# NOTES

## *Sterling Exchange Rates, 1847-80* *

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For Britain, and indeed for much of the developed world, the years from the mid-1870s to the eve of the First World War have been conventionally portrayed as years of stability in matters of international finance. For most commentators this was a period in which the Bank of England developed techniques for "fine tuning" both internal and external monetary flows against the background of a robust and stable exchange rate.[1] In contrast study of the extent of

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[1] The Cunliffe Report (*First Interim Report of the Committee on Currency and Foreign Exchange* (Cd. 9182, P.P. 1918), VII, pp. 853-64) represents the classical view on the smoothness of the pre-First World War gold standard mechanism and the efficacy of Bank of England action. W.M. SCAMMEL, "The Working of the Gold Standard" *Yorkshire Bulletin of Economic and Social Research*, Special Number, 17, 1, 1965, pp. 32-45, is an example of the traditional view established by the 1960s; and R.S. SAYERS *The Bank of England, 1890-1914*. (Cambridge University Press, Cambridge 1976), 1, chapters 1 & 3, generally complies with the view that the Bank was effective in its manipulation of the international gold standard. The traditional, "Cunliffe view" has been subjected to continuous revision, however — e.g. see especially P.B. WHALE, "The Working of the Pre-War Gold Standard "*Economica*", n.s. IV, 1937, pp. 18-32: ARTHUR IRVING BLOOMFIELD, *Monetary Policy under the International Gold Standard, 1880-1914* (Federal Reserve Bank of New York, New York 1959) and *Short-Term Capital Movements under the Pre-1914 Gold Standard* (Princeton Studies in International Finance, 11, Princeton 1963); and PETER M. LINDERT, *Key Currencies and Gold, 1900-13* (Princeton Studies in International Finance, 24, Princeton 1969). A useful synthesis is provided in A.G. FORD "International Financial Policy and the Gold Standard, 1870-1914" University of Warwick Economics Discussion Paper 104, 1977. Finally, for two recently expressed unorthodox views see Marcello de Cecco, *Money and Empire: The International Gold Standard, 1890-1914* (Basil Blackwell, Oxford 1974) and DONALD N. MCCLOSKEY and J. RICHARD ZECKER "How the Gold Standard Worked, 1880-1913" in DONALD N. MCCLOSKEY, *Enterprise and Trade in Victorian Britain* (Geo. Allen & Unwin, 1981), pp. 184-208. The last reference, on the basis of the monetary interpretation of the balance of payments, particularly belittles the Bank of England's international influence.

exchange rate stability in the decades preceding the 1870s has been relatively neglected. Although Britain returned from wartime inconvertibility and adopted the gold standard as early as 1821, the implication of the oft-expressed, favourable remarks on the post-1870 era is that the earlier exchange rate regime may not have been quite so stable. Indeed, in many respects greater instability in the earlier period could be anticipated, for while Britain may have fixed the value of her currency in terms of gold the experience of other nations varied; thus raising the possibility of variation in the value of sterling *vis a vis* these other currencies. For most of these years, France operated a bimetallic standard; the U.S.A. was more diverse with gold and silver coins available as well as the federal government's fiat paper, the "greenback", 1862-79; and others such as Holland, Germany and India were on a silver standard. For this reason W.E. Huffman and J.R. Lothian have recently argued that,

> "... even though Britain was on a gold standard during this period, it was more a domestic commodity standard than (a) worldwide gold standard... Consequently, much of the external influence that one would normally associate with an international gold standard may have been absent".[2]

On the other hand, a case could be made for theoretical expectations of relative exchange rate stability for the U.K. if, as is known to have existed, there was freedom to melt down, and to import and export, precious coin and bullion, and if international bullion and other money markets were so organized as to permit effective arbitrage. In such circumstances market forces could ensure stable exchange rates within narrow limits (the specie import and export points) not only for gold currencies, but also for bimetallic currencies based on both gold and silver. Moreover, as shall be shown, provided world demand and supply conditions for the precious metals were such as to avoid major changes in the gold/silver price ratio, then exchange rate stability between gold and silver currencies would be a reasonable expectation. The operation of bimetallic standards could provide an important bridge between the gold and silver currencies of the world, permitting market forces to restrict the degree of exchange fluctuations.

The extent of exchange rate stability is fundamentally an empirical issue, and it is the main aim of this paper to present newly-constructed indices of sterling exchange rates for the period, 1847-80, and to explain movements in these series, particularly over the long-term. Once the facts about stability have been established it will be easier for historians to assess Huffman and Lothian's view that much of the "external influence" of operating a stable exchange rate may have been missing in the pre-1870s period.

[2] Wallace E. Huffman and James R. Lothian "Money in the United Kingdom, 1833-80" *Journal of Money, Credit and Banking*, XII, 1980, p. 165.

## II

Figure 1 plots movements in quarterly indices of the rates of exchange between sterling and five major currencies: the (gold) dollar, franc, guilder, mark and rupee. (The data are presented in tabular form in the Appendix). Also shown is a weighted composite index of all five exchange rates representing an "effective exchange rate" for the pound against the currencies of the UK's leading trading partners during the period, 1847-80.

The raw data used in the compilation of the indices were all published weekly in the London *Economist*. For present purposes a quarterly series is produced from the arithmetic mean of the last four weeks' quotations for each of the months, March, June, September and December. Difficulties arise in using the published data - it is impossible to know with certainty how precisely they reflect transactions actually undertaken, but it is assumed that they capture the major characteristics of the exchanges. One particular drawback is that the published rates are quotations on different centres. Thus, the French and Dutch rates were those quoted in London, while the German, American and Indian were quoted overseas.[3]

Inevitable time lags in the reporting of particularly the last two mean that the five rates used are not simultaneous market rates, but are rates published simultaneously in London. Indeed, an important advantage of using published rates is that it was these which were generally presented to contemporaries as representing the price of sterling in competitive foreign exchange markets.[4] The published rates reached a wide audience of bankers, financiers, merchants, industrialists and policy makers and, therefore, they seem to be the most appropriate to use in any study of the *effects* of rate movements on contemporary actions and opinions. This is not to claim that British businessmen were necessarily involved in exchange transactions themselves — we know, for instance, that in the case of the American dollar almost all exchange business was conducted on the western side of the Atlantic — but rather that the ramifications

[3] The French rate was that for Paris, the German for Hamburg (1847-1872) and Berlin (1873-1880); the Dutch for Amsterdam and the Indian for Calcutta. Breaks occur in two of the series:
(a) No quotation appeared for the franc during March 1871 following the upheavals of the Franco-Prussian War and the uprising in Paris. Therefore, the franc is excluded from the combined index for that one quarter;
(b) Between the last quarter of 1872 and the first quarter of 1873 the German rate against sterling switched from *mark bancos* per pound, based on Hamburg, to *reichs marks* per pound, based on Berlin. Therefore, the mark is excluded from the combined index for March 1873.

[4] From the second half of the 1840s the *Economist* was among a number of London commercial publications which regularly commented on movements in the published exchanges, offering interpretation and advice to readers. Other sources of regular quotations, though covering different time periods, include the *Circular to Bankers*, the *Journal of the Statistical Society* and the *Bankers' Magazine*.

of exchange movements were well-known to the informed British business community.

Before the data could be used some adjustment was necessary. The intention has been to produce indices for estimated "sight" or "spot" sterling exchange rates, but the original series were in a variety of forms. The franc, guilder and mark were all for "short" (3 day) or "sight" paper and these have been used unadjusted for interest rates. However, the dollar and rupee rates were bill prices in New York and Calcutta and for "sixty days" and "six months" respectively.[5] The quoted rates, therefore, comprised not only the dollar or rupee "sight" price for sterling but also an element of interest. In other words, the bill rate for sterling would have been lower (in terms of dollars or rupees) than the "sight" rate, as the purchaser of the bill would have sought an adjustment in order to earn interest for the credit granted during the usance of the bill. In calculating the "pure" exchange rate, therefore, it is necessary to deduct the interest element from the bill price. For this purpose the appropriate commercial discount rate in the dominant money market, London, has been used. The use of London rates follows the method employed by E.J. Perkins in his recent revision of the original Davis-Hughes' dollar: sterling exchange rate, but here a market rate rather than the Bank rate (which was used by Perkins) seems more relevant as the Bank of England conducted relatively little commercial discount business.[6] A problem with the rupee calculation, however, is that no regular six-month interest rate series is available until 1861. Therefore, an estimate has had to be made and, in consequence, the series is less reliable for these years, 1847-61.[7]

[5] In the case of the dollar, up to 1874 the bill price was expressed as a percentage premium on the pre-1834 exchange par of $ 4.44: £ 1 and, therefore, initial adjustment was necessary to express the market price in terms of the post-1834 par of $ 4.8665: £ 1. For details see E.J. Perkins *Financing Anglo-American Trade: The House of Brown 1800-1880* (Harvard University Press, Cambridge, Mass., 1975), pp. 183-6; and L.E. Davis and J.R.T. Hughes "A Dollar-Sterling Exchange, 1803-1895" *Economic History Review*, ser. 2, XIII, 1960-1, pp. 54-5.

[6] E.J. Perkins "Foreign Interest Rates in American Financial Markets: A Revised Series of Dollar-Sterling Exchange Rates, 1835-1900" *Journal of Economic History*, XXXVIII, 1978, pp. 392-417, and Davis and Hughes "Dollar-Sterling Exchange" pp. 52-78, where a New York interest rate was used for the adjustment. A number of nineteenth century British exchange market experts would have supported the use of a London rate, arguing that the dominant rate in determining the price of international bills was the rate prevailing in the market where the bill had been accepted and was due to be paid. For instance see, Arthur Crump *The English Manual of Banking* (Longman, Green & Co., 3rd ed., London 1878), p. 170; Ernest Seyd *Bullion and the Foreign Exchanges* (Effingham Wilson, London 1868), pp. 438-9, 444-7, George Clare *The ABC of the Foreign Exchanges* (Macmillan and Co.; London 1893), pp. 71-2, and George Clare *A Money-Market Primer and Key to the Exchanges* (Effingham Wilson, 2nd ed., London 1902), p. 83.

[7] Interest rates are from *Select Committee on Bank Acts*, P.P. 1857, 2, X-1, pp. 463-4

With these adjustments completed, five quarterly series of estimated "sight" exchange rates were then available. The next step was to convert each of them into a separate index; and to combine all five into a composite index, weighting according to the relative importance of each of the foreign countries within British visible trade.[8] The form of the index used was of the type:

$$I_{t,\,t+1} = \frac{\sum_{i}^{n} R_{ti} \cdot W_{Ti}}{\sum_{i}^{n} W_{Ti}}$$

Where,

$t$ = quarters of each year i.e. 1, 2, 3... 135 (for period June 1847 - December 1880).

$n$ = number of individual currencies (i.e. 5).

$R_{ti}$ = ratio of the market exchange rate of currency, i, to £ 1 sterling in time period, t+1, over that same market exchange rate in the previous time period, t.

$W_{Ti}$ = weight given to currency, i, in year, T. The weights change only every fourth quarter as they are based on the annual current value of an individual country's visible trade with the UK.

$I_{t,t+1}$ = the sum of the weighted ratios of change in the five sterling exchange rates between time periods.

Multipling through produces the chain index:

$$I(Ch)_{1,135} = I_{1,2}, I_{2,3}, I_{3,4} \ldots I_{134,\,135}$$

for the years, 1847-54 inclusive; and from S. NISHIMURA *The Decline of Inland Bills of Exchange in the London Money Market, 1855-1913* (Cambridge University Press, 1971), pp. 114-21 for the years, 1855-80 inclusive. For the period 1847-61, it has been assumed that the ratio that the six month rate bore to the three month rate was 1.42: 1, which was the mean ratio during 1858 and 1862 when data for both rates are available. Examination of the data from 1861 shows that the direction of change in both rates was almost always the same, offering some justification for the estimation procedure.

[8] Trade figures are from B.R. MITCHELL *European Historical Statistics 1750-1970* (Macmillan, London 1974), pp. 572-3. Until 1854 only visible export values are available, but 1854-80 the combined value of both visible imports and exports has been used for calculating relative weights. As only annual trade figures are used, the relative weights change with each set of four, quarterly observations. The absence of figures for invisible trade prevents the use of total current account trade values in calculating the weights. In the mid-50s (1855) the relative weights were in the order of: 43 (USA), 15 (France), 11.1 (Holland), 25.9 (Germany), 22.9 (India). In 1880 they were 138 (USA), 58 (France), 35.2 (Holland), 41 (Germany), 61 (India).

The same form of index has been used for the individual currency series, although obviously no weights were needed here. The base period for all indices is the first quarter of 1850 (= 100).

Finally on individual currencies, it is important to appreciate that the dollar: sterling index refers to the rate of exchange between the gold dollar and the pound. The use of the gold dollar in this context follows a well-established tradition but it is appropriate here to offer some explicit justification as to why this is so. Prior to the outbreak of the Civil War in 1861 the USA was effectively on a gold standard; but by the close of the first year of conflict disruption to trade and the burden of Federal war financing had forced the New York banks to suspend specie payments. This precipitated a widespread suspension among other financial institutions, with the Treasury, too, stopping specie payments on its notes; and by an act of February 1862 Congress formalised the abandonment of gold by authorising the Federal Government to issue inconvertible notes, popularly known as "greenbacks". These quickly depreciated against gold, and in most of the Northern States specie disappeared from circulation. Through the war monetary experience remained somewhat mixed, however, for while most cash transactions were conducted in terms of inconvertible currency, on the West Coast specie continued to be used.[9] Nevertheless, for most domestic purposes American residents were operating with an inconvertible currency whose value relative to foreign exchange was largely determined by market forces — i.e. a floating exchange rate.[10] Thus, if we were examining the exchange rate from a broad, international perspective, then the impact of America's civil war and the abandonment of the gold standard can be seen only as having added to uncertainty and instability in international transactions.

It was not until 1879 that America formally resumed specie payments. However, during the greenback era a free market in gold also existed, in New York, and if Americans wished to buy foreign exchange, such as sterling bills, they had first to obtain gold.[11] In other words, for purposes of international

[9] For further discussion on the variety of media used in the North see MILTON FRIEDMAN and ANNA JACOBSON SCHWARTZ *A Monetary History of the United States, 1867-1960* (Princeton University Press, paperback edition, Princeton 1971), pp. 16-29 and PAUL R. AUERBACH "Greenbacks and the American Civil War: Implications for Monetary Analysis" Kingston Polytechnic Discussion Paper in Political Economy, no. 20. On conditions in the South see EUGENE M. LERNER "Money, Prices and Wages in the Confederacy, 1861-65" in RALPH ANDREANO (ed.) *The Economic Impact of the American Civil War* (Schenkman Publishing Co., Cambridge, Mass. 1962), pp. 11-40.

[10] FRIEDMAN and SCHWARTZ *Monetary History*, chapter 2, expecially p. 58f.; REUBEN A. KESSEL and ARMEN A. ALCHIAN "Real Wages in the North during the Civil War: Mitchell's Data Reinterpreted" in ROBERT WILLIAM FOGEL and STANLEY L. ENGERMAN (ed.) *The Reinterpretation of American Economic History* (Harper and Row, New York 1971), pp. 459-67, and F.D. GRAHAM "International Trade under Depreciated Paper: the United States, 1862-79" *Quarterly Journal of Economics*, XXXVI, 1922, pp. 220-73.

[11] WESLEY C. MITCHELL *A History of the Greenbacks* (University of Chicago Press, Chicago 1903).

transactions the quoted exchange rate remained that between the gold dollar and the foreign currency concerned.[12] Thus, from the perspective of British traders and financiers the exchange rate with the gold dollar seems to have been the one most directly relevant. Although it is impossible to be categorical, from the point of view, too, of domestic bankers, including the Bank of England, a movement in the rate with the gold dollar is more likely to have been seen as the harbinger of gold flows and, therefore, to have been of potential importance for lending and investment decisions.

Another important point in the choice of the most appropriate dollar exchange rate is that, at least on trend, there is evidence to suggest that the adverse effects of depreciating paper money on America's terms of trade were largely offset by the rise in domestic prices — the theory of purchasing power parity appears to have been operating.[13] *Ceteris paribus,* therefore, the price of American goods and services in terms of sterling retained their relative position. This is not to say, of course, that real and speculative factors did not affect trade and capital flows, particularly in the short-run and more obviously during wartime, but it does mean that trend movements in the paper dollar/sterling rate would have been dominated by America's inflation (deflation) rate. Again from the perspective of sterling's experience and the study of British economic history, it seems more appropriate to use the gold dollar rate in the compilation of the new indices.

## III

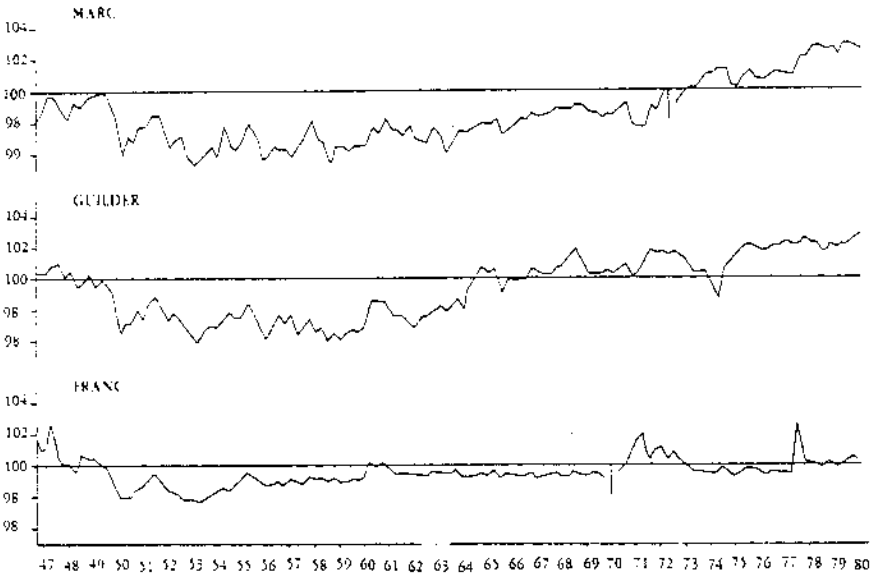
Examination of the new exchange rate series shows that the experience of sterling was somewhat mixed. If the composite index is used as a general measure of the value of sterling, then the conclusion must be that most of the period was marked by a fairly high degree of stability, and that Britain's domestic money market operated, if not within a *de facto* stable exchange rate regime, then with a high degree of certainty as to exchange rate values. Figure 1 shows short-term fluctuations over only a very narrow range from the early fifties to the mid-seventies. In detail the index ranged from 95.18 to 99.86, June 1850 — December 1875, with all but four observations falling within three points (96.00 - 98.99 inclusive) for the period, June 1850 - December 1869. In other words, through the 1850s and 1860s changes in sterling's effective exchange rate ranged over only some 3% of the 1850 value. Table 1 (a) sets out

[12] James K. Kindahl "Economic Factors in Specie Resumption: The United States, 1865-1879" in Fogel and Engerman (eds) *Reinterpretation* p. 470:

> "There was thus no market in which foreign exchange was bought and sold in terms of American currency (greenbacks), and hence there were no price quotations for foreign exchange in terms of American currency".

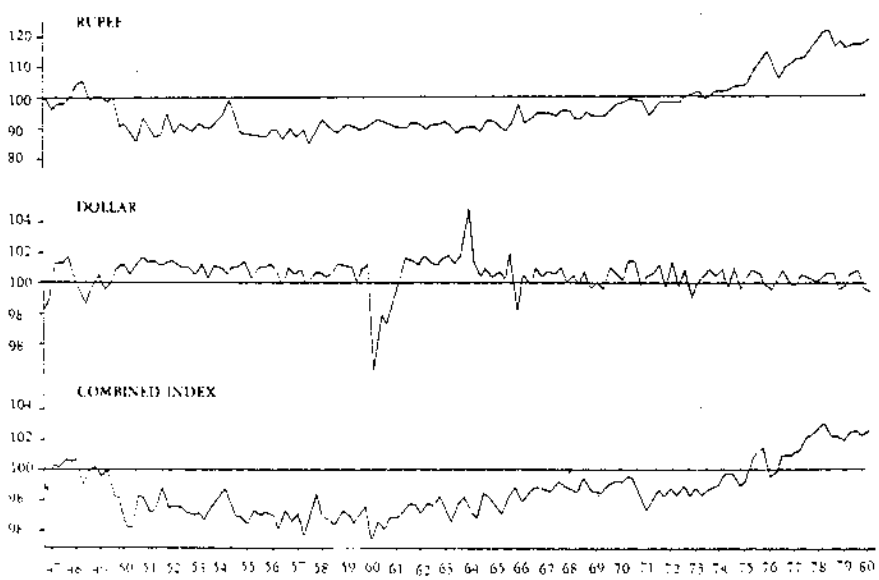
[13] Kindahl "Economic Factors", especially pp. 470-3.

Figure 1: Quarterly indices of sterling exchange rates, 1847-1880




PERIOD: june 1847-DECEMBER 1880

Figure 1 (Continued): Quarterly indices of sterling exchange rates, 1847-1880
(March 1850 = 100 (NB. RUPEE IS DRAWN TO DIFFERENT SCALE)




PERIOD: JUNE 1847-DECEMBER 1880

TABLE 1

STABILITY OF INDICES OF STERLING EXCHANGE RATES

(a) All series, quarterly 1847-80.

| Currency | Mean | Standard Deviation | Coefficient of Variation (%) | Range |
|---|---|---|---|---|
| Dollar | 100.5 | 1.03 | 1.03 | 94.5 - 105.0 |
| Franc | 99.5 | 0.85 | 0.86 | 97.7 - 102.7 |
| Guilder | 99.4 | 1.97 | 1.98 | 95.9 - 102.8 |
| Mark | 98.5 | 1.93 | 1.96 | 95.2 - 102.9 |
| Rupee | 96.8 | 8.58 | 8.88 | 85.0 - 120.8 |
| Combined Index | 98.6 | 1.67 | 1.69 | 95.2 - 103.0 |

(b) Comparison with post-1870s period.

| | Coefficient of Variation (%) | Period |
|---|---|---|
| Mark | 0.24 | Oct. 77 - July 1914 * |
| | 1.96 | II. 47 - IV. 80. |
| Franc | 0.25 | Oct. 77 - July 1914 * |
| | 0.77 | II. 50 - IV. 80. |
| Dollar | 0.34 | Jan. 79 - July 1914 * |
| | 0.67 | II. 47 - III. 60, IV. 66 - IV. 80. |
| Combined Index | 1.72 | II. 50 - IV. 80 |
| | 1.77 | II. 50 - III. 60 IV. 66 - IV. 80. |

(Roman numerals refer to quarters)

*Sources:* Appendix and * Oskar Morgenstern *International Financial Transactions and Business Cycles* (Princeton University Press, Princeton 1959), Table 36, pp. 193-7.

more formally the measures of dispersion for the whole series, and these confirm the general impression of stability. The composite index, of course, captures the sum change in its components and it is clear from the rest of Table 1 that in general the value of the pound against all individual currencies, with the important exception of the rupee, was also fairly steady. Such a conclusion is a matter of judgement, of course — the coefficients of variation are generally low, but it could be argued that the extreme scores indicate the extent of adjustment possible. Morgenstern has provided comparable statistics on three sterling exchange rates (dollar, franc, and mark) for the post-1870s period and these provide one convenient yardstick against which to assess the stability of the new exchange indices.[14] Section (b) of Table 1 details the coefficients of variation for the relevant exchange rates over different periods. It is immediately apparent that the pre-1880s stability was not as great as during the classical gold standard

[14] Oskar Morgenstern *International Financial Transactions and Business Cycles* (Princeton University Press, Princeton 1959), Table 36, pp. 193-7.

period, the earlier period did not have the fixed exchange rate regime of later years. This is as expected — given the much wider adoption of a formal gold standard and the general improvements in international communications by the late nineteenth century — but it does not detract from the fact that a high degree of stability also existed before 1880. Indeed, exclusion of the pre-1850 years of political revolution and currency inconvertibility for the franc and of the Civil War period for the dollar, highlights the main finding: that sterling exchange rates were normally quite stable (Table 1(b) for detail). However, this was much less true for the rates of exchange with silver-based currencies, particularly the rupee, than with the dollar and franc and this discrepancy will be discussed in some detail below. Finally, it should be noted that the stability of the overall composite index partly arises from the heavy weighting given to the relatively stable gold dollar, especially as there was a tendency for changes in the dollar rate to be inversely correlated to changes in other rates (see Table 2).[15]

TABLE 2

CORRELATION COEFFICIENTS BETWEEN PAIRED STERLING EXCHANGE RATES, QUARTERLY 1847-80

| | Franc | Guilder | Mark | Rupee | Combined Index |
|---|---|---|---|---|---|
| Dollar | − 0.20* | − 0.22* | − 0.19* | − 0.23* | − 0.04 |
| Franc | | 0.63* | 0.55* | 0.47* | 0.49* |
| Guilder | | | 0.86* | 0.78* | 0.80* |
| Mark | | | | 0.89* | 0.88* |
| Rupee | | | | | 0.94* |

* Significant at the 0.05 level.

(Neither seasonal nor trend factors strongly affected these correlations, and the results here refer to the untreated data).

[15] The series produced in Davis and Hughes "Dollar-Sterling Exchange" also exhibits a great deal of stability although the authors are keen to compare it adversely to the late nineteenth century:

> "It appears that the exchange rate stability commonly associated with the pre-1914 gold standard was a characteristic of the dollar-sterling exchange rate only after the early 1870s. Before that time the dollar-sterling rates varied widely; and these short fluctuations constitute (except for 1861-5) an indicator of the rate of internal US expansion (or stagnation)". (p. 69).

However, their conclusion now carries less credence for the two latest, revised dollar-sterling rate series both show greater stability. The two new rates, of course, are those in Perkins "Revised Series" (where the same basic source as Davis-Hughes is used but is modified with the use of a London rate of interest) and in the present paper (where a different source but a London interest rate is also employed).

Yet, despite its overall stability, some important variations do occur in the composite index. these take two forms:

(a) secular changes associated with the depreciation of the pound during the 1850s and the gradual improvement of the 1870s, and

(b) short-term oscillations related to particular political or business cycle episodes.

## IV

Much of the secular change seems explainable in terms of alterations in world demand and supply conditions for monetary silver and gold. The most important monetary phenomenon of the 1850s was the sharp increase in the supply of new gold consequent upon the discovery of goldfields in California in 1848 and in Australia three years later. The scale of the new bullion flow was unprecedented. Although detailed estimates vary somewhat, Table 3 reproduces representative output figures presented to the British Royal Commission on Gold and Silver, 1887. These show the marked rise in the output of the gold mines: in volume terms, it more than doubled from the 1830s to the 1840s; and then rose by almost eight-fold in the 1850s. Even though silver production also increased it failed to keep pace, with the result that whereas gold had accounted for about one-half of the value of the combined output in the 1840s this leapt to over three-quarters in the following decade. An earlier British enquiry, in 1858, had marvelled at the sharp increase in the flow of bullion to Europe, referring to the "importation of gold and silver on a scale unknown in history since the period which immediately succeeded the first discovery of America".[16]

The expectation, therefore, is that such an unprecedented change in the supply of new precious metal would have seriously affected the relative values of currencies based on gold, silver, or a combination of the two. Movements in the new exchange rate indices directly reflect this realignment. Thus, the composite index shows a definite fall of some 2-3 per cent in the value of the gold pound *vis à vis* all the other currencies in the early years of the fifties and it remains at this lower level for two decades, although there is a slight tendency for it to rise towards the end of the sixties. The impact of the gold discoveries is even more obvious from changes in the component indices. Against the gold dollar the pound did not weaken; depreciation against the bimetallic franc was mild (at about one per cent.); against the silver European currencies, the guilder and mark, the pound's weakening was more noticeable (c. three per cent. during the 1850s); and the fall against the silver rupee was the most severe, being in the order of 10-12 per cent.

Thus, the new exchange series capture the secular realignments to be expected in the early fifties. Perhaps just as interesting though, is the fact that despite the extent of changes in the world's supply of new gold, the degree of realignment was not much greater. Indeed, while movements in the price of

[16] *Report of the Select Committee on the Bank Acts*, P.P. 1857-8, V. p.V.

silver and in the silver: gold price ratio confirm the steady, long-term appreciation of the lesser of the precious metals, they also illustrate the apparently undramatic nature of the impact of the new gold, especially when compared to the changes that were to come in the 1870s. (See Table 4). Part of the explanation is that any one year's supply of new gold must have been but a very small addition to the total stock. For Europe, however, another important influence was the part financial markets played in ensuring the wide dispersal of the new gold. The new gold was spread thinly throughout many countries in the developed world and led to the redistribution and loss of existing European stocks of precious metals. Thus, the relatively small changes in the silver: gold price ration enabled arbitrageurs to reap rewards from shifting bullion across international boundaries, easing the absorption into Europe of the flow of treasure from the New World.

The role of France and others with bimetallic currencies was central to the readjustment.[17] Initially much of the new gold found its way to the London bullion market, but the fall in the market value of gold relative to silver meant that the French and other official mint prices which were maintained at the old rate, now undervalued silver (overvalued gold). The silver and bimetallic countries found themselves the agents of powerful market forces, for as exchange rates reflected the disequilibrium between official and market prices the well-known Gresham's law came into operation — gold flowed in, and silver flowed out. Very quickly the almost-exclusively silver French coinage was displaced and the franc (as the dollar) became a *de facto* gold currency. The experience of other European currencies depended upon the nature of their currency arrangements but the overall effect was the same, gold displaced silver and silver was lost from circulation.[18] This dispersal effect became known as the "parachute" for it softened the impact on the market price of gold and, as a result, on the relative value of sterling.[19] It both absorbed a great deal of the new gold into monetary use and simultaneously offset this increase to the European bullion stock by encouraging the drain of silver from the developed world. Much of the silver flowed to the Far East, to China and especially to India, where it formed the basis of local currencies, was in heavy demand and was used by the West to cover its net deficit on eastern trade. Political factors served to reinforce market pressures. Thus, disturbances in China from 1853 and the Indian Mutiny of 1857 enhanced Asian demands for cash. The Indian disturbances also entailed the raising of special loans and the remittance of funds from London. In all,

[17] Much of the contemporary debate is contained in Richard S. SAYERS "The Question of the Standard in the Eighteen-Fifties" *Economic History* (supplement to Economic Journal), II, 1933, pp. 575-601; and DAVID A. MARTIN "The Impact of Mid-Nineteenth Century Gold Depreciation upon Western Monetary Standards" *Journal of European Economic History*, VI, pp. 641-58.

[18] MARTIN "Gold Depreciation" pp. 652-6.

[19] MICHEL CHEVALIER *On the Probable Fall in the Value of Gold* (1859, reprint Greenwood Press, New York 1968).

contemporaries saw this continued drain of silver to the East as the main reason why the monetary disturbances of the new gold had not been more severe. In a retrospective, the *Economist* summarised the general view:

> "These shipments of silver to the East have thus indirectly been one of the chief means of absorbing our gold reserves in filling up the vacuum in France caused by the abstraction of silver".[20]

This, then, would seem to offer a reasonable explanation of the 1850s secular change in sterling exchange rates; an explanation which embraces both the relative degree of sterling depreciation against different currencies, and the comparatively modest extent of the depreciation overall.

The other major secular change was the turnaround and rise in the value of sterling from the 1870s. The explanation here is well-known, but it is no less intricate than that for the 1850s and again relates to the market price of gold and silver — to changes in relative demand and supply. On the supply side, existing gold mines continued to produce, but at a diminishing rate, and there were to be no new significant discoveries until the 1890s.[21] Meanwhile silver output increased with new finds, most notably in Nevada. (See Table 3). Thus, by the late 1860s supply conditions were already tending to put pressure on the price of silver (see Table 4). More importantly, however, there were changes in demand which led to the sterilization of a larger proportion of the world's monetary gold

TABLE 3

WORLD PRODUCTION OF PRECIOUS METALS, 1831-80

| Period | Weight (tonnes) | | Value | | | |
|---|---|---|---|---|---|---|
| | Gold | Silver | Million Marks | | Percentage share | |
| | | | Gold | Silver | Gold | Silver |
| 1831-40 | 20.3 | 596.5 | 56.6 | 105.6 | 35 | 65 |
| 1841-50 | 54.3 | 780.4 | 152.3 | 137.4 | 53 | 47 |
| 1851-60 | 401.2 | 1791.1 | 1119.2 | 325.1 | 77 | 23 |
| 1861-70 | 380.1 | 2440.3 | 1060.4 | 439.0 | 71 | 29 |
| 1871-80 | 346.3 | 4419.7 | 966.2 | 726.7 | 57 | 43 |

*Source: Report of the Royal Commission... (on) Recent Changes in the Relative Prices of the Precious Metals...* (P.P. 1887, XXII), Appendix III, p. 318, original data from A.D. Soetbeer "Materialien...".

[20] Vol. XIII, 10 November 1855, p. 1229. Among the best contemporary discussions see FRANCIS JOURDAN "The Effect of the Gold Supplies on the Foreign Exchanges between the United Kingdom and Foreign Countries, and on the Price of Silver" *Journal of the Statistical Society*, XXIV, 1861, pp. 38-54; and J.E. CAIRNES *Essays in Political Economy: Theoretical and Applied* (Macmillan & Co. 1873) especially pp. 98-9, 164-5.

[21] ROBERT GIFFEN "Trade Depression and Low Prices" *Contemporary Review*, XLVII, 1885, p. 814 provides some early figures. The article is reproduced in his *Essays in Finance: Second Series* (2nd ed., Geo. Bell & Sons. 1887).

TABLE 4

THE VALUE OF SILVER, 1846-80

| | a) Silver: Gold Ratio | b) London Price of 1 oz. of Standard Silver (pence) |
|---|---|---|
| 1846-50 | | 59.4 |
| 1851-55 | 15.3 | 61.2 |
| 1856-60 | 15.3 | 61.7 |
| 1861-65 | 15.3 | 61.3 |
| 1866-70 | 15.4 | 60.6 |
| 1871-75 | 15.9 | 59.1 |
| 1876-80 | 17.9 | 52.7 |

*Sources:* a) Calculated from Table 2 of A.D. Soetbeer's paper contained as Appendix XVI of the *Report of the Royal Commission... (on) Recent Changes in the Relative Prices of the Precious Metals...* (P.P. 1888, XVI), p. 620; b) Calculated from Appendix 1 (presented by Pixley) of the *Report of the Royal Commission... (on) Recent Changes in the Relative Price of the Precious Metals...* (P.P. 1887, XXII), pp. 314-5.

and a fall-off in the demand for silver. The 1870s witnessed a switch by a number of leading countries from silver or silver-related currencies to gold-based currencies. Most significantly, the new Germany led the way by providing for the issue of gold coins in 1871 and by establishing a gold standard in 1873. This necessitated the purchase and accumulation of gold reserves while allowing the release of silver. The growing "glut" and falling price of silver added to the general pressure on those countries operating silver currencies: Holland (between 1872 and 1877), and a number of other European countries soon followed Germany's lead, technical changes introduced between 1873 and 1878 placed the formally bimetallic franc even further into the gold camp; and in 1879 the USA went onto a *de facto* gold standard.[22] In the following decades the internalization of gold was to continue but the impact on the silver/gold price ratio, and on the relation of gold and silver currencies, was already apparent by the 1870s.

The changes are reflected in the new exchange rate series, where the composite index records a general appreciation in the value of the gold pound. From its nadir of 95.18 at the end of 1860 the index registers a gradual rise, barely perceptible at the turn of the decade but which gradually gathered momentum from 1873 and ended with a sterling appreciation of about 6% against the basket of currencies by 1880. Again sterling's performance against individual currencies varied. As we would expect, against the gold dollar there is no significant change on trend and only relatively minor short-term fluctuations *excepting* the politically disturbed period of the Civil War and concomitant Cotton Famine.

[22] A.G. KENWOOD and A.L. LOUGHEED *The Growth of the International Economy 1820-1960* (Geo. Allan & Unwin 1971), pp. 120-2 provide a convenient summary of the spread of the system. Leland B. YEAGER *International Monetary Relations: Theory, History and Policy* (2nd ed., Harper & Row, New York 1976), pp. 295 f., and MARCELLO DE CECCO *Money and Empire: The International Gold Standard 1890-1913* (Basil Blackwell, Oxford 1974) Chapter 3, provide more detail.

The sterling franc rate was also very stable over the long-term — the sharp changes during 1870-73 and the first half of 1878 being associated with special circumstances. These circumstances were, first, the Franco-Prussian War of 1870 and the subsequent political and economic upheaval in France which led to the suspension of exchange quotations altogether at the end of 1870 and to the introduction of restrictions on specie payments, 1870-77. In particular, the need of the French to pay war indemnities to Germany in specie or "hard" currencies necessitated the purchase of increased amounts of foreign exchange, including sterling, and partially accounts for the relatively high value of the index during 1870-73. The second "kink" in the sterling: franc exchange series in early 1878 may be directly attributable to the uncertainty associated the position of France and her Latin Union partners with regard to their new "limping" gold standard. Thus, the exchange rate against the nominally bimetallic franc would seem to have been almost as stable as against a full gold currency, although it was the deteriorating position of silver which ultimately brought about the changed status of the franc. The fact remains that, ignoring the two aberrations, the index registers remarkable stability with only a 1% or so rise in the value of sterling against the franc for the 1870s as a whole.

It is against the silver-backed currencies, of course, that we might expect to find the largest changes in the value of sterling in these years. The pound did, indeed, appreciate against the mark, guilder and rupee but, as for the earlier period, there were important differences of degree. For the 1860s and early 1870s in general, the silver mark could be considered to have depreciated on trend but to only a very modest extent, of some 2%, 1860-72. Similarly, over the same period, the silver guilder depreciated too, but by a more significant 5% or so. It should be noted, however, that even after the change to gold these two European currencies continued to fall against sterling, by some 2-3%, 1874-80. Thus, movements in the silver: gold price ratio do not provide a full explanation for changes in sterling rates. But the change from silver to gold for the mark and guilder has meant that these two indices do not capture the full impact of the silver depreciation of the 1870s.

It is the sterling: rupee rate which fully reflects the relative fortunes of the precious metals, for India remained on silver. Here the most dramatic changes are registered: sterling generally strengthened against the rupee in the 1860s; there was then a sharp rise in 1872/3, with the gains being maintained and consolidated through the 1870s. In all, sterling rose by over 23% against the rupee from 1872 to its peak in March 1879 before falling back somewhat, to about 120% of its 1872 value; and the pound was to continue to grow in strength *vis à vis* the rupee far beyond the close of our period.[23] Although Anglo-Indian trading and financial relations continued to develop and expand throughout, the depreciation of the rupee, nevertheless, proved to be an element of instability.[24]

[23] *Index Number of Indian Prices, 1861-1931* (Department of Commercial Intelligence and Statistics, India (1933)) Table XI, p. 18.

[24] RADHE SHYAM RUNGTA *The Rise of Business Corporations in India, 1851-1900*

Naturally it tended to cheapen Indian goods on world markets, reportedly favouring domestic producers while operating against the interests of importers who relied heavily on European, especially British, supplies. Also the exchange rate oscillation and accompanying higher risk associated with the depreciation may well have deterred both commodity and capital flows. Finally — and this was to prove decisive in bringing about ultimate currency reform — the fact that heavy official remittances had to be made regularly to London in either gold or sterling, meant that the fall in the gold sterling price of the rupee sharply added to this burden. Reform was to come in 1893 when the issue of silver coins was restricted and the rupee was placed on a gold exchange standard.

Returning to the general picture, the new exchange rate series show clearly that the trend value of sterling was more obviously affected by the "gold shortage" of the 1870s than the release of new gold in the 1850s. Thus for Britain the 1870s were marked by an appreciating currency, and this phenomenon was due in part to the same international monetary changes which are often said to have been an important constituent of the explanation of the so-called "Great Depression".[25] The falling import prices of the depression were accompanied by a rising rate of exchange against foreign currencies.

## V

Apart from these important secular changes in the pound's international value, what do the new series reveal of shorter-term fluctuations? We have already looked at instances of particularly sharp fluctuations which seem to be related to extraordinary circumstances pertaining to the country or countries concerned, such as the American Civil War, or the Franco-German War of 1870. Similarly, the political unrest on the Continent in 1848, and its accompanying financial instability (e.g. French suspension of specie payments in 1848), was probably an important factor in the pound's strength at that time, and its subsequent depreciation in the early fifties as greater European stability returned. By their very nature, such disturbances to the foreign exchanges were usually of short duration and, indeed, a quarterly index may be insufficient to capture many of them. In addition to these, there also seem to be some more

(Cambridge University Press, 1970), pp. 127, 154-6, 175, 184-5; de Cecco *Money and Empire*, chapter 4; Daniel H. Buchanan *The Dovelopment of Capitalist Enterprise in India* (Macmillan, New York 1934), pp. 155, 318-9, 474. For a brief history of the major technical changes affecting the rupee see John Maynard Keynes *Indian Currency and Finance* (Macmillan & Co., 1913) especially chapters 2 and 12. On Anglo-Indian trade see S.B. Saul *Studies in British Overseas Trade, 1870-1914* (Liverpool University Press, 1960) chapter 8.

[25] The most convenient review of the literature on the Great Depression is S.B. Saul, *The Myth of the Great Depression 1873-1896* (Macmillan & Co., 1969). Specifically on import prices see G.M. Meier "Long Period Determinants of Britain's Terms of Trade, 1880-1913" *Review of Economic Studies*, XX, 1953, pp. 115-30.

systematic short-term oscillations. Of special interest is the apparently close cyclical experience of the European exchanges, revealed in the graphs in Figure 1. The high correlation coefficients reported for each pair of European rates (guilder, mark and franc) in Table 2 would seem to be capturing not only the common trend elements already discussed, but also a shared cyclical experience. Thus, dating peaks and troughs in the value of the pound against the three currencies gives the chronology listed in Table 5.

TABLE 5

DATES OF CYCLICAL TURNING POINTS IN EUROPEAN STERLING EXCHANGE RATES, 1850-70

| Value of Sterling against | Peaks | Troughs |
|---|---|---|
| Guilder | II.52 I.56 - I-II.61 (III.65) II.69 | IV.50 I.54 - II.59 III.62 (II.66) |
| Mark | I-II.52 I.56 (III.58) III.61 - II.69 | IV. 50 IV.53 (III.56) II.59 I.64 |
| Franc | III.52 I.56 - III.61 | IV.50 I.54 III.56 - 1.57 |

*Notes:* Roman numerals refer to quarters. In a number of instances more than one date is given (See Appendix for details). Parentheses are used where an "extra" turning point could be specified for a particular exchange rate.

The relationship between the sterling exchange rates with the guilder and mark is particularly close, at least until the introduction of new currency arrangements in the early 1870s; and the franc, too, seems to share this relationship, at least until the early 1860s. In other words, within narrow limits the value of sterling against the Continental currencies was subject to cyclical oscillation and it tended to rise and fall in unison during the early years of the period, less so later. Obviously the fact that all three are sterling rates holds part of the explanation — all rates have the pound as denominator — but the dollar rate does not share these regular turning points. Geographical proximity, the closer integration of product and finance markets than could exist for non-Continental countries, and the common dependence on silver, may have all been important. As for longer-term factors, this last point may have been significant for the silver rupee showed a number of the common turning points. Obviously more research is needed here before any firm conclusions can be drawn. Even so, returning to our general theme, it can be said that for the European rates the oscillations occurred within a relatively narrow range and that overall the value of sterling was fairly stable.

## VI

The new quarterly exchange rate series presented in this paper should, in themselves, be of use for a more detailed study of short-term fluctuations in the exchanges and in related economic series, such as interest rates and gold flows.

The general finding of relatively stable exchange rates for the U.K. through the middle years of the nineteenth century also has implications for future research. Thus, long-term exchange rate stability suggests that relative changes in productivity and competitiveness between Britain and her trading partners were not greatly reflected in exchange rate movements but were to be found in trade flows, in shifts in the share of world markets.

There are also implications for the study of price movements and the international adjustment mechanism. We have seen from very recent experience in Europe and America that fixed exchange rates are only tenable if there are no sharp changes in the general level of domestic prices. Thus, successful maintenance of reasonably stable exchange rates over a 34-year period in the mid-nineteenth century implies that changes in domestic prices were not unduly severe in those years. And the fact that exchange rate stability was achieved at a time when sterling was wedded to gold and when the Bank of England held comparatively small gold reserves, adds strength to this implication of stable prices.[26] An alternative explanation would have to lie in the presumed efficacy of some international adjustment mechanism operating in such a way as to have greatly eased the burden of adjustment to balance-of-payments' disequilibria (and, therefore, avoided sharp changes in the exchange rate). Could this have been the "see-saw" oscillation of the specie flow/price mechanism, whereby deficit countries incurred domestic price deflation; and surplus countries, inflation? Little work has been carried out on the period, but research into the late nineteenth and early twentieth centuries would suggest this was unlikely.[27] Is it more probable, then, that price movements were commonly-shared among the main trading nations — with competition, arbitrage and capital flows ensuring the international transmission of market pressures? If so, could domestic price movements have occurred in Britain without getting too far out of line with her main competitors, especially for internationally-traded commodities?[28] Obviously much more research is required here, but the finding of reasonably stable sterling exchange rates provides one of the basic parameters in any future studies of the international adjustment mechanism during the mid-nineteenth century.

The findings in this paper similarly have a bearing on future research into domestic monetary conditions in Britain. Within the tolerably stable exchange

[26] It is true that the British government had to make provision for the brief suspension of the "convertibility legislation" on three separate occasions (1847, 1857 and 1866) but, as has been shown, on the whole the mid-nineteenth-century gold standard was a stable one for Britain.

[27] BLOOMFIELD, *Monetary Policy*, pp. 35-6; and ROBERT TRIFFIN, *The Evolution of the International Monetary System: Historical Reappraisal and Future Perspectives* (Princeton Studies in International Finance, No. 12, Princeton, 1964), pp. 3-4.

[28] MCCLOSKEY and ZECHER "How the Gold Standard Worked", have suggested that for the period, 1880-1913, exchange rate stability was dependent on the efficiency of international commodity arbitrage.

rate regime that has been shown to have existed, it would be a reasonable expectation to discover that the powers of the "monetary authorities" to alter the size of the domestic money stock were somewhat circumscribed. The sort of exchange rate movements revealed would permit some flexibility, but policy which resulted in a rate of change in the money stock out of line with that of Britain's major trading partners and which, in turn, led to changes in relative prices, would soon invoke equilibrating pressures. The expectation would be particularly strong for a country like the U.K. whose "central bank" was legally obliged to maintain convertibility of the currency into gold, and which permitted the free international movement of specie and bullion. Moreover, those responsible for monetary policy were operating within an atmosphere of public debate dealing with the efficacy of external constraints on Bank of England policy and with the relationship between the exchange rate, gold flows, interest rates and the money supply.[29] Thus, a case could be made that not only were there real external constraints on domestic monetary policy arising out of the relative stability in the exchange rate, but also that the chief instigator of policy, the Bank of England, may well have perceived itself as being bound by such constraints. If true, then much of the external influence of Britain's gold standard which Huffman and Lothian have suggested "may have been absent" for this period was, in fact, present. Of course, such a conclusion follows directly from our findings of a stable — though not fixed — sterling exchange rate. Having established that such an exchange rate regime existed it would now seem possible to conduct further research into the nature of these external constraints on British monetary policy. In particular, earlier findings on the response of Bank of England interest rates, assets, and liabilities, to exchange rate movements, international gold flows, and international interest rate differentials, could be pursued in greater depth. It should be possible to discover if the policy of the Bank of England was any less bound up with the "external influence" of the exchange rate in this period than in the classical era of the international gold standard. The findings of this paper suggest that while the Bank of England may not have been as closely constrained as under the truly international gold standard of the late nineteenth century, the nature of the pre-1880s exchange rate regime also imposed important external constraints upon the domestic economy.

[29] Detailed discussion of the nature of the debate is contained in Frank Whitson Fetter, *Development of British Monetary Orthodoxy, 1797-1875* (Harvard University Press, Cambridge, Mass., 1965), p. 144 f.

## Appendix

## INDICES OF STERLING EXCHANGE RATES, QUARTERLY JUNE 1847 - DECEMBER 1880 (March 1850 = 100)

*Notes:*

1. A rise in the index indicates an appreciation of the value of sterling *vis a vis* foreign currency; and vice versa.

2. Conversion of index to currency ratios:
At March 1850 = 100

| | | |
|---|---|---|
| 25.497 | francs | = £ 1 |
| 12.048 | guilders | = £ 1 |
| 4.858 | US dollars | = £ 1 |
| 10.916 | rupees | = £ 1 |
| 13.695 | mark bancos | = £ 1 |

(June 1873: 20.073 reichsmarks = £ 1).

| Date | | Franc | Guilder | Mark | Dollar | Rupee | Combined Index |
|---|---|---|---|---|---|---|---|
| 1847 | 2 | 101.66 | 100.32 | 98.14 | 97.98 | 100.91 | 99.24 |
| | 3 | 100.85 | 100.32 | 98.68 | 98.87 | 95.56 | 98.55 |
| | 4 | 100.95 | 100.42 | 98.82 | 101.24 | 98.52 | 100.32 |
| 1848 | 1 | 102.67 | 100.82 | 99.62 | 101.24 | 97.93 | 100.22 |
| | 2 | 100.61 | 100.92 | 98.92 | 101.75 | 100.40 | 100.72 |
| | 3 | 100.01 | 100.02 | 98.13 | 100.22 | 104.70 | 100.62 |
| | 4 | 100.21 | 100.51 | 99.31 | 99.42 | 105.22 | 100.72 |
| 1849 | 1 | 99.51 | 99.41 | 99.01 | 98.72 | 99.22 | 99.01 |
| | 2 | 100.70 | 99.71 | 99.60 | 99.81 | 100.61 | 100.00 |
| | 3 | 100.40 | 100.41 | 99.80 | 100.51 | 99.81 | 100.20 |
| | 4 | 100.30 | 99.50 | 99.90 | 99.60 | 99.01 | 99.60 |
| 1950 | 1 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| | 2 | 100.00 | 99.60 | 99.20 | 100.90 | 91.00 | 98.35 |
| | 3 | 99.20 | 98.90 | 98.41 | 101.20 | 91.27 | 98.25 |
| | 4 | 97.81 | 96.53 | 95.75 | 100.49 | 88.53 | 96.48 |
| 1851 | 1 | 98.01 | 97.01 | 97.18 | 101.10 | 85.44 | 96.39 |
| | 2 | 98.01 | 97.21 | 96.80 | 101.60 | 93.47 | 98.41 |
| | 3 | 98.50 | 98.08 | 97.78 | 101.30 | 91.04 | 98.12 |
| | 4 | 98.69 | 97.39 | 97.76 | 101.40 | 87.40 | 97.33 |

## INDICES OF STERLING EXCHANGE RATES
## QUARTERLY JUNE 1847 - DECEMBER 1880 (March 1850 = 100)

| Date | | Franc | Guilder | Mark | Dollar | Rupee | Combined Index |
|---|---|---|---|---|---|---|---|
| 1852 | 1 | 99.29 | 98.47 | 98.55 | 101.09 | 87.66 | 97.53 |
| | 2 | 99.48 | 98.96 | 98.55 | 101.20 | 94.67 | 98.99 |
| | 3 | 98.99 | 98.27 | 97.66 | 101.40 | 88.14 | 97.60 |
| | 4 | 98.49 | 97.28 | 96.39 | 101.09 | 91.58 | 97.70 |
| 1853 | 1 | 98.19 | 97.77 | 96.97 | 100.99 | 90.48 | 97.60 |
| | 2 | 98.10 | 97.57 | 97.16 | 100.89 | 88.94 | 97.31 |
| | 3 | 97.80 | 97.09 | 95.80 | 100.49 | 91.52 | 97.21 |
| | 4 | 97.90 | 96.31 | 95.23 | 101.19 | 90.69 | 97.21 |
| 1854 | 1 | 97.71 | 95.92 | 95.70 | 100.38 | 90.60 | 96.82 |
| | 2 | 97.80 | 96.79 | 95.99 | 101.09 | 92.32 | 97.60 |
| | 3 | 98.10 | 96.98 | 96.47 | 100.98 | 94.91 | 98.18 |
| | 4 | 98.29 | 96.98 | 95.80 | 100.58 | 99.28 | 98.77 |
| 1855 | 1 | 98.49 | 97.47 | 97.81 | 101.08 | 92.23 | 98.08 |
| | 2 | 98.39 | 97.86 | 96.54 | 101.08 | 88.63 | 97.10 |
| | 3 | 98.79 | 97.56 | 96.34 | 101.29 | 88.36 | 97.00 |
| | 4 | 99.08 | 97.56 | 96.92 | 100.17 | 87.48 | 96.62 |
| 1856 | 1 | 99.58 | 98.63 | 97.99 | 101.07 | 87.31 | 97.30 |
| | 2 | 99.28 | 97.94 | 97.20 | 101.07 | 87.57 | 97.10 |
| | 3 | 99.08 | 96.87 | 95.74 | 101.17 | 90.02 | 97.30 |
| | 4 | 98.78 | 96.09 | 95.84 | 100.97 | 90.02 | 97.10 |

## INDICES OF STERLING EXCHANGE RATES
## QUARTERLY JUNE 1847 - DECEMBER 1880 (March 1850 = 100)

| Date | | Franc | Guilder | Mark | Dollar | Rupee | Combined Index |
|---|---|---|---|---|---|---|---|
| 1857 | 1 | 98.78 | 96.76 | 96.61 | 99.96 | 86.96 | 96.23 |
| | 2 | 98.98 | 97.73 | 96.41 | 101.06 | 90.00 | 97.39 |
| | 3 | 98.78 | 97.15 | 96.41 | 100.66 | 87.84 | 96.70 |
| | 4 | 99.08 | 97.73 | 95.84 | 100.86 | 89.42 | 97.19 |
| 1858 | 1 | 98.98 | 96.36 | 96.60 | 99.95 | 84.95 | 95.63 |
| | 2 | 98.88 | 96.65 | 97.18 | 100.65 | 89.28 | 97.16 |
| | 3 | 99.37 | 97.42 | 98.25 | 100.75 | 93.30 | 98.52 |
| | 4 | 99.18 | 98.64 | 96.97 | 100.45 | 90.69 | 96.95 |
| 1859 | 1 | 99.08 | 96.84 | 96.59 | 100.75 | 89.51 | 96.75 |
| | 2 | 98.98 | 95.87 | 95.43 | 101.25 | 88.71 | 98.46 |
| | 3 | 99.08 | 96.54 | 96.57 | 101.15 | 91.63 | 97.43 |
| | 4 | 98.98 | 96.06 | 96.67 | 101.05 | 90.90 | 97.13 |
| 1860 | 1 | 98.88 | 96.54 | 96.28 | 100.14 | 89.81 | 96.55 |
| | 2 | 99.08 | 96.73 | 96.47 | 100.94 | 90.26 | 97.03 |
| | 3 | 99.08 | 96.63 | 96.47 | 101.25 | 91.97 | 97.52 |
| | 4 | 99.18 | 96.92 | 96.67 | 94.56 | 92.89 | 95.18 |
| 1861 | 1 | 100.07 | 98.67 | 97.88 | 98.06 | 92.43 | 96.80 |
| | 2 | 99.88 | 98.67 | 97.24 | 97.28 | 91.69 | 96.22 |
| | 3 | 100.17 | 98.57 | 98.41 | 99.03 | 91.05 | 96.89 |
| | 4 | 99.57 | 97.88 | 97.62 | 100.32 | 90.59 | 96.99 |

INDICES OF STERLING EXCHANGE RATES
QUARTERLY JUNE 1847 - DECEMBER 1880 (March 1850 = 100)

| Date | | Franc | Guilder | Mark | Dollar | Rupee | Combined Index |
|---|---|---|---|---|---|---|---|
| 1862 | 1 | 99.37 | 97.59 | 97.62 | 101.52 | 90.50 | 97.18 |
| | 2 | 99.47 | 97.59 | 97.23 | 101.42 | 91.95 | 97.86 |
| | 3 | 99.37 | 97.20 | 97.81 | 101.11 | 91.77 | 97.76 |
| | 4 | 99.27 | 96.81 | 96.93 | 101.82 | 89.84 | 97.18 |
| 1863 | 1 | 99.37 | 97.48 | 96.84 | 101.31 | 91.55 | 97.86 |
| | 2 | 99.37 | 97.58 | 96.74 | 101.21 | 91.45 | 97.76 |
| | 3 | 99.57 | 97.97 | 97.71 | 101.62 | 92.28 | 98.44 |
| | 4 | 99.57 | 98.17 | 97.22 | 101.72 | 90.25 | 97.56 |
| 1864 | 1 | 99.57 | 97.97 | 96.05 | 101.11 | 88.71 | 96.58 |
| | 2 | 99.47 | 98.17 | 96.72 | 102.02 | 91.02 | 97.84 |
| | 3 | 99.76 | 98.66 | 97.50 | 104.98 | 90.29 | 98.33 |
| | 4 | 99.27 | 96.98 | 97.40 | 101.41 | 90.29 | 97.44 |
| 1865 | 1 | 99.37 | 99.67 | 97.50 | 100.39 | 88.76 | 96.86 |
| | 2 | 99.37 | 100.17 | 97.89 | 101.00 | 93.10 | 98.50 |
| | 3 | 99.56 | 100.67 | 98.08 | 100.39 | 92.55 | 98.30 |
| | 4 | 99.17 | 100.27 | 97.89 | 100.69 | 90.51 | 97.62 |
| 1866 | 1 | 99.66 | 100.57 | 98.28 | 100.19 | 88.88 | 97.23 |
| | 2 | 99.16 | 98.86 | 97.10 | 101.89 | 91.90 | 98.10 |
| | 3 | 99.56 | 99.95 | 97.58 | 98.12 | 98.70 | 98.88 |
| | 4 | 99.36 | 99.65 | 97.80 | 100.57 | 91.30 | 97.89 |

INDICES OF STERLING EXCHANGE RATES
QUARTERLY JUNE 1847 - DECEMBER 1880 (March 1850 = 100)

| Date | | Franc | Guilder | Mark | Dollar | Rupee | Combined Index |
|---|---|---|---|---|---|---|---|
| 1867 | 1 | 99.26 | 100.05 | 98.27 | 99.97 | 93.40 | 98.28 |
| | 2 | 99.26 | 100.05 | 98.27 | 100.97 | 94.71 | 98.87 |
| | 3 | 99.46 | 100.65 | 98.76 | 100.36 | 94.80 | 98.87 |
| | 4 | 99.16 | 100.45 | 98.46 | 100.77 | 94.52 | 98.77 |
| 1868 | 1 | 99.26 | 100.25 | 98.56 | 100.56 | 94.05 | 98.68 |
| | 2 | 99.36 | 100.25 | 98.66 | 101.07 | 95.83 | 99.27 |
| | 3 | 99.56 | 100.65 | 99.05 | 100.06 | 94.97 | 98.97 |
| | 4 | 99.36 | 100.75 | 98.96 | 100.46 | 93.74 | 98.77 |
| 1869 | 1 | 99.26 | 101.35 | 98.86 | 99.85 | 93.36 | 98.57 |
| | 2 | 99.66 | 101.96 | 99.25 | 100.75 | 94.95 | 99.46 |
| | 3 | 99.36 | 100.94 | 99.15 | 99.64 | 93.81 | 98.67 |
| | 4 | 99.36 | 100.33 | 98.76 | 100.04 | 93.72 | 98.67 |
| 1870 | 1 | 99.46 | 100.33 | 98.66 | 99.64 | 94.00 | 98.57 |
| | 2 | 99.46 | 100.33 | 98.36 | 100.94 | 96.16 | 99.16 |
| | 3 | 99.06 | 100.44 | 98.56 | 100.63 | 97.89 | 99.36 |
| | 4 | n.a. | 100.33 | 96.46 | 100.13 | 98.38 | 99.26 |
| 1871 | 1 | 99.56 | 100.64 | 98.85 | 101.03 | 99.36 | 99.55 |
| | 2 | 99.85 | 100.94 | 99.25 | 101.34 | 98.96 | 99.36 |
| | 3 | 100.55 | 100.03 | 97.96 | 99.82 | 98.27 | 98.16 |
| | 4 | 101.56 | 100.33 | 97.76 | 100.51 | 93.40 | 97.38 |

INDICES OF STERLING EXCHANGE RATES
QUARTERLY JUNE 1847 - DECEMBER 1880 (March 1850 = 100)

| Date | | Franc | Guilder | Mark | Dollar | Rupee | Combined Index |
|---|---|---|---|---|---|---|---|
| 1872 | 1 | 101.96 | 101.03 | 97.67 | 100.72 | 95.79 | 98.06 |
| | 2 | 100.33 | 101.84 | 99.13 | 101.12 | 98.57 | 98.75 |
| | 3 | 100.93 | 101.64 | 98.73 | 99.60 | 98.47 | 98.25 |
| | 4 | 101.04 | 101.74 | 100.02 | 100.70 | 98.67 | 98.94 |
| 1873 | 1 | 100.33 | 101.53 | n.a. | 99.69 | 98.87 | 98.35 |
| | 2 | 100.83 | 101.74 | 99.12 | 100.89 | 100.35 | 99.03 |
| | 3 | 100.23 | 101.43 | 99.71 | 98.87 | 100.95 | 98.34 |
| | 4 | 100.02 | 101.13 | 100.21 | 99.96 | 102.16 | 98.93 |
| 1874 | 1 | 99.62 | 100.42 | 100.21 | 100.36 | 99.00 | 98.34 |
| | 2 | 99.53 | 100.42 | 100.41 | 100.96 | 100.28 | 98.83 |
| | 3 | 99.53 | 100.32 | 101.01 | 100.35 | 102.29 | 99.03 |
| | 4 | 99.43 | 99.72 | 101.11 | 100.85 | 102.39 | 99.13 |
| 1875 | 1 | 99.53 | 98.62 | 101.42 | 99.75 | 102.70 | 99.83 |
| | 2 | 99.82 | 100.59 | 101.42 | 101.04 | 103.83 | 99.72 |
| | 3 | 99.52 | 101.10 | 100.30 | 99.63 | 103.21 | 98.92 |
| | 4 | 99.33 | 101.40 | 100.20 | 100.32 | 104.55 | 99.41 |
| 1876 | 1 | 99.62 | 102.01 | 100.90 | 100.83 | 109.15 | 100.61 |
| | 2 | 99.82 | 102.11 | 101.20 | 100.62 | 112.20 | 101.21 |
| | 3 | 99.82 | 102.01 | 100.80 | 99.92 | 114.33 | 101.31 |
| | 4 | 99.52 | 101.80 | 100.70 | 99.62 | 105.42 | 99.59 |

INDICES OF STERLING EXCHANGE RATES
QUARTERLY JUNE 1847 - DECEMBER 1880 (March 1850 = 100)

| Date | | Franc | Guilder | Mark | Dollar | Rupee | Combined Index |
|---|---|---|---|---|---|---|---|
| 1877 | 1 | 99.42 | 101.80 | 100.90 | 100.12 | 105.21 | 99.79 |
| | 2 | 99.62 | 102.01 | 101.20 | 100.92 | 100.52 | 100.99 |
| | 3 | 99.52 | 102.11 | 101.10 | 100.01 | 110.72 | 100.89 |
| | 4 | 99.52 | 102.42 | 101.00 | 100.01 | 111.94 | 101.09 |
| 1878 | 1 | 99.42 | 102.21 | 101.00 | 100.51 | 111.83 | 101.19 |
| | 2 | 102.51 | 102.11 | 102.11 | 100.31 | 113.51 | 102.20 |
| | 3 | 100.05 | 102.62 | 102.11 | 100.11 | 117.25 | 102.30 |
| | 4 | 100.15 | 102.31 | 102.73 | 100.21 | 120.07 | 102.81 |
| 1879 | 1 | 100.04 | 102.21 | 102.83 | 100.61 | 120.79 | 103.02 |
| | 2 | 99.84 | 101.60 | 102.62 | 100.71 | 115.47 | 102.20 |
| | 3 | 100.24 | 102.10 | 102.73 | 99.50 | 117.20 | 102.09 |
| | 4 | 99.94 | 101.90 | 102.21 | 99.80 | 115.68 | 101.89 |
| 1880 | 1 | 100.04 | 102.10 | 102.93 | 100.60 | 116.72 | 102.50 |
| | 2 | 100.34 | 102.21 | 102.93 | 100.80 | 115.79 | 102.50 |
| | 3 | 100.54 | 102.72 | 102.72 | 99.69 | 116.48 | 102.19 |
| | 4 | 100.24 | 102.82 | 102.52 | 99.49 | 118.81 | 102.40 |