of trade and investment. Dependencies, sovereign and nonsovereign, following Britain to the gold standard, are mentioned above. Similarly, German economic satellites (Netherlands, Scandinavia) followed Germany and French satellites (Switzerland, Belgium, Italy) followed France. Eichengreen and Flandreau (1996) extend this thread to India and Straits Settlements, Dutch East Indies, Korea (and, logically, Taiwan), and Philippines, following Britain, Netherlands, Japan, and United States, respectively.

The role of the fall in the price of silver in the switch to gold is subject to amendment. Perhaps it was the desire to stabilize commodity prices that was the impetus for the switch (Gallarotti 1995). And it is arguable that the fall in the price of silver relative to gold was determined by shifts in demand rather than supply (Milward 1996), whence an endogenous phenomenon. These issues warrant further attention by historians and cliometricians.

Conventional scholarly wisdom is that war indemnity helps to explain some adoptions of the gold standard (e.g., France and Germany following the Franco- Prussian War, Japan after victory over China in 1895). Industrialization is also said to play a role, with its high value/weight ratio making gold the better metal than silver for transactions large in size and volume. Also, the gold standard had a "Good Housekeeping Seal of Approval" for the inflow of long-term capital (Bordo and Rockoff 1996, of which more below). Countries with fluctuating exchange rates might have been attracted to the stability of gold. There are also political theories of gold-standard adoption. Ideologically, there was the desire to follow the monetary standard of Britain and Germany, the leading economic powers. Domestically, there was the rise of urban-capitalist and industrial over agricultural interest groups, the former favoring gold for its low inflation (Gallarotti 1995), and the perennial conflict between creditors and debtors, again the former supporting gold for its purportedly deflationary power.

Empirically unscrambling the many theories of the scramble for gold is a difficult task. Meissner (2005) adopts an approach that warrants attention and extension. Using an econometric "duration model," his determined variable is the number of years (after 1870) until a country adopts the gold standard. The strongest result is that "a country would

be more likely to move to gold the more it traded with other gold standard countries" (Meissner 2005, p. 400). Also "A higher gold cover ratio [gold reserves/notes outstanding] is associated with earlier adoption times" (p. 395). So is a higher spread between domestic bond yield and British consol rate, in line with the "Good Housekeeping" hypothesis. In general, "the order in which countries adopted depended on trade patterns, financial needs, and structural constraints" (Meissner 2005, p. 401).

14.1.3 Characteristics of Gold Standard

14.1.3.1 Domestic Gold Standard

Coin Standard

Most gold-standard countries were on a coin standard (see Table 14.1). From a domestic standpoint, the coin standard had four properties. First, there was a well-defined and fixed gold content of the domestic monetary unit. For example, the dollar was defined as a specified weight of pure gold. Second, gold coin circulated as money with unlimited legal-tender power (meaning it is compulsorily acceptable means of payment of any amount in any debt transaction or obligation). Third, privately owned bullion (gold in mass, foreign coin considered as mass, or gold in the form of bars) was convertible into gold coin in unlimited amounts at the government mint or at the central bank (if one existed), and at the "mint price" (of gold, the inverse of the gold content of the monetary unit). Fourth, private parties had no restriction on their holding or use of gold (except possibly that privately created coined money could be prohibited); in particular, they may melt coin into bullion. The effect is as if coin were sold to the monetary authority (central bank, or Treasury acting as a central bank) for bullion. It sometimes made sense for the authority to sell gold bars directly for coin, even though not legally required, thus saving cost of coining. The third and fourth properties in effect committed the monetary authority to transact in coin and bullion in both directions such that the mint price, or gold content of the monetary unit approximately (because of transactions costs) governed in the marketplace.

However, even under a coin standard, gold was not the only money. Rather than a "pure" coin standard, the norm was a "mixed" coin standard, with both gold coin and other money circulating. In fact, a pure coin standard did not exist in any country during the gold-standard period. There was non-gold coin and also paper currency (notes)—issued

Table 14.2 Structure of money: major-countries aggregate

	1885	*1913*
Money supply ($ billion)	8	26
Ratio of metallic money to money supply (%)	33	15
Ratio of official reserves to money supply (%)	18	16
Ratio of official to official-plus-money gold (%)	33	54

Source Triffin (1964, p. 62)

End of year. Major countries are core (Britain, United States, France, Germany), Western Europe (Belgium, Italy, Netherlands, Sweden, Switzerland), Canada, and Japan. Money supply consists of metallic money, minor coin, paper currency, and demand deposits. Metallic money in 1885 is gold and silver coin; an overestimate, as includes commercial-bank holdings that could not be isolated from coin held outside banks by the public. Metallic money in 1913 is gold and silver coin. Official reserves are gold, silver, and foreign exchange. Official gold is gold in official reserves. Money gold is the gold-coin component of money supply

by the government, central bank, or commercial banks—and demand-deposit liabilities of banks. Generally, except for a "limping" gold standard (see above), non-gold (in particular, silver) coin was not officially convertible into gold and had only "token" status, meaning limited legal-tender power and face-value exceeding metallic value. In contrast, government or central-bank notes and central-bank deposit liabilities were directly convertible into gold coin at the fixed established price on demand. Commercial-bank notes and demand deposits might be converted not directly into gold but rather into gold-convertible government or central-bank currency. This indirect convertibility of commercial-bank liabilities would apply certainly if the government or central-bank currency were legal tender, but also generally even if it were not.

As legal tender, gold coin was always exchangeable for paper currency or deposits at the mint price, and usually the monetary authority would provide gold bars for its coin. Again, two-way transactions in unlimited amount fixed the currency price of gold at (or approximately at) the mint price. The credibility of the monetary-authority commitment to a fixed price of gold is the essence of a successful, ongoing gold-standard regime.

Over time, gold coin declined from about 1/5 of the world money supply in 1800 (2/3 for gold and silver coin together, as silver was then the predominant monetary standard) to 17% in 1885 (1/3 for gold and silver, for an eleven-major-country aggregate), and 10% in 1913 (15% for gold and silver, for the major-country aggregate) (Triffin 1964, pp. 15, 56, and see Table14.2). The main use of gold coin became not circulating

medium but rather reserves for Treasuries, central banks, and (generally to a lesser extent) commercial banks.

Gold-Exchange Standard

As shown in Table 14.1, some countries in the periphery were on a gold-exchange standard, in which the monetary authority buys and sells not gold (in any form) but rather gold-convertible foreign exchange, that is, the currency of a country that itself is on the coin standard. Countries on a gold-exchange standard usually were colonies or territories of a country on a coin standard. In situations in which the periphery country lacked its own (even-coined) currency, the gold-exchange standard existed almost by default.

14.1.3.2 International Gold Standard

Properties

An "international" gold standard requires, in addition to the domestic properties, freedom both of international gold flows (private parties permitted to import or export gold without restriction) and of foreign-exchange transactions (an absence of exchange control). Then the fixed mint prices of any two countries on the gold standard imply a fixed exchange rate ("mint parity") between the countries' currencies. For example, the US mint price effective 1837 was $20.671835 (rounded) per fine ounce of gold, the British since 1717 £4.247727(+), whence dollar-sterling mint parity was $4.8665635 per pound sterling (Officer 1996, p. 51). There are actually several concepts of parity, for which (considering the dollar-sterling case) one may consult Officer (1996, Chap. 5; 2006). The lag of "legal parity" (for appraisal of British merchandise for tariffs) behind mint parity, catching up only in 1873, is an issue that warrants explanation by historians.

Gold Points and Gold-Point Arbitrage

A fixed exchange rate (at the mint parity) for two countries on the gold standard is an oversimplification, which is often made but is misleading. There were costs of importing or exporting gold. These costs included freight, insurance, handling (packing and cartage), interest on money committed to the transaction, risk premium (compensation for risk), normal profit, any deviation of purchase or sale price from the mint price, possibly mint charges, and possibly abrasion (wearing out or removal of gold content of coin—should the coin be sold abroad by weight or as

bullion). Expressing the exporting costs as percent of the amount invested (or, equivalently, as percent of parity), the product of 1/100th these costs and mint parity (number of units of domestic currency per unit of foreign currency, for example, number of dollars per pound) was added to mint parity to obtain the gold-export point, the exchange rate at which gold is exported. To obtain the gold-import point, the product of 1/100th of the importing costs and mint parity was subtracted from mint parity.

If the exchange rate was greater than the gold-export point, private-sector "gold-point arbitrageurs" exported gold, thereby obtaining foreign currency. Conversely, for the exchange rate less than the gold-import point, gold was imported and foreign currency relinquished. Usually the gold was, directly or indirectly, purchased from the monetary authority of the one country and sold to the monetary authority in the other. The domestic-currency cost of the transaction "per unit of foreign currency obtained" was the gold-export point. That "per unit of foreign currency sold" was the gold-import point. Also, foreign currency was sold, or purchased, at the exchange rate. Therefore, arbitrageurs receive a profit proportional to the exchange-rate/gold-point divergence.

However, the arbitrageur supply of foreign currency eliminates profit by returning the exchange rate to below the gold-export point. Therefore, perfect "gold-point arbitrage" would ensure that the exchange rate has upper limit of the gold-export point. Similarly, the arbitrageur demand for foreign-currency returns the exchange rate to above the gold-import point, and perfect arbitrage ensures that the exchange rate has that point as a lower limit. It is important to note what induces the private sector to engage in gold-point arbitrage: (1) the profit motive and (2) the credibility of the commitment to (a) the fixed gold price and (b) freedom of foreign exchange and gold transactions, on the part of the monetary authorities of both countries.

Discussions of gold-point arbitrage are in Officer (1996, Chap. 8) and Canjels et al. (2004, pp. 871–875).

Spread, Gold-Point Estimation, and Gold-Effected Transfer of Funds

The "spread," the exchange-rate range over which arbitrage is unprofitable, is the difference between the gold-export point and gold-import point. It is sometimes convenient to express the gold points (and exchange rate) as percentage of parity. Then the spread becomes the sum of the gold points. Estimates of gold points and spreads involving

Table 14.3 Gold-point estimates

Countries	*Period*	*Gold points (%)*		*Spread (%)*	*Method of computation*
		Export	*Import*		
US/Britain	1841–1850	1.7476	3.2960	5.0436	A
US/Britain	1851–1860	1.3306	1.8631	3.1937	A
US/Britain	1881–1890	0.6585	0.7141	1.3726	A
US/Britain	1891–1900	0.6550	0.6274	1.2824	A
US/Britain	1901–1910	0.4993	0.5999	1.0992	A
US/Britain	1911–1914	0.5025	0.5915	1.0940	A
US/Britain	1879–1913	0.7706–0.1192		0.8898	B
US/Britain	1879–1913	0.4192–0.2486		0.6678	C
France/US	1877–1913	0.6888	0.6290	1.3178	D
Germany/US	1894–1913	0.4907	0.7123	1.2030	D
France/Britain	1877–1913	0.4063	0.3964	0.8027	D
Germany/Britain	1877–1913	0.3671	0.4405	0.8076	D
Germany/France	1877–1913	0.4321	0.5556	0.9877	D
Austria/Britain	1912	0.6453	0.6037	1.2490	E
Netherlands/ Britain	1912	0.5534	0.3552	0.9086	E
Scandinavia/ Britain	1912	0.3294	0.6067	0.9361	E

Sources US/Britain, 1879–1913–Canjels et al. (2004, p. 879). US/Britain, other periods–Officer (1996, p. 174). France/US, Germany/US, France/Britain, Germany/Britain, Germany/France–Morgenstern (1959, pp. 178–181). Austria/Britain, Netherlands/Britain, Scandinavia/Britain–Easton (1912, pp. 358–363)

Gold points apply to numerator country. Therefore, gold-export point is gold-import point for denominator country, and gold-import point is gold-export point for denominator country. Spread is gold-export point plus gold-import point. Scandinavia is Denmark, Sweden, and Norway

Method of computation A: sum of period-average arbitrage-cost components; B: exchange-rate behavior, nonparametric model; C: exchange-rate behavior, smooth time-trend model; D: median estimate of various authorities for various dates; E: writer's estimate. B-E: converted to percent deviation from parity; B-C: Gold-points symmetric and decline over time as shown, from beginning of period (maximum spread) to end of period (minimum spread); figure for spread is midpoint of maximum and minimum spread

core countries are presented in Table 14.3. There are many methods of obtaining or estimating gold points—Officer (1996, pp. 117–121) identifies nine techniques, which Canjels et al. (2004, p. 869) reduce to four. The main distinction is between summing cost components over time (method A in Table 14.3) and applying sophisticated time-series analysis to high-frequency, daily, exchange-rate data (methods B and C). Canjels et al. argue that their technique is superior to method A (exemplified by

Officer 1996) and that their results—especially a narrower spread than estimated by Officer—are consistent with gold-flow data. However, the Canjels et al. symmetry assumption (implying gold export and import points equidistant from parity), perhaps made for analytic convenience, is at variance with historical evidence.

Noteworthy in Table 14.3 is that the gold points, and therefore the spread, declined over time (evidenced by the dollar-sterling figures, whether methods A or B-C). Explanations involve technological improvements in transportation, communication, and arbitrage itself.

Almost always forgotten by economic historians is the fact that gold flows also were employed to transfer funds in lieu of a foreign-exchange transaction (rather than in combination with such transaction, per gold-point arbitrage). It is supremely ironic that contemporary accounts of such operations almost always pertain to gold- effected transfer of funds, whereas modern textbooks and scholarly articles deal exclusively with gold-point arbitrage! It is easy to demonstrate theoretically—and Officer shows empirically—that the spread pertinent to transfer of funds was always narrower than the gold-point arbitrage spread.

14.1.4 Implications for Money Supply and Automatic Correctives

Consider a domestic gold standard. Under a pure coin standard, gold in circulation, monetary base, and money supply are all one. With a mixed standard, the money supply is the product of the money multiplier (dependent on the commercial-banks' reserves/deposit and the nonbank-public's currency/deposit ratios) and the monetary base (the actual and potential reserves of the commercial banking system, with potential reserves held by the nonbank public). The monetary authority alters the monetary base by changing its gold holdings and its loans, discounts, and securities portfolio (non-gold assets, domestic assets). However, the level of its domestic assets is dependent on its gold reserves, because the authority generates demand liabilities (notes and deposits) by increasing its assets, and convertibility of these liabilities must be supported by a gold reserve, if the gold standard is to be maintained. Therefore, the gold standard provides a constraint on the level (or growth) of the money supply.

The international gold standard involves balance-of-payments surpluses settled by gold imports at the gold-import point and deficits financed by gold exports at the gold-export point. (Within the spread, there are no

gold flows and the balance of payments is in equilibrium.) The change in the money supply is then the product of the money multiplier and the gold flow, providing the monetary authority does not change its domestic assets. For a country on a gold-exchange standard, holdings of "foreign exchange" (the reserve currency) take the place of gold. In general, the "international assets" of a monetary authority may consist of both gold and foreign exchange. Discussion of automatic correctives of a payments imbalance assumes "neutral" policy of the monetary authorities, that is, abstraction both from policies that would enhance and policies that would inhibit correction.

14.1.4.1 Traditional Mechanism

A country experiencing a balance-of-payments deficit loses gold and its money supply automatically decreases, the extent of the decrease depending on the legal or customary reserve requirements for non-gold (or non-foreign-exchange) money (for the variety of legal institutions, see Martin-Aceña 2007, p. 105). Assuming that velocity does not increase (i.e., the demand for money does not decrease), money income contracts, via the equation of exchange. Then the price level and/or real income falls. If prices are fully flexible (guaranteed only by pure *and* perfect competition), then the price level bears the full force of the deflation. As long as elasticity conditions (moderate, but typically neglected in the literature) are satisfied, exports increase not only in real but also in nominal terms, and imports similarly decrease. Symmetrically, a surplus country gains gold, the money supply increases, money income expands, the price level rises, exports decrease, and imports increase. In each case, balance-of-payments equilibrium is restored via the current account. This is called the price specie-flow mechanism; "developed in the eighteenth century, it remains the dominant approach to thinking about the gold standard today" (Eichengreen 2008, p. 24).

An extended adjustment mechanism incorporates changes in real income and interest rates. To the extent that prices are inflexible, movements of real income in the same direction as money income occur; in particular, the deficit country suffers unemployment, but the payments imbalance is nevertheless corrected.

The capital account also acts to restore balance, via the deficit-country reduced money supply increasing interest rates, inducing a net inflow of capital. The interest-rate increases also reduce real investment and thence real income and imports. Similarly, interest-rate decreases in the

surplus country elicit capital outflow and increase real investment, income, and imports. This process enhances the price specie-flow current-account correction of the imbalance.

14.1.4.2 Monetary Mechanism

From a general monetarist standpoint, the traditional mechanism is unnecessary to restore payments equilibrium, because, with fixed exchange rates, gold flows simply adjust money supply to money demand. Changes in prices, real income, and interest rates are superfluous to the adjustment process. Further, under a "global-monetarist" framework, prices, interest rates, and incomes are all determined worldwide. Therefore, in logical extreme, the price-specie-flow and like mechanisms cannot even occur (on the monetarist approaches, see Kreinin and Officer 1978, Chap. 3).

For some authors (McCloskey and Richard Zecher 1976; Temin 1984, pp. 576–577; Gallarotti 1995, pp. 35–36), historical data support the monetary mechanism for the classical gold standard: Gold flows were too small to be suggestive of the traditional correctives, and prices, incomes, and interest rates moved closely in correspondence (rather than in the opposite directions predicted by the traditional adjustment mechanisms)—at least among non-outer-periphery countries, especially the core group. Hatton (1992) is skeptical of this work, while Wallace and Choudhry (1995) present evidence against global monetarism and in favor of the price specie-flow mechanism.

The "law of one price"—purchasing power parity (PPP) in weak form—is associated with the monetary approach and contravenes price specie-flow. Examining ten studies published during the period spanned by Enders (1989) and Catão and Solomou (2005), some of which are discussed in Officer (2012), I judge that eight provide at least partial support for PPP. However, PPP is generally found to be stronger over time, which leads to the open question "how long is too long for the monetary approach to receive validation?" Undoubtedly, there remains scope for additional work on automatic correctives.

14.1.5 Sources of Instability of the Gold Standard

There were three elements making for instability of the classical gold standard. First, the use of foreign exchange as reserves increased as the gold standard progressed. Available end-of-year data indicate that, worldwide,

foreign exchange in official reserves (the international assets of the monetary authority) increased by 36% from 1880 to 1899 and by 356% from 1899 to 1913. In comparison, gold in official reserves increased by 160% from 1880 to 1903 but only by 88% from 1903 to 1913 (Lindert 1969, pp. 22–25). While in 1913 only Germany among the center countries held any measurable amount of foreign exchange—15% of total reserves excluding silver (which was of limited use)—the percentage for the rest of the world was double that for Germany (Table 14.4). If there were a rush to cash in foreign exchange for gold, reduction or depletion of the gold of reserve-currency countries could place the gold standard in jeopardy.

Second, Britain—the predominant reserve-currency country—was in a particularly sensitive situation. From 1899 to 1913, recorded sterling balances (mostly official) increased more than 2.5-fold (Lindert 1969, p. 22). Considering end-of-1913 data, almost half of world foreign-exchange reserves was in sterling, but the Bank of England had only 3% of world gold reserves (Tables 14.5, 14.6). Defining the "reserve ratio" of

Table 14.4 Share of foreign exchange in official reserves: 1913

	Including silver	*Excluding silver*
Britain	0	0
United States	0	0
France	0	0
Germany	13	15
Rest of world	27	31

Source Lindert (1969, pp. 10–11)
Official reserves are gold, foreign exchange, and including or excluding silver

Table 14.5 Composition of world official foreign-exchange reserves: 1913

Currency	*Percent*
British pounds	47
US dollars	2
French francs	30
German marks	16
Other	5

Source Lindert (1969, pp. 18–19)
End of year. Excludes holdings for which currency unspecified. "Other" is primarily Dutch guilders and Scandinavian kroner

Table 14.6 Official-reserves components: 1913

Country	*Percent of world total*	
	Gold	*Foreign exchange*
Britain	3	0
United States	27	0
France	14	0
Germany	6	5
Rest of world	50	95

Sources Gold: Board of Governors of the Federal Reserve System (1943, pp. 544–545, 551). Foreign exchange: Lindert (1969, pp. 10–11)

the reserve-currency-country monetary authority as the ratio of (i) official reserves to (ii) liabilities to foreign monetary authorities held in financial institutions in the country, in 1913 this ratio was only 31% for the Bank of England, far lower than those of the monetary authorities of the other core countries (Table 14.7).

An official run on sterling could easily force Britain off the gold standard. Because sterling was an international currency, private foreigners also held considerable liquid assets in London and could themselves initiate a run on sterling.

Third, the United States, though a core country, was a great source of instability to the gold standard. The US Treasury accumulated and held a high percentage of world gold reserves (in 1913, more than that of the three other core countries combined), resulting in an absurdly high

Table 14.7 Reserve ratio of reserve-currency countries: 1913

Country	*Including silver*	*Excluding silver*
Britain	0.31	0.31
United States	90.55	64.42
France	2.38	2.02
Germany	2.11	1.75

Source Lindert (1969, pp. 10–11, 19). Foreign-currency holdings for which currency unspecified allocated proportionately to the four currencies based on known distribution.
End-of-year ratio of official reserves to official liquid liabilities (that is, liabilities to foreign governments and central banks). Percent. Official reserves are gold, foreign exchange, and including or excluding silver

reserve ratio—Tables 14.5, 14.6, 14.7). With a decentralized banking system composed of many banks of three distinct types (national, state, savings)—De Cecco 1984, pp. 111–113) includes loan and trust companies as a fourth group—operating under different rules, but with a New York center, interbank deposits were prevalent and financial crises involving bank failures frequent. Eichengreen (1992, p. 55) sees an analogy between interior banks maintaining balances in New York and the US financial system holding sterling balances in London banks. In addition to episodic financial shocks, there was periodic, seasonal financial stress, as monies would flow back and forth between the agricultural interior and the New York banking center. Cyclically, the US demand for money shifted greatly, but the supply was relatively inelastic. This led to episodic high interest rates in the New York money market, which attracted capital from abroad. Further, there was an upward trend in the demand for money on the part of the US private sector, which exacerbated the capital inflow.

During the heyday of the gold standard, the US had no central bank to serve as a lender of last resort or otherwise help to stabilize the US monetary base. Provocatively, Officer (2002, pp. 115–117—and see Chapters 22–23) has argued that the First and Second Banks of the United States played the role of central bank, but these Banks had long vanished by the heyday of the gold standard. And the Federal Reserve had barely begun operations when the gold standard collapsed in 1914. The Treasury did not fill the void: "The US Treasury was by no means the lender of last resort of the American system; once it acquired gold, it just sat on it" (De Cecco 1984, p. 117).

Therefore, far from the United States assisting Britain, gold often flowed from the Bank of England to the United States to satisfy increases in US demand for money. Though in economic size the United States was the largest of the core countries, in many years it was a net importer rather than exporter of capital to the rest of the world—the opposite of the other core countries. The political power of silver interests (desiring to enhance the role of silver relative to gold), the accusations of farmer debtors and manufacturer exports (blaming the gold standard for deflation), and recurrent financial crises led to imperfect credibility in the US commitment to the gold standard. Runs on banks and runs on the Treasury gold reserve placed the US gold standard near collapse in the early and mid-1890s. During that period, the credibility of the Treasury's commitment to the gold standard was shaken. Indeed, the gold standard

was saved in 1895 (and again in 1896) only by cooperative action of the Treasury and a bankers' syndicate, which stemmed gold exports.

Using time-series analysis on six-month commercial-bank loans (deemed a "more developed" market, because that maturity is the longest series available), Tullio and Wolters (2000, pp. 62, 67) conclude (based on previous work) that "the UK and London were more vulnerable to US influences in the period under study than they were to French and German influences" and (in their current study) that "All in all, the influence of US on UK interest rates is much stronger and lasts much longer than vice versa." The latter finding is stronger for 1897–1907 than for 1890–1896. I interpret these results as confirming the US unstable role in the gold standard.

In sum, the United States, by virtue of economic size and early experience with the gold standard, was a core country to be sure, but a core country that decidedly exacerbated the instability of the gold standard!

14.1.6 Rules of the Game

14.1.6.1 The Rules

According to the "rules of the [gold-standard] game," central banks were supposed to reinforce, rather than "sterilize" (moderate or eliminate) or ignore, the effect of gold flows on the monetary supply. A gold outflow typically decreases the international assets of the central bank and thence the monetary base and money supply. The central-bank's proper response was: (1) raise its discount rate, thereby inducing commercial banks to adopt a higher reserves/deposit ratio and therefore decreasing the money multiplier and (2) decrease lending and sell securities, thereby decreasing domestic interest-earning assets and thence the monetary base. On both counts, the money supply is further decreased. And the higher interest rate acted to increase interest rates generally and induce a capital inflow. The converse argument (involving increases in the money supply, and lower interest rates) applies symmetrically to a gold inflow.

It is interesting that the "rules of the game" did not appear in the literature until a decade after the classical gold standard ended (Eichengreen 1992, p. 36). The originator was Keynes (1925, p. 18), who wrote that given the overvalued pound upon the UK return to the gold standard and the consequent payments imbalance and incipient gold loss: "The Bank of England is *compelled* to curtail credit by all the rules of the Gold Standard game." Such "credit restriction" (money-supply decrease, in

today's parlance) deflates the economy (reduces nominal GDP), reducing wages (the price level) via unemployment (decreasing real GDP). External balance is maintained at the expense of internal balance. Anticipating his *General Theory*, Keynes advocates rather an "easy credit policy" (easy-money policy) to "restore prosperity" (full employment) rather than following the rules of the game and "aggravate a depression" (worsening real GDP).

Should the central bank rather increase its domestic assets when it loses gold, it engages in "sterilization" of the gold flow and is decidedly not following the "rules of the game." The converse argument (for gold inflow) also holds, with sterilization involving the central bank decreasing its domestic assets when it gains gold.

According to the monetary approach, neither the "rules of the game" nor sterilization can have any effect except in the short run. Under fixed exchange rates, gold flows simply adjust money supply to money demand; the money supply cannot be determined by policy. The central bank can control the (reserve-asset versus domestic-asset) composition of the monetary base but not the level of the base. Indeed, the rules of the game are unnecessary in the first instance, because gold flows occur only because of a disequilibrium between money demand and money supply. When gold (or any reserve) has moved sufficiently to re-equate money supply to money demand, the gold loss or gain ceases. Thus rule (2) is unnecessary and is ineffective except possibly in the short run.

Furthermore, under global monetarism, interest rates and incomes are determined worldwide. Even core countries can influence these variables domestically only to the extent that they help determine them in the global marketplace. Therefore, rule (1) is inapplicable as well. In sum, the "rules of the game," whether followed or not, are deemed inconsequential by those who adhere to the monetary approach to the balance of payments.

14.1.6.2 Discount-Rate Rule

However, the Bank of England did, in effect, manage its discount rate ("Bank Rate") in accordance with rule (1). The Bank's primary objective was to maintain convertibility of its notes into gold, that is, to preserve the gold standard, and its principal policy tool was Bank Rate. When its liquidity ratio of gold reserves to outstanding note liabilities decreased, it would usually increase Bank Rate. The increase in Bank Rate carried with it market short-term interest rates, inducing a short-term capital inflow

and thereby moving the exchange rate away from the gold-export point by increasing the exchange value of the pound. The converse would be a rise in the liquidity ratio involving a Bank Rate decrease, capital outflow, and movement of the exchange rate away from the gold import point—but if the converse held, it was in weaker form. Nevertheless, the Bank was constantly monitoring its liquidity ratio and in response altered Bank Rate almost 200 times over 1880–1913.

Time-series analyses, such as Jeanne (1995) and Davutyan and Parke (1995), essentially support that narrative. No doubt the Bank had other objectives: certainly profitability, given that it was a commercial bank (albeit with public functions), possibly, at times, economic activity ("home trade"). If Bank rate exceeded the market rate by too great a margin, the Bank's commercial business would suffer and shareholders would object. However, maintenance of note convertibility was required by law and viewed as necessary for the Bank's commercial functioning. So the goals of maintenance of convertibility and earning of satisfactory profits were not necessarily in conflict. In contrast, the studies show little concern for economic activity. The Bank's low gold holdings (which, of course, earned zero return) were viewed by contemporaries as based on an overriding concern for the interests of shareholders, that is, profitability (Gallarotti 1995, p. 115).

The Reichsbank operated in an environment similar to that of the Bank of England, except that the Reichsbank kept a greater reserve buffer and the Berlin money market was not as large as that of London. The Reichsbank, like the Bank of England, generally moved its discount rate inversely to its liquidity ratio.

However, most other central banks often violated the rule, with changes in their discount rates of inappropriate direction, or of insufficient amount or frequency. The Bank of France, in particular, kept its discount rate stable. Unlike the Bank of England, it chose to have large gold reserves (see Table 14.6), with payments imbalances accommodated by fluctuations in its gold rather than financed by short-term capital flows. This policy was due in part to a small money market in Paris. (Of course, the United States, lacking a central bank, had no discount rate to use as a policy instrument.)

14.1.6.3 Sterilization Was Dominant

As for rule (2)—that the central-bank's domestic and international assets move in the same direction—in fact the opposite behavior, sterilization,

Table 14.8 Annual changes in international and domestic assets of central bank: 1880–1913

Country	*Percent changes in same direction*
Britain	48
France	26
Germany	31
Western Europe	32
Scandinavia	40
Russia	33

Source Bloomfield (1959, p. 49)
International assets are gold, silver, and foreign exchange; domestic assets are income-earning: discounts, loans, and securities. Change in same direction implies country is following "rules of the game." Observations with zero or negligible changes in either class of assets excluded. Years when country is off gold standard excluded (see Table 14.1). Western Europe consists of Austria-Hungary, Belgium, and Netherlands; Scandinavia incorporates Denmark, Finland, Norway, and Sweden

was dominant, as shown in Table 14.8. The Bank of England followed the rule more than any other central bank, but even so violated it more often than not! The sterilization policy of the Bank of France was a substitute for discount-rate policy (Bazot et al. 2016).

14.1.6.4 Was the Bank of England Supreme?

Eichengreen quotes Keynes that the "Bank of England could almost have claimed to be the conductor of the international orchestra" (Eichengreen 1987, p. 5) and finds that Bank rate tended to lead the Reichsbank discount rate and even the Bank of France rate. Other studies confirm that the Bank of England discount rate sometimes was followed by a change in the same direction on the part of the Reichsbank, but not the reverse. And Bazot et al. (2016), with advanced time-series analysis, find that French sterilization was ultimately due to an increase in the Bank of England rate: "the Banque de France's credit to the domestic economy (discounts and advances) correlates negatively with gold flows because it correlates positively with the discount rate of the Bank of England" (p. 2).

Morys (2013), making use of central-bank archival data and sophisticated time-series analysis, examines the behavior of discount rates of 14 central banks and concludes that "a considerable amount of monetary autonomy was retained under the Classical Gold Standard, even for peripheral countries" (p. 215). However, Morys can be criticized for

having no gold-flow or domestic-activity variables, for not conducting unit-root and cointegration testing, and for a principal-components solution to exchange-rate multicollinearity. Stokes and Neuburger (2016), in an ultra-sophisticated time-series analysis, determine that the London money-market rate heavily influenced the French and Reichsbank money-market rates. Their use of market rather than official interest rates brings richer data to bear on the issue of English leadership.

One concludes that the Bank of England was influential in determining foreign money-market conditions if not official rates, but Bank "leadership" or "hegemony" remains an open question and perhaps a matter of definition.

14.1.7 Stability of Gold Standard

How then did the classical gold standard cope with payments imbalances? Why was it a stable system?

14.1.7.1 Private-Sector Credibility in Convertibility

The fundamental reason for the stability of the classical gold standard is that there was always absolute private-sector credibility in the commitment to the fixed domestic-currency price of gold on the part of the center country (Britain), two (France and Germany) of the three remaining core countries, and certain other European countries (Belgium, Netherlands, Switzerland, and Scandinavia). Certainly, that was true from the late-1870s onward. For the United States, this absolute credibility applied from about 1900. In earlier periods, that commitment had a contingency aspect: it was recognized that convertibility could be suspended in the event of dire emergency (such as war); but, after normal conditions were restored, convertibility would be re-established at the pre-existing mint price and gold contracts would again be honored. The Bank Restriction Period is an example of the proper application of the contingency, as is the greenback period (even though the United States, effectively on the gold standard, was legally on bimetallism). An excellent discussion of "the gold standard as a contingent rule" is Bordo and Kydland (1996).

The absolute credibility in countries' commitment to convertibility at the existing mint price implied that there was extremely low, essentially zero, convertibility risk (the probability that Treasury or central-bank notes would not be redeemed in gold at the established mint price) and

also essentially zero exchange risk (the probability that the mint parity between two currencies would be altered or that exchange control or prohibition of gold export would be instituted).

14.1.7.2 Reasons Why Commitment to Convertibility Was so Credible

There were many reasons why the commitment to convertibility was so credible.

1. Contracts were expressed in gold; if convertibility were abandoned, contracts would inevitably be violated—an undesirable outcome for the monetary authority.
2. Shocks to the domestic and world economies were infrequent and generally mild. There was basically international peace and domestic calm.
3. The London capital market was the largest, most open, most diversified in the world, and its gold market was also dominant. A high proportion of world trade was financed in sterling, London was the most important reserve-currency center, and balances of payments were often settled by transferring sterling assets rather than gold. Therefore, sterling was an international currency—not merely supplemental to gold but perhaps better: a boon to non-center countries, because sterling involved positive, not zero, interest return, and its transfer costs were much less than those of gold. Advantages to Britain were the charges for services as an international banker, differential interest returns on its financial intermediation, and the practice of countries on a sterling (gold-exchange) standard of financing payments surpluses with Britain by piling up short-term sterling assets rather than demanding Bank of England gold.
4. There was widespread ideology—and practice—of "metallist orthodoxy" and "monetary orthodoxy" (Gallarotti 1995), involving authorities' commitment to an anti-inflation, balanced-budget, stable-money policy. In particular, the ideology implied low government spending and taxes and limited monetization of government debt (financing of budget deficits by printing money). Therefore, it was not expected that a country's price level or inflation would get

out of line with that of other countries, with resulting pressure on the country's adherence to the gold standard.

5. This ideology was mirrored in, and supported by, domestic politics. Gold had won over silver, and paper and stable-money interests (bankers, industrialists, manufacturers, merchants, professionals, creditors, urban groups) over inflationary interests (farmers, landowners, miners, debtors, rural groups).
6. There was freedom from government regulation and a competitive environment, domestically and internationally. Therefore, prices and wages were more flexible than in other periods of human history (before and after). The core countries had virtually no capital controls, the center country (Britain) had adopted free trade, and the other core countries had moderate tariffs. Balance-of-payments financing and adjustment could proceed without serious impediments.
7. Internal balance (domestic macroeconomic stability, at a high level of real income and employment) was an unimportant goal of policy. Preservation of convertibility of paper currency into gold would not be superseded as the primary policy objective. While sterilization of gold flows was frequent, the purpose was more "meeting the needs of trade" (passive monetary policy) than fighting unemployment (active monetary policy).
8. The gradual establishment of mint prices over time ensured that the implied mint parities (exchange rates) were in line with relative price levels; so countries joined the gold standard with exchange rates in equilibrium.
9. Current-account and capital-account imbalances tended to be offsetting for the core countries, especially for Britain. A trade deficit induced a gold loss and a higher interest rate, reducing capital outflow and attracting a capital inflow. Indeed, the capital-exporting core countries—Britain, France, and Germany—could eliminate a gold loss simply by reducing lending abroad.

14.1.7.3 Rareness of Violations of Gold Points

Many of the above reasons not only enhanced credibility in existing mint prices and parities but also kept international-payments imbalances, and hence necessary adjustment, of small magnitude. Responding to the essentially zero convertibility and zero exchange risks implied

Table 14.9 Violations of gold points

Exchange rate	*Time period*	*Number of months*	*Violations*	
			Number	*Percent of months*
Dollar-sterling	1889–1908	240	1	0.4
Dollar-sterling	1890–1906	204	3	1.5
Franc-sterling	1889–1908	240	12	5.0
Mark-sterling	1889–1908	240	18	7.5

Sources Dollar-sterling, 1890–1906: Officer (1996, p. 235). Other: Giovannini (1993, pp. 130–131); numbers are approximate, deciphered from graph

by the credible commitment, private agents further reduced the need for balance-of-payments adjustment—via gold-point arbitrage. When the exchange rate moved beyond a gold point, arbitrage acted to return it to the spread. So it is not surprising that "violations of the gold points" were rare on a monthly average basis, as demonstrated in Table 14.9 for the dollar, franc, and mark exchange rate versus sterling. Certainly, gold-point violations did occur; but they rarely persisted sufficiently to be counted on monthly average data. Such measured violations were generally associated with financial crises.

The number of dollar-sterling violations for 1890–1906 exceeding that for 1889–1908 is due to the results emanating from different researchers using different data. Nevertheless, the important common finding is the low percent of months encompassed by violations. Canjels et al. (2004), using daily exchange-rate data, find that Officer's gold-point spread is too wide to accommodate recorded gold flows. On the other hand, Spiller and Wood (1988, p. 888), working with weekly exchange rates, conclude that "Many instances of alleged gold-point violations identified by previous authors, then, may have been nothing more than instances in which arbitrage costs may have been larger than average." This conundrum cries out for richer gold-point and gold-flow data and, of course, careful and appropriate time-series analysis.

14.1.7.4 Stabilizing Speculation

The perceived extremely low convertibility and exchange risks gave private agents profitable opportunities not only outside the spread (gold-point arbitrage) but also within the spread (exchange-rate speculation). As the exchange value of a country's currency weakened, the exchange rate

approaching the gold-export point, speculators had an ever-greater incentive to purchase domestic currency with foreign currency (a short-term capital inflow); for they had good reason to believe that the exchange rate would move in the opposite direction, whereupon they would reverse their transaction at a profit. Similarly, a strengthened currency, with the exchange rate approaching the gold-import point, involved speculators selling the domestic currency for foreign currency (a short-term capital outflow). Clearly, the exchange rate would either not go beyond the gold point (via the actions of speculators of this ilk) or would quickly return to the spread (via gold-point arbitrage). Also, the further the exchange rate moved toward the gold point, the greater the potential profit opportunity, for there was a decreased distance to that gold point and an increased distance from the other point.

This "stabilizing speculation" enhanced the exchange value of depreciating currencies that were about to lose gold, and thus the gold loss could be prevented. The speculation was all the more powerful, because the absence of controls on capital movements meant private capital flows were highly responsive to exchange-rate changes. Dollar-sterling data, in Table 14.10, show that this speculation was extremely efficient in keeping the exchange rate away from the gold points—and increasingly effective over time. Interestingly, these statements hold even for the 1890s, during which at times US maintenance of currency convertibility was precarious. The average deviation of the exchange rate from the midpoint of the

Table 14.10 Average deviation of dollar-sterling exchange rate from gold-point-spread midpoint

Time period	*Percent of parity*	*Percent of spread*
Quarterly observations		
1881–1890	0.32	23
1891–1900	0.25	19
1901–1910	0.15	13
1911–1914	0.12	11
Monthly observations		
1890–1906	0.24	20

Source Officer (1996, p. 272). Year 1914 ends with second quarter

spread fell decade-by-decade from about 1/3 of 1% of parity in 1881–1890 (23% of the gold-point spread) to only 12/100th of 1% of parity in 1911–1914 (11% of the spread).

Under basic target-zone theory, credibility is 100% operationally; thus, the exchange rate never violates the spread ("target zone") and exhibits "smooth pasting" at the gold points (Duarte et al. 2013). Hallwood et al. (1996) test the assumption of full credibility and find that it is a reasonable description of the sterling-franc exchange rate but that "instances of positive devaluation expectations of the dollar are…common" (Hallwood et al. 1996, p. 191), though large only during 1890–1896, consistent with the discussion in Sect. 14.1.5.

14.1.7.5 Government Policies that Enhanced Gold-Standard Stability

Government policies also enhanced gold-standard stability. First, by the turn of the century, South Africa—the main world gold producer—sold all its gold in London, either to private parties or actively to the Bank of England, with the Bank serving also as residual purchaser of the gold. Thus, the Bank had the means to replenish its gold reserves. Second, the orthodox-metallism ideology and the leadership of the Bank of England—other central banks would often gear their monetary policy to that of the Bank—kept monetary policies harmonized. Monetary discipline was maintained.

Third, countries used "gold devices," primarily the manipulation of gold points, to affect gold flows. Consider the Bank of England. By law, the Bank had to redeem its notes in domestic gold coin (sovereigns) at a minimum price equivalent to £3 17 s. 10½d. per standard ounce of gold and purchase gold bars at a minimum price of £3 17 s. 9d. Beyond that, the Bank had tremendous discretion. It would foster gold imports by lowering the foreign gold-export point (British gold-import point, number of units of foreign currency per pound) through interest-free loans to gold importers or raising its purchase price for bars and foreign coin. The Bank would discourage gold exports by lowering the foreign gold-import point (British gold-export point) via increasing its selling prices for gold bars and foreign coin, refusing to sell bars, or redeeming its notes in underweight domestic gold coin. These policies were alternative to increasing Bank Rate.

The US Treasury followed similar policies at times. In addition to providing interest-free loans to gold importers and changing the premium

at which it would sell bars (or refusing to sell bars outright), the Treasury condoned banking syndicates to put pressure on gold arbitrageurs to desist from gold export in 1895 and 1896, a time when the US adherence to the gold standard was under stress. Officer (1996, Chap. 9) provides detailed data on the two countries' gold devices from a bilateral standpoint.

The Bank of France and Reichsbank employed gold devices relative to discount-rate changes more than Britain did. Some additional policies included converting notes into gold only in Paris or Berlin rather than at branches elsewhere in the country, the Bank of France converting its notes in silver coin rather than gold (permitted under its "limping" gold standard), and the Reichsbank using moral suasion to discourage the export of gold. Gold devices combined with a huge buffer stock of gold enabled the Bank of France to keep its discount rate stable while maintaining convertibility. In the 1900s, the Bank stopped the use of gold devices, replacing them with foreign-exchange market intervention (Bazot et al. 2016).

Also, the monetary system was adept at conserving gold, as evidenced in Table 14.2. This was important, because the increased gold required for a growing world economy could be obtained only from mining or from non-monetary hoards. While the money supply for the eleven-major-country aggregate more than tripled from 1885 to 1913, the percent of the money supply in the form of metallic money (gold and silver) more than halved. This process did not make the gold standard unstable, because gold moved into commercial-bank and central-bank (or Treasury) reserves: the ratio of gold in official reserves to official plus money gold increased from 33 to 54%. The relative influence of the public versus private sector in reducing the proportion of metallic money in the money supply is an issue warranting exploration by monetary historians.

Further, while the stable environment in which the gold standard operated did not require regular central-bank cooperation, such cooperation was forthcoming when needed, that is, during financial crises. Although Britain was the center country, the precarious liquidity position of the Bank of England meant that it was more often the recipient than the provider of financial assistance. In crises, it would obtain loans from the Bank of France (also on occasion from other central banks), and the Bank of France would sometimes purchase sterling to push up that currency's exchange value. "Interestingly, it was because France cared so much more about domestic finance, that it came to care about international finance…International markets represented the first line of defense

for French finance; i.e. mitigating the problem at the source" (Eichengreen 2008, p. 33). Assistance also went from the Bank of England to other central banks, as needed. And cooperation went beyond the core countries. "In effect, the resources on which any one country could draw when its gold parity was under attack extended beyond its own reserves to those that could be borrowed from other gold-standard countries" (Eichengreen 2008, p. 33). Further, the credible commitment was so strong that private bankers did not hesitate to make loans to central banks in difficulty. Cooperation during the gold standard is discussed by Gallarotti (1995, Chap. 3) and Eichengreen (1992, pp. 48–52).

In sum, "virtuous" two-way interactions were responsible for the stability of the gold standard. The credible commitment to convertibility of paper money at the established mint price, and therefore the fixed mint parities, were both a cause and a result of (1) the stable environment in which the gold standard operated, (2) the stabilizing behavior of arbitrageurs and speculators, and (3) the responsible policies of the authorities—and (1), (2), and (3), and their individual elements, also interacted positively among themselves.

14.1.8 Experience of Periphery

An important reason for periphery countries to join and maintain the gold standard was the access to the capital markets of the core countries thereby fostered. Adherence to the gold standard connoted that the peripheral country would follow responsible monetary, fiscal, and debt-management policies—and, in particular, faithfully repay the interest on and principal of debt. This "Good Housekeeping Seal of Approval," by reducing the risk premium, involved a lower interest rate on the country's bonds sold abroad, and very likely a higher volume of borrowing. The favorable terms and greater borrowing enhanced the country's economic development. However, Flandreau and Zumer (2004) argue and demonstrate that gold-standard adherence was unimportant in explaining international interest-rate spreads. Rather, a country's debt burden (ratio of interest-service to revenue) and default history were the crucial explanatory variables. This finding detracts from the alleged advantage of the gold standard to the periphery.

Furthermore, periphery countries bore the brunt of the "burden of adjustment" of payments imbalances with the core (and other Western

European) countries, in four ways. First, some of the periphery countries were on a gold-exchange standard. When they ran a surplus, they typically increased (and with a deficit, decreased) their liquid balances in London (or other reserve-currency country) rather than withdraw gold from (or ship gold to) the reserve-currency country. The monetary base of the periphery country would increase, or decrease, but that of the reserve-currency country would remain unchanged. This meant that such changes in domestic variables—prices, incomes, interest rates, portfolios, etc.—that occurred to correct the surplus or deficit were primarily in the periphery country. The periphery, rather than the core, bore the burden of adjustment.

Second, the non-gold (silver and inconvertible-paper) periphery was subject to substantial exchange-rate variability, which altered real exchange rates, generating core-periphery payments adjustment. "From the perspective of the core, exchange rate flexibility in the periphery facilitated international relative price adjustment, while maintaining the monetary stability required for the preservation of the gold peg" (Catão and Solomou 2005, p. 1272).

Third, when Bank Rate increased, London drew funds from France and Germany, which attracted funds from other Western European and Scandinavian countries, which drew capital from the periphery. Also, it was easy for a core country to correct a deficit by reducing lending to, or bringing capital home from, the periphery, thus bringing about "sudden stops" to the capital inflow of periphery countries.

Fourth, the periphery countries were underdeveloped; their exports were largely primary products (agriculture and mining), which inherently were extremely sensitive to world market conditions. This feature made adjustment in the periphery compared to the core take the form more of real than financial correction. This conclusion also follows from the fact that capital obtained from core countries for the purpose of economic development was subject to interruption and even reversal ("sudden stops"). While the periphery was probably better off with access to the capital than in isolation, its welfare gain was reduced by the instability of capital import.

Fifth, peripheral countries were subjected to financial crises more than the core. Bordo and Meissner (2011, p. 85) show that "higher capital inflows were strongly related to a higher probability of having any kind of crisis." They examine the roles of "original sin" (hard-currency-denomination debt), "currency mismatches" (lack of assets-liabilities

offsets in foreign-currency debt), and "debt intolerance" (past defaults) in 30 countries over 1880–1913. Their results "tend to confirm that it is difficult to find robust determinants of financial crises." However, they find a strange quadratic relationship between "the ratio of hard-currency debt to total debt" and debt crises. Economic historians look for patterns, of which either the absence or the weirdness is frustrating: the answer generally lies in further research.

The experience on adherence to the gold standard differed among periphery groups. The important British Dominions and colonies—Australia, New Zealand, Canada, and India—successfully maintained the gold standard. They were politically stable and, of course, heavily influenced by Britain. They paid the price of serving as an economic cushion to the Bank of England's financial situation; but, compared to the rest of the periphery, gained a relatively stable long-term capital inflow. The European periphery had the advantage of emigrant remittances, which, according to Esteves and Khoudour-Castéras (2009, p. 980), served as a substitute for capital inflows and "were instrumental in relieving [international] credit constraints to developing nations." Some European periphery countries "shadowed the gold standard." Even with inconvertible paper currency, they maintained relatively stable exchange rates and prices, thus largely behaving as if they were on the gold standard (see, for example, Tattara and Volpe 1997, Tattara 2003, Martin-Aceña et al. 2012).

In undeveloped Latin American and Asia, adherence to the gold standard was fragile, with lack of complete credibility in the commitment to convertibility. Many of the reasons for credible commitment that applied to the core countries were absent—for example, there were powerful inflationary interests, strong balance-of-payments shocks, and rudimentary banking sectors. For Latin America and Asia, the cost of adhering to the gold standard was very apparent: loss of the ability to depreciate the currency to counter reductions in exports. Yet the gain, in terms of a steady capital inflow from the core countries, was not as stable or reliable as for the British Dominions and colonies.

Comparisons of periphery-country experience with the core and with each other are presented in Table 14.11. It is perhaps surprising that Southern Europe exhibits even less adherence to the gold standard than does Latin America. In terms of money growth, there is a schism (seen most clearly in the coefficient of variation—ratio of standard deviation to mean) between stability for the core, Scandinavia, Western Europe, and

Table 14.11 Country-group statistics: 1881–1913

Country group	*Component-Country Means*						
	Gold-Standard adherence	*Money growth*		*Government deficit*		*Inflation*	
	Mean	*Mean*	*St. Dev.*	*Mean*	*St. Dev.*	*Mean*	*St. Dev.*
Core	100	4.0	3.8	0.8	0.9	0.3	3.4
Scandinavia	100	5.6	4.2	0.3	0.7	0.4	3.2
Western Europe	100	4.2	3.5	2.1	0.3	0.6	3.6
Dominions	100	5.4	5.5	7.8	1.6	0.4	2.6
Southern Europe	22	2.5	6.7	0.6	0.7	0.3	2.6
Latin America	32	3.3	15.9	2.3	3.1	4.0	13.6
Japan	52	7.2	14.5	−3.1	3.3	4.6	5.5

Sources Gold-Standard adherence: Table 1. Other columns: Bordo and Schwartz (1996, pp. 46–47, 52–53, 58–59)

Gold-standard adherence is percent of years 1881–1913 on gold standard. Money growth is the time coefficient from annual regression of natural logarithm of M2 on constant and time trend. Government deficit is percent of GNP. Inflation is the time coefficient from annual regression of natural logarithm of GDP deflator (or equivalent) on constant and time trend

Core: Britain, United States, France, Germany. Scandinavia: Denmark, Finland, Norway, Sweden. Western Europe: Belgium, Netherlands, Switzerland. Dominions: Australia, Canada. Southern Europe: Italy, Portugal, Spain. Latin America: Argentina, Brazil, Chile

Dominions, versus instability for the remaining periphery. The figures for government deficit have some anomalies; but the core, Scandinavia, and Western Europe certainly exhibit "monetary orthodoxy." Inflation level and variability are relatively high for Latin America and Japan. The figures do not uniformly reflect the quantity theory of money; but, except for the Southern Europe anomaly, there is broadly an association between gold-standard adherence and stable money in all senses.

14.1.9 Performance

Performance of the gold standard is reasonably evaluated via contrast with alternative international monetary systems, whether past or future—and the possible criteria are various. Consider first, in Table 14.12, monetary criteria for the US heyday gold standard (1879–1913) in comparison with previous US systems: First and Second Banks (1792–1810, 1817–1838),

Table 14.12 US monetary statistics: gold standard versus other periods

Period	*Exchange-market pressure (period mean, percent)*		*Ratio of monetary base to specie stock (end of year)*	
	Algebraic value	*Absolute value*	*Mean*	*Coeff. of variation (%)*
1792–1810	0.83	7.09	1.22	6.86
1811–1816	7.04	8.20	1.25	17.80
1817–1838	2.74	6.51	1.27	11.45
1839–1846	4.89	7.76	1.06	4.69
1847–1861	−17.00	17.89	1.00	10.81
1862–1878	−10.26	10.27	3.72	42.77
1879–1913	0.63	2.69	2.17	14.80

Source Officer (2002, p. 135, 137)
Statistics of annual values

Independent Treasury (1847–1861), intermittent paper standards (1811–1816, 1839–1846), and greenback period (1862–1878). Very revealing, but almost neglected in the historical literature, is exchange-market pressure (EMP) as a criterion of performance. Under certain assumptions (no money illusion, money-market equilibrium, purely monetary model, small open economy—assumptions Officer 2002, p. 134, defends for the US gold-standard period), EMP in favor of the domestic currency (US dollar) is the unweighted sum of "payments imbalance as percentage of the monetary base" and "percentage change in the foreign-currency price of the dollar." Whether taking the mean of algebraic or absolute values of EMP as the criterion, EMP is lowest for the gold standard—in fact, by a multiple in 11 of 12 comparisons. At least for the United States and for whatever reasons, the classical gold standard worked to minimize exchange-market pressure better than all previous alternatives.

The other monetary criterion is decidedly unfavorable to the gold standard. The ratio of the monetary base to specie stock ("pyramiding ratio") measures discipline in restricting the monetary base. Under a pure coin standard, the ratio is unity; so the ideal ratio is a zero coefficient of variation around a unitary mean. It is to be expected that the greenback period is least disciplined, but the gold standard follows as second (mean) or third (coefficient of variation) highest pyramiding ratio. Paradoxically, the flexible ratio may help to explain the high gold-standard EMP efficiency. It might also reflect the unstable role of the United States in the working of the gold standard!

Restricting comparisons to later and different monetary systems, Tables 14.13 and 14.14 measure inflation and real per-capita income growth for the four core countries. In mean inflation, the gold-standard is tops, with all four countries having lower inflation than under Bretton Woods or floating exchange rates. However, for no country is the variability of inflation lowest. And for no country does the gold standard entail maximum mean growth—Bretton Woods exhibits highest mean

Table 14.13 Inflation in core countries: gold standard versus later periods

Country	*Gold standard (1881–1913)*		*Bretton Woods (1946–1970)*		*Floating Exchange rates (1974–1995)*	
	Mean	*Standard Deviation*	*Mean*	*St. Dev.*	*Mean*	*St. Dev.*
Britain	0.3	3.1	3.9	2.2	7.5	5.6
United States	0.3	3.0	2.5	3.5	5.0	2.4
France	0.0	4.9	5.0	3.5	6.4	3.8
Germany	0.6	2.6	2.7	4.0	3.2	1.3

Source Bordo and Schwartz (1999, p. 205)
Mean inflation is time coefficient from annual regression of natural logarithm of GDP deflator (or equivalent) on constant and time trend. For United States, gold-standard mean is 0.4 using alternative data

Table 14.14 Growth of core countries: gold standard versus later periods

Country	*Gold standard (1881–1913)*		*Bretton Woods (1946–1970)*		*Floating Exchange Rates (1974–1995)*	
	Mean	*Standard Deviation*	*Mean*	*St. Dev.*	*Mean*	*St. Dev.*
Britain	1.1	2.4	2.1	1.8	1.8	2.3
United States	1.8	4.9	2.0	4.6	1.5	2.3
France	1.5	4.7	4.1	2.1	1.7	1.5
Germany	1.7	2.8	5.0	3.3	1.1	4.9

Source Bordo and Schwartz (1999, p. 205)
Mean growth is time coefficient from annual regression of natural logarithm of real per-capita GDP (or equivalent) on constant and time trend. For United States, gold-standard mean and standard deviation are 1.6 and 2.7, respectively, using alternative data

growth—or minimum standard deviation of growth. Of course, historical time periods reflect more than differential monetary systems; but the gold-standard balancing of relatively low inflation with relatively low growth is suggestive of a trade-off offered by that system.

Representative of pertinent time-series-analysis literature is the careful study for the gold-standard core provided by Bordo et al. (2010), who present a somewhat different conclusion. They distinguish "good deflation" (induced by positive supply shocks) from "bad deflation" (resulting from negative demand shocks). Although they do not make comparisons with other periods in this paper, they do see supply shocks (productivity improvements) as having significant effects on growth. Their time-series analysis shows a structural break around 1896, whereby deflation preceded inflation. For the European core, money is essentially neutral; but for the United States, monetary shocks significantly affect output—not unexpected for this core country.

14.1.10 Breakdown of Gold Standard

The classical gold standard was at its height at the end of 1913, ironically just before it came to an end. The proximate cause of the breakdown of the classical gold standard was political: the advent of World War I in August 1914. However, it was the Bank of England's precarious liquidity position and the gold-exchange standard that were the underlying cause. With the outbreak of war, a run on sterling led Britain to impose extreme exchange control—a postponement of both domestic and international payments—that made the international gold standard non-operational. Convertibility was not legally suspended; but moral suasion, legalistic action, and regulation had the same effect. Gold exports were restricted by extralegal means (and by Trading with the Enemy legislation), with the Bank of England commandeering all gold imports and applying moral suasion to bankers and bullion brokers.

Almost all other gold-standard countries undertook similar policies in 1914 and 1915. The United States entered the war and ended its gold standard late, adopting extralegal restrictions on convertibility in 1917 (although in 1914 New York banks had temporarily imposed an informal embargo on gold exports). An effect of the universal removal of currency convertibility was the ineffectiveness of mint parities and inapplicability of gold points: floating exchange rates resulted.

The classical gold standard possessed strong elements both of stability and instability. In the end, the shock of war led to dominance of the unstable forces. It is an open question how long the gold standard would have lasted had World War I not brought it to a close, that is, whether and when the forces making for instability would have overcome those supporting stability.

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