What Was the Price of Gold Then? A Data Study

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I. British Official Price of Gold

A. Existing Compilations

Table 1 summarizes salient features of three existing compilations of the British official price of gold over time: Feavearyear, Challis, and Redish. All are inputs into the British official price series in **What Was the Price of Gold Then?** However, they have deficiencies (from the standpoint of presenting an official-price series) that led to the new series provided here.[1] The limitations are of two kinds, common and specific.

Table 1
Compilations of British Official Price of Gold

Source	Period	Frequency	Denomination	Decimal Places
Feavearyear (1963, p. 436)	1257-1717	annual, monthly (1544-1547, 1696)	s, d per fine ounce	1
Challis (1992, pp. 699-758)[a]	1279-1817	exact dates	£, s, d per standard Tower lb. (1279-1523), Troy lb. (1533-1817)	exact
Redish (2000, pp. 91-92)	1343-1717	annual	£ per fine pound	2

[a]1485-1601 also in Challis (1978, pp. 309-329).

Common limitations are as follows. (1) Each of the three is incomplete in coverage. In the aggregate (counting only one price—for example, one coin specification—for each date), Feavearyear and Challis each have 24 new prices over time, and Redish 23; the series in **What Was the Price of Gold Then?** has 30. (2) All three authors complicate the compilation by incorporating mint charges, which, like the official price, changed over time. This inclusion makes their compilations unwieldy for the purpose of expositing the official price.

The specific limitations of Feavearyear are (1) incompleteness of his coverage of mint indentures and (2) inconsistencies and errors in his figures. His virtues are (1) an excellent style of writing and presentation, and (2) inclusion of whatever price changes he could discover, although his compilation remains incomplete.

Specific limitations of Challis are threefold. (1) He lists mint indentures but not Royal Proclamations that changed the official price, with the exception of the Proclamations of 1526. (2) The unit of measurement is not convenient, the pound (Tower or Troy) too large a unit.[2] (3) Challis does not present his series in tabular form; rather, he lists all mint indentures (that he could find) in specific detail.[3] Challis is to be admired for (1) thorough research in identifying all known mint indentures, and (2) provision of the characteristics of these indentures, where available.

There are also three specific problems with Redish. (1) Like Challis, she chooses an inconvenient measure, the (Troy) pound rather than ounce. (2) Her sources are limited to Feavearyear and Challis, neglecting information elsewhere. (3) Her time period is shorter than those of the other two authors. However, Redish deserves credit for (1) overcoming the inconsistencies in these earlier works, (2) distilling excellently the information therein, and (3) employing a useful tabular format.

Table 2 outlines a related compilation of the three authors, namely, specification of the characteristics of British gold coin, an important ingredient into the official price of gold. For Challis and Redish, the same comments as for Table 1 apply, because their summaries of British coin are simply another aspect of their same compilations.

Table 2
Compilations of Specifications of British Gold Coin

Source	Period	Frequency	Coins	Denomination	Decimal Places	
					Fineness	Weight (grains)
Feavearyear (1963, pp. 437-438)	1257-1816	annual, some exact dates	all	s, d	exact	1[a]
Challis (2000, pp. 679-758)[b]	1279-1817	exact dates	all	s, d	exact	1
Redish (2000, p. 75)	1533-1560	exact dates	sovereign	s	exact	2
Redish (2000, pp. 91-92)	1343-1717	annual	one per year	s, d	4	1

[a]Except sovereign: 3.
[b]1485-1601 also in Challis (1978, pp. 309-329).

In addition, it should be noted that the Redish tabulation is incomplete in three respects. (1) She does not consider all coin for each (annual) entry. Rather, she selects only one coin, notwithstanding the fact that there often were multiple gold coins, some of which led to different official prices. In fairness, she deserves praise for choosing the unique coin well, using three criteria: extent of circulation (greater is preferred), fineness

(higher preferred), and period of production (longer favored). (2) In any calendar year only the final coin specification is provided, although occasionally there is more than one change in the coin characteristics during the year. (3) She does not pay attention to sub-denominations of coin.

In contrast, the Feavearyear compilation is more informative, and he strives to make it complete. Arrangement is by coin, chronological for a given coin, including sub-denominations. Unfortunately, some of his information is incorrect and some inconsistent.

B. New Series

1. Characteristics of Coin and Coinage

Table 3—developed for **What Was the Price of Gold Then?—** builds on the work of Feavearyear, Challis, and Redish. None of these authors has complete coverage and there are inconsistencies among them. Therefore additional authorities are used to enhance coverage toward completion and to resolve ambiguities among the three main sources. The table lists, for each gold coin, the date (or year, if precise date is unknown) on which there was the original or an altered specification of the economic characteristics of a coin: fineness, legal value, weight, with the specified characteristics shown.[4] Corresponding information for sub-denominations is provided in notes to the table. Also shown is the value of coinage per Tower (to 1526) or Troy (from that year) pound of gold of that fineness, as stipulated in the associated mint indenture (if such indenture was involved). The final column of the table presents the implied official price of gold, computed in the optimal way from all these data.

Table 3
Elements in British Official Price of Gold

Date	Fineness	Basic Coin				Mint Indenture: Value per pound of gold[a]			Implied Official Price (£ per fine oz.)
		Coin	Value s	Value d	Weight (grains)	£	s	d	
1257	1	penny	1	8	45		____		0.888889*
1265	1	penny	2	0	45		____		1.066667*
1343 (Dec. 4)	1	florin[b]	6	0	108	15	0	0	1.333333*
1344 (July 9)	1	noble[c]	6	8	136.7	13	3	4	1.170370*
1346 (July 28)	1	noble[c]	6	8	128.6	14	0	0	1.244444*
1349 (Jan. 27)	23.875/24	noble[c]	6	8	128.6	14	0	0	1.250960*
1351 (June 20)	23.875/24	noble[c]	6	8	120	15	0	0	1.340314*
1409	23.875/24	noble[c]	6	8	112.5	16	0	0	1.429668*
1413 (April 14)[d]	23.875/24	noble[c]	6	8	108	16	3	4	1.489238*
1464 (Aug. 13)	23.875/24	noble[c]	8	4	108	20	16	8	1.861547*

Table 3
Elements in British Official Price of Gold

Date	Fineness	Basic Coin				Mint Indenture: Value per pound of gold[a]			Implied Official Price (£ per fine oz.)
		Coin	Value s	Value d	Weight (grains)	£	s	d	
1465 (Mar. 6)	23.875/24	ryal[e]	10	0	120	22	10	0	2.010471*
		angel[f]	6	8	80				
1489 (Oct. 28)		sovereign[g]	20	0	240				
1526 (Aug. 22)	23.875/24	sovereign[h]	22	0	240	____			2.211518[i]
		angel[f]	7	4	80				
	unclear[j]	crown [k]	4	6	unclear[l]				unclear
1526 (Nov. 5)	23.875/24	sovereign[h]	22	6	240	____			2.261780[m]*
		angel[f]	7	6	80				
		George noble[n]	6	8	71.1				2.262134
	11/12	crown[o]	5	0	57.3				2.284626
1533 (April 6)	23.875/24	same as for 1526 (Nov. 5)				27	0	0	2.261780
	11/12	crown[o]	5	0	57.3	25	2	6	2.284091*
1544 (May 16)[p]	23/24	sovereign[q]	20	0	200	28	16	0	2.504348[s]*
		angel[r]	8	0	80				
	23.875/24	ryal[t]	12	0	120	____			2.412565
1545 (Mar. 27)	11/12	sovereign[q]	20	0	192	30	0	0	2.727273*
		crown[o]	5	0	48				
1546 (April 1)	5/6	sovereign[q]	20	0	192	30	0	0	3.000000*
		crown[o]	5	0	48				
1549 (Jan. 24)[u]	11/12	sovereign[v]	20	0	169.4	34	0	0	3.090909*
		crown[o]	5	0	42.4				
1549 (April)	23/24	angel[r]	9	8	80	____			3.026087
1551 (Oct. 5)	23.875/24	sovereign	30	0	240	36	0	0	3.015707*
		angel[f]	10	0	80				
	11/12	sovereign[w]	20	0	174.5	33	0	0	3.000000
1578 (Sept. 15)	23.8125/24	angel[r]	10	0	80	36	1	10½	3.031496*
1583 (Jan. 30)	23.875/24	angel[r]	10	0	80	36	0	0	3.015707*
1593 (Jan. 10)	11/12	sovereign[w]	20	0	174.5	33	0	0	3.000000*
1601 (July 29)	11/12	sovereign[w]	20	0	171.9	33	10	0	3.045454*
	23.875/24	angel[r]	10	0	78.9	36	10	0	3.057592
1604 (Nov. 11)	11/12	unite[x]	20	0	154.8	37	4	0	3.381818*
1605 (July 16)	23.875/24	rose ryal[y]	30	0	213.3	40	10	0	3.392670
1611 (Nov. 23)	11/12	unite[x]	22	0	154.8	____			3.719999*
	23.875/24	rose ryal[z]	33	0	213.3				3.731937
1612 (May 18)	11/12	unite[xA]	22	0	154.8	40	18	0	3.718182*
	23.875/24	rose ryal[z]	33	0	213.3	44	11	0	3.731937
1619 (July 31)	11/12	unite[x]	20	0	140.5	41	0	0	3.727273*
	23.875/24	angel[r]	10	0	71.1	44	10	0	3.727749

Table 3 Elements in British Official Price of Gold									
Date	Fineness	Basic Coin				Mint Indenture: Value per pound of gold[a]			Implied Official Price (£ per fine oz.)
		Coin	Value		Weight (grains)	£	s	d	
			s	d					
	11/12	unite[B]	20	0	140.5	41	0	0	3.727273*
1623 (July 17)	23.875/24	rose ryal[y]	30	0	194.2	44	10	0	3.727749
			23	6	154.8				3.971694
	11/12	unite[C]	21	4	140.5				3.975757*
			35	0	213.3				3.958115
1661 (Aug. 26)	23.875/24	rose ryal[D]	32	0	194.2	____			3.976266
1663 (Dec. 24)	11/12	guinea[E]	20	0	129 39/89[F]	44	10		4.045454*
1670 (Oct. 8)	11/12	guinea[G]	20	0	129.4	44	10		4.045454*
1696 (Mar. 25)	11/12	guinea[G]	26	0	129.4	____			5.259091
1696 (April 10)	11/12	guinea[G]	22	0	129.4	____			4.450000*
1699 (Feb. 15)	11/12	guinea[G]	21	6	129.4	____			4.348864*
1717 (Dec. 22)	11/12	guinea[G]	21	0	129.4	____			4.247727*
1718 (May 6)	11/12	guinea[H]	21	0	129.4	46	14	6	4.247727*
1817 (Feb. 6)	11/12	sovereign[I]	20	0	123.3	46	14	6	4.247727*
1817 (July 1)	11/12	sovereign[J]	20	0	123.274	46	14	6	4.247727*
1870 (April 4)	11/12	sovereign[I]	20	0	123.27447	46	14	6	4.247727*

*Entry in series "British official price of gold" in **What Was the Price of Gold Then?**
[a]Tower pound until 1526, Troy pound from that year.
[b]Half-florin and quarter-florin in proportion to florin.
[c]Half-noble and quarter-noble in proportion to noble.
[d]Instituted by Parliamentary Statute in 1412.
[e]Also called new noble, ryal noble, royal. Half-ryal and quarter-ryal in proportion.
[f]Half-angel (also called angelet) in proportion.
[g]Also called double-ryal.
[h]Ryal [half-sovereign] in proportion.
[i]All existing denominations of coin enhanced by 1/10th.
[j]Unclear whether fineness is 11/12 or 23.875/24.
[k]Of the (single) rose.
[l]Unclear whether weight is "approximately 51" or 54 grains.
[m]All existing denominations of coin enhanced again, for total rise of 1/8th. Ratio of value to fine weight [pence per fine grain of gold, computed as product of (i) inverse of fineness and (ii) ratio of value (in pence) to weight (in grains)], is 1.125 for sovereign and angel, 1.125176 for George noble, 1.142313 for crown. Ratio of value to fine weight is proportional to implied official price of gold. Thus, for George noble, implied official price of gold is in line with sovereign and angel (only 0.0156 percent deviation from that for sovereign and angel), but not quite so for crown (1.5389 percent deviation).
[n]Half-George-noble in proportion.
[o]Of the double rose. Half-crown in proportion.

[p]Specification of sovereign and angel in mint indenture of 1542 (May 16), but indenture not proclaimed until May 16, 1544.
[q]Half-sovereign in proportion.
[r]Half-angel and quarter-angel in proportion.
[s]Ratio of value to fine weight [see note m] is 1.252174 for sovereign and angel, 1.206283 for ryal (3.6649 percent deviation from that for sovereign and angel).
[t]Half-ryal and quarter-ryal in proportion.
[u]Mint indenture not found. Some details in indenture for January 29, 1549.
[v]Half-sovereign (at 86 grains) and crown not in proportion to sovereign, but crown almost in proportion. Ratio of value to fine weight [see note m] is 1.416765 for sovereign, 1.395349 for half-sovereign (1.5116 percent deviation from that for sovereign), and 1.415094 for crown and half-crown (0.1179 percent deviation from that for sovereign).
[w]Half-sovereign, crown, and half-crown in proportion.
[x]Double-crown (10s), Britain crown (5s), thistle crown (4s), and half-crown (2s 6d) in proportion.
[y]Spur ryal (15s) and angel (10s) in proportion.
[z]Spur ryal, angel, half-angel, and quarter-angel in proportion.
[A]Unites of this issue sometimes called laurels.
[B]Double crown and Britain crown in proportion.
[C]With respect to unite of 154.8 grains, new/old price ratio for double crown and Britain crown equals that for unite; but ratio for thistle crown and half-crown differs from that for unite by 0.6151 and 0.7092 percent, respectively.
[D]New/old price ratio for spur ryal and for angel equal to that for respective rose ryal; ratios for half-angel and for quarter-angel presumed equal to that for respective angel.
[E]Half-guinea and "the rest of our gold coynes" in proportion.
[F]Derived from statement that 44½ guineas to be coined from one Troy pound of crown (11/12th fineness) gold. With 5760 grains equal to one pound, the implied weight of the guinea is 5760/44.5 = 129$^{39/89}$ grains.
[G]Half-guinea, two-guinea, and five-guinea in proportion.
[H]Quarter-guinea, half-guinea, two-guinea, and five-guinea in proportion.
[I]Half-sovereign, two-pound, five-pound in proportion.
[J]Sovereign declared "current and lawful Money," that is, legal tender. Half-sovereign so declared on October 11.

Sources: *Public General Statutes* (1870, vol. 5, p. 160*), International Monetary Conference* (1879, p. 316), Horton (1887, pp. 229-283), Craig (1953, pp. 102-103, 130, 218, 285), Horsefield (1960, pp. 80-83), Feavearyear (1963, pp. 1-172, 213, 436-438), Li (1963, pp. 37-38, 122-129, 151-157), Officer (1996, pp. 35-36), Challis (1992, pp. 699-758), Redish (2000, pp. 61-63, 74-77, 91-92).

Interesting is that the fineness of gold coins varied not only over time but also with the specific coin at a given point in time. This was the case until the advent of the guinea in 1663, when fineness of 11/12 ("crown gold") became the invariant standard.[5] When gold was first coined, there was no alloy: fineness was unity, later called the "old right standard of England" (Craig, p. 103). Subsequently, fineness of 23.875/24 (formally

23 carats and 3½ grains) was used for so long that it became known as “ancient fineness” or “the ancient standard of England” (Feavearyear, pp. 49, 87). Little known is that there was also limited experience with finenesses of 5/6 and 23/24, as the table exhibits.

The medium for the specification (or change in specification) of a coin was not unique. Indeed, there were six ways in which a coin’s fineness, value, or weight, or the value of its coinage per pound of gold, could be established or changed. These instruments, and the dates of their use (with reference to the entries in Table 3), are as follows:

1. Mint indenture: 1343-1489, 1533, 1544 (sovereign and angel), 1545-1549 (Jan. 24), 1551-1605, 1612, 1623, 1670, 1718, 1817 (Feb. 6).

2. Royal Proclamation changing the value of existing coin: 1265, 1526 (sovereign, angel, and George nobel), 1544 (ryal), 1549 (April), 1611, 1619, 1661, 1717.

3. New coin ordered to be minted, without formal mint indenture: 1257, 1526 (crown), 1663.

4. Act of Parliament establishing or changing the value of existing coin: 1696, 1870.

5. Treasury order changing the value of existing coin: 1699.

6. Royal Proclamation proclaiming existing coin lawful money: 1817 (July 1).

2. Implied Official Price of Gold

Each entry in Table 3 has an implied official price of gold. The methods of computing this price, which has dimension £ per fine ounce, are as follows:

Method A1: (inverse of fineness) X (value, in £, per Tower pound of gold)/11.25

The fineness is always expressed in proportion form, as in the table. Of course, the value in £ is converted from £, s, d, and there are 11.25 Troy ounces per Tower pound.

Method A2: (inverse of fineness) X (value, in £, per Troy pound of gold)/12

There are 12 Troy ounces per Troy pound.

Method B: (480/240) X (inverse of fineness) X (value of coin, in pence)/(weight of coin, in grains)

Of course, the value in pence is converted from s, d. Note that there are 480 grains per ounce and 240 pence per £.

Method C: (1 + E/100) X (previous official price of the coin), where E is the percent enhancement in the price.

Method D: (new price)/(old price) X (previous official price of the coin)

Method E: 480 X (P/20)/(fineness X weight of coin), where P is the price of the coin in shillings.

Of course, there are 20 shillings per pound, and "fineness X weight" is the fine weight of the coin, in grains.

Methods A1 and A2 are preferred to method B, because greater precision is achieved. While the value of a coin can be truncated or rounded, the mint-indenture value per pound of gold is a precise £, s, d valuation. Method B is used when the value per pound of gold is unavailable. Method C is used when applicable (and, of course, when the value per pound is unavailable). The same statement applies to method D. The latter method applies when, instead of a percent enhancement in the price, the proclamation states the new price directly. Method E is used where applicable, only for the guinea.

The method used for the entries in Table 3 are as follows:

Method A1: 1343-1489.

Method A2: 1533, 1544 (sovereign and angel), 1545-1549 (Jan. 24), 1551-1605, 1612-1623, 1663, 1670, 1718-1870.

Method B: 1257, 1265, 1544 (ryal), 1549 (April).

Method C: 1526, 1611.

Method D: 1661.

Method E:1696-1717.

3. Selection of Coin for Official-Price Series

For the British Official Price series in **What Was the Price of Gold Then?** one implied official price must be selected for each year. In fact, the series is end-of-year. The implied prices that constitute the official-price series are indicated by * in the final column of Table 3. The criteria for inclusion or exclusion are as follows:

Criterion a. There is only one coin (possibly with sub-denominations) minted in the year, so the entry is automatically included.

Criterion b. While several coins are ordered to be minted, there is a unique value per pound of gold, or, alternatively (if no value per pound of gold provided), the

value/weight ratio is the same for all coins. Again, inclusion is automatic, with no selection needed.

Criterion [c]. The entry is superseded by another later in the year, therefore the former entry is excluded [square brackets representing exclusion].

Criterion d. The coin is selected by Redish in her compilation (see section A above), and alternative coins for the year are excluded.

Criterion [e]. The entry is excluded as unimportant, because the fineness is obsolete and coinage is small.

Criterion f. A coin not selected by Redish is included, because the entry involves a new official price—providing criterion [e] does not apply.

The entries in Table 3 that are the objects of each criterion are as follows :[6]

Criterion a: 1257-1464, 1578-1593, 1604, 1663-1870.

Criterion b: 1465, 1489, 1526 (Nov. 5), 1544-1549 (Jan. 24).

Criterion [c]: 1526 (Aug. 22).

Criterion d: 1526 (Nov. 5), 1544, 1551, 1601, 1611-1661.

Criterion [e]: 1605-1661.

Criterion f: 1533.

Except for the one-time application of criterion f, the coin selection here is consistent with that of Redish, who chooses coins as follows for her official-price series: florin 1343, nobel 1344-1464, ryal 1465-1492, sovereign 1526-1560, angel 1572-1583, sovereign 1593-1601, unite 1604-1670, guinea 1717.

The coverage of the series here is greater than that of Redish in three respects: the time period is longer (in both directions), the number of specifications for a given coin is complete (as far as can be determined by the authorities cited as sources in Table 3), and all coins giving rise to a given official price are listed.

4. Official-Price Series

The British official-price series is presented with six decimal places in **What Was the Price of Gold Then?** In fact, each element in the series is a rational number, and so can be expressed in fractional form. As an example, consider the official price from 1717 onward. Traditionally, this price was stated in £, s, d per standard ounce, rather than £ per fine ounce (the expression in **What Was the Price of Gold Then?**). In particular, the

price since December 22, 1717, was £3 17s 10½d per standard (11/12th fine) ounce, which is equivalent to £3$_{143/160}$ = £3.89375 (exactly) = 934½d per standard ounce. This price translates into 12/11 X 934.5d = 1019.4545+d = £4.2477272+ = £4 4s 11.4545+d = £4 4s 11$_{5/11}$d = £4$_{109/440}$.

II. U.S. Official Price of Gold

A. Historical Simplicity Compared with British Price

The history of the U.S. official price of gold is simpler than that of the British official price. There are several reasons for this phenomenon:

1. In contrast to the six different ways in which the British official price was established (see section I.B.1), with one of the mediums applying to any given date, the U.S. official price has always been determined in one mode: by Act of Congress. This role of Congress is prescribed in the U.S. Constitution, which states: "The Congress shall have power...to coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures" (Article I).

2. The time period spanned by the U.S. official price is much short than that for the British price, the former beginning in the late 18th, the latter in the mid-13th, century.

3. Unlike the British experience, a unique fineness is specified for all U.S. gold coins at any time.

4. The value/weight ratio of all U.S. gold coin is the same at any point in time, quite different from British coin history in the, turbulent, 1526-1661 period (see Table 3).

B. Existing Compilations

Only two existing compilations of the history of the U.S. official price of gold are of note, and their characteristics are presented in Table 4. The main problem with the Mint Report is its incomplete coverage, with the first (1786) Mint Act of Congress omitted (albeit this legislation was never put into effect) and Acts establishing the $1, $3, and double-eagle coins ignored. A minor criticism is that the gold price is expressed in decimal form rather than as an exact (rational) number. The defects of Officer are omission of the Acts establishing the above coins, expression of the final (1973) price in decimal form, and provision only of the gold content of the dollar rather than the dollar price of gold.

Table 4 Compilations of U.S. Official Price of Gold				
Source	Period	Frequency	Denomination	Decimal Places
Mint *Report* 1980, p. 68[a]	1792-1973	exact dates	standard and pure grains per $, $ per fine ounce	8
Officer (1996, pp. 15-17)	1786-1973	exact dates	pure grains per $	exact, except 1973: 4

[a]Also in earlier *Reports*.

C. New Series

1. Characteristics of Pertinent Legislation

Table 5 lists the characteristics of all Congressional legislation specifying either U.S. gold coin or the U.S. monetary unit. Note that U.S. coin history involves only three different finenesses, rather than the five of British experience. And of the three, the unwieldy fineness of 116/129 (= .8992) was quickly replaced by 9/10. Also of interest is the fact that there is only one U.S.-British shared fineness: 11/12, the final British standard, but only the initial U.S. standard. The relationship among the last three columns of Table 3 is: "fine weight" = fineness X "standard weight." This identity is used to complete gaps in the legal specification. The three components of the identity are expressed as exact numbers: decimal form (if the number has a finite number of decimal places) fractional part (if the decimal component of the number is an infinitely recurring sequence).

Table 5 Legislation Specifying U.S. Gold Coin or Monetary Unit						
		Coin or	Value		Weight (grains)	
Date of Act	Effective Date	Unit	($)	Fineness	Standard	Fine
Aug. 8, 1786	____	eagle[a]	10	11/12	268.656[b]	246.268
April 2, 1792	April 2, 1792	eagle[c]	10	11/12	270	247.5
June 28, 1834	July 31, 1834	eagle[c]	10	116/129[d]	258	232
Jan. 18, 1837	Jan. 18, 1837	eagle[c]	10	9/10	258	232.2[e]
Mar. 3, 1849	Mar. 3, 1849	double-eagle, gold dollar	20, 1	9/10[f]	516, 25.8[f]	464.4, 23.22[f]
Feb. 21, 1853	June 2, 1853	$3 gold coin	3	9/10[g]	77.4[g]	69.66[g]
Feb. 12, 1873	Feb. 12, 1873	gold dollar[i,h]	1	9/10	25.8	23.22[e]
Mar. 14, 1900	Mar. 14, 1900	dollar[i, j]	1	9/10	25.8	23.22[e]
May 12, 1933[k] Jan. 30, 1934[l]	Jan. 31, 1934[m]	dollar[i]	1	9/10	15 5/21	13 5/7[e]
Mar. 31, 1972	May 8, 1972[n]	dollar[i]	1	9/10[o]	14 2/57[b]	12 12/19[p]
Sept. 21, 1973	Oct. 18, 1973[n]	dollar[i]	1	9/10[o]	12 12/19[b]	11 7/19[q]

[a]Half-eagle in proportion to eagle.
[b]Computed here as ratio of fine weight to fineness.
[c]Half-eagle and quarter-eagle in proportion to eagle.
[d]Computed here as ratio of fine to standard weight.
[e]Computed here as product of fineness and standard weight.
[f]Inferred from statement that the double-eagle and gold dollar are to be coined "conformably in all respects to the standard for gold coins now established by law."
[g]Inferred from statement that three-dollar piece is to be coined "conformably in all respects to the standard of gold coins now established by law."
[h]Quarter-eagle, three-dollar piece, half-eagle, eagle, and double-eagle in proportion to gold dollar.
[i]Monetary unit.
[j]All gold coin in proportion to dollar—inferred from statement that "all forms of money issued or coined by the United States shall be maintained at a parity of value with this standard."
[k]Authorized the President by proclamation to fix the weight of the gold dollar in grains $9/10^{th}$ fine at a maximum reduction of 50 percent present weight.
[l]Set such fixed weight of dollar at maximum of 60 percent present weight.
[m]Presidential Proclamation.
[n]New par value of dollar established by Secretary of the Treasury, as authorized by the Act.
[o]Fineness not specified in the Act, but applicable from Act of May 12, 1933 and earlier Acts—and recognized in Mint *Report* 1980, p. 68, and earlier *Reports*.
[p]Derived here from statement that "$1 equals one thirty-eighth of a fine troy ounce of gold." With 480 grains equaling one ounce, price of gold is $480/38 = 12_{12/19}$ grains per dollar.
[q]Derived here from statement that "$1 equals 0.828948 Special Drawing Right or, the equivalent in terms of gold, of forty-two and two-ninths dollars per fine troy ounce of gold." With 480 grains equaling one ounce, price of gold is $480/42_{2/9} = 11_{7/19}$ grains per dollar.

Sources: *International Monetary Conference* (1879, pp. 450-451); Huntington and Mawhinney (1910, pp. 475-476, 496-497, 502, 508, 513, 534, 610); *United States Statutes at Large* (vol. 48, March 1933 – June 1934, pp. 52-53, 342, 1730-1731; vol. 86, 1972, pp. 116-117; vol. 87, 1973, p. 352); Mint *Report* 1980, p. 68; de Vries (1985, pp. 34-35, 69).

This table describes the gold content of U.S. coin or of the dollar monetary unit; it does not exhibit the implied official price. Interestingly, only the Act of 1973 provides the official price explicitly, although that of 1972 states the inverse of the price (see notes p and q of Table 3).

2. Official Price of Gold

Three methods are used to compute the official price of gold ($ per fine ounce), constructed as an end-of-year series, from the explicit specification in the legislation:

Method F: 480 X (value of coin, in $)/(fine weight of coin, in ounces)

Of course, 480 is the number of grains per ounce.

Method G: (inverse of fineness) X (value of coin, in $)/(standard weight of coin, in ounces)

Method H: 1/(fine weight of coin, in ounces per $)

Method F is used for 1786, 1792, and 1834; method G for 1837 and 1934; Method H for 1972. The official price for 1973 is stated explicitly in the Act, as noted in section C.1. The legislations of 1849-1900 involved no change in the price.

The U.S. official-price series in **What Was the Price of Gold Then?** is exhibited with six decimal places. In fact, as rational numbers, they can be expressed in exact (fractional) form, as follows (in $ per fine ounce):

1786 to 1791: $19\frac{30,227}{61,567}$
1792 to 1833: $19\frac{13}{33}$
1834 to 1836: $20\frac{20}{29}$
1837 to 1933: $20\frac{260}{387}$
1934 to 1971: 35
1972: 38
1973 to 2001: $42\frac{2}{9}$

III. London Market Price of Gold

A. Existing Compilations

The London market price of gold always has pertained primarily to bar gold (as distinct from foreign gold coin), and this discussion (as well as the market-price series in **What Was the Price of Gold Then?**) pertains to that form of gold. Specifically, what is priced is standard bars ($11/12^{th}$ fine). The goal for the series in **What Was the Price of Gold Then?** is a series that is fully representative, that is, an annual series averaging a maximum number of intra-annual observations.

There are a large number of compilations of the London market price.Their characteristics are shown in Table 6, and they are discussed further below.

Table 6 Compilations of London Market Price of Gold					
Source	Period	Frequency	Observation	Denomination	Decimal Places
British Parliamentary Papers (1819, pp. 330-354; 1832, pp. 98-109;1840, pp. 96-103; 1841, p. 317)	1790-1840	weekly	daily rate	£, s, d per standard ounce of bar gold	exact
Tooke (1824, appendix, p. 1)	1800-1821	annual	unstated average	£, s, d per standard ounce of bar gold	exact
White (1830, pp. 93-94)[a]	1760-1829	annual	unstated	£, s, d per standard ounce of bar gold	exact
Tooke (1838, pp. 384-385; 1848, p. 451)	1797-1847	2-4 per year[b]	daily rate	£, s, d per standard ounce of bar gold	exact
Jevons (1884, p. 139)[c]	1798, 1801-1803, 1810-1821	annual	unstated	£, s, d per standard ounce of bar gold	exact[d]
Hawtrey (1918, p. 64)	1797-1798, 1800-1801, 1804-1805, 1811-1818[e]	annual	unstated	index number of £, s, d per standard ounce of bar gold (mint price = 100)	1
Shrigley (1935, p. 92)	1870-1932	annual	average of daily rates	£, s, d per standard (1870-1918), fine (1919-1932) oz. of bar gold	2
Shrigley (1935, pp. 93-194)	1919-1925	daily	daily rate	s, d per fine oz. of bar gold	exact
Warren and Pearson (1935, pp. 157-158)[f]	1914-1925, 1931-1934	monthly, annual	average of: monthly series, daily quotations	s, d per fine ounce of bar gold[g]	exact

Mint *Report* 1944, pp. 89-90[h]	1870-1943	annual	average of daily rates	£, s, d per standard (1870-1918), fine (1919-1943) oz. of bar gold	2[i]
Jastram (1977, pp. 26-29)	1560-1976	annual	various (see text)	index number of £, s, d per fine (1560-1716, 1919-1932), standard (1717-1918) oz. of bar gold (1930 =100)	1
Arnon (1988, p. 11)[j]	1782-1822	annual	unstated	index number of £, s, d per standard ounce of bar gold (mint price = 100)	0
Schneider, Schwarzer, and Zellfelder (1991, pp. 264-268)	1777-1910	monthly	one day per month	£ per 10 kilograms fine bar gold	2
Boyer-Xambeu, Deleplace, and Gillard (1995, pp. 138-374)	1718-1873	semi-weekly	daily rate	£ per standard ounce of bar gold[k]	3
International Monetary Fund (2001)	1948-1956	annual	end of year	dollars per fine ounce	2
International Monetary Fund (2001)	1957-2001	monthly	end of month	dollars per fine ounce	2

[a]Reprinted in *International Monetary Conference* (1879, pp. 647-648).
[b]Except one in 1838 and 12 (monthly) in 1847.
[c]Originally published in Jevons (1865), reprinted in Carus-Wilson (1962, p. 13).
[d]Also level and logarithm of index number (mint price = 100).
[e]Extended to 1819 in Hawtrey (1950, p. 283).
[f]Also in Warren and Pearson (1932, p. 19).
[g]Also in percentage of par.
[h]Also in earlier *Reports*.
[i]Pence component.
[j]Reprinted in Arnon (1991, p. 159).
[k]With exceptions, see text.

British Parliamentary Papers (BPP) provide ideal data, except that the series is not annualized. The series definitely pertains to market transactions, with *The Course of the Exchange* undoubtedly the source. Boyer-Xambeu, Deleplace, and Gillard (BDG) present data from the same source, therefore compatible with BPP. Their series, also, is not annualized; but it has double the frequency of BPP, showing the entirety of the data in *The Course of the Exchange*. However, the BDG series is inferior to that of BPP in that, denominated as the £-price with three decimal places, the figures are not exact.

BDG can be criticized for their generation of the series for the years 1800-1820, enveloped by the Bank Restriction Period (1797-1821). For 1800-1820, they see data on quotations for bars as infrequent and therefore, for a continuous series, use the price of Portuguese gold coin when available. Otherwise, they take the price of bar gold. Absent the latter price, they resort to the price of another foreign gold coin, the Spanish doubloon. While the authors can be defended for having simply made a judgment call, there are several problems with their decisions from the standpoint of developing an annual series:[7]

1. For much of the 1800-1820 period, there do exist bar data of satisfactory frequency, which should have been utilized systematically. Indeed, the problem period is not the entirety of 1800-1820 but rather only 1800-1812, and even within that shorter period there are sub-periods during which there is some availability of the bar price.

2. For consistency with the rest of the 1718-1873 data, the price of bar gold rather than Portuguese coin should be the primary series.

3. It is arguable that foreign coin is a fundamentally different form of gold, and therefore should not be used in place of bar gold.

Schneider-Schwarzer-Zellfelder (SSZ) state *The Course of the Exchange* as the source of their series; but there are three limitations with their series. (1) It is not clear that the series is uniformly consistent with BDG. For example, SSZ show some variation in 1859-1869, whereas BDG have an unchanged price (see section B below). (2) The weight denomination of the series is unusual: 10-kilogram rather than ounce. (3) The series is based on only one daily observation per month.

Tooke (1838, 1848) exhibits a series compatible with BPP; but the small number of observations per year negate its use for most purposes.

The Mint *Report* provides the best data in every respect. No criticism can be levied, except to bemoan that the series ends with the year 1943. Shrigley's series are consistent with the Mint *Report*; but the Warren-Pearson series has different data sources, and so is inconsistent with the Mint *Report* and Shrigley.

While *International Financial Statistics* (IFS) gold-price data—as in International Monetary Fund (2001)—are impeccable in reliability, their frequency is limited: end-of-year for 1948-1956, end-of-month for 1957 onward.

Various authors focus on data for the Bank Restriction Period. The Tooke (1824) figures for 1800 and 1804-1809 are suspect, because they are, respectively, the mint price and the 1803 value repeated. The source and method of computation of the series are unstated. The Jevons (1884) series is the same as that of Tooke, except that some years are omitted. Again it is not stated how the series is generated. Arnon presents the Tooke series, except that he expands it by assigning the mint price to 1782-1800 and 1822. This yields incorrect figures. The White data are inconsistent with BPP and BDG. Though White provides a number of authorities, he does not reveal how his series is generated. Finally, while Hawtrey declares that his series is based on BPP, it is not clear how the series is computed.

Jastram deserves praise for developing a price series of great length (1560-1976, although the index-number format could involve imprecise figures); but there are problems with many sub-periods:

1560-1716: During this period, the market price is unavailable, and the mint price is used instead.[8] Jastram multiplies the mint price by the ratio of the mint price to the Bank of England buying price in 1717, to approximate the market price. However, this technique does not correct for the fact that the series is on a fine-ounce basis to 1717 and a standard-ounce basis thereafter (to 1918).

1717-1759: Jastram uses the Bank of England buying price for gold bars. He is wrong in judging that "the use of Bank buying prices from 1717 to 1759 is well in line with market prices for much of the period" (p. 19). At £3 17s 6d, the Bank price is generally too low to represent the market price, as the true market data for that period show.[9]

1760-1829: Jastram employs the White data—a poor choice. He describes the White series as "an exceptional collection of London market prices" (p. 25). On the contrary, the White series is highly suspect. Not only are its data sources and method of computation unrevealed; but also the series is the numerator of White's gold/silver price series, that has been severely criticized (see section V.A. below).

1830-1840: The Bank of England buying price is employed; but market data are available, and only for 1834 is the market price uniformly at £3 17s 9d (the Bank price).

1933-1967: The series is not representative, as preferred data sources (Mint *Report*, IFS) are not used. Jastram cites as sources "dependent on quarterly memoranda of the Royal Economic Society" (1933-1939) and "prices compiled from the *London Times* (1940-1959, 1961-1967).

1960, 1968-1976: IFS data are used, the best choice; but for most years the average is computed from end-of-quarter rather than end-of-month data, thereby reducing the number of intra-annual observations.

B. New Series

1. £, s, d per standard ounce (1718-1918)

1718-1789: The BDG series is the data source. For each year, the average of the observations is calculated and converted to £, s, d form.

1790-1796: £3 17s 6d. This is the uniform price in BPP, although there are many missing observations in 1795-1796.

1797-1840: For each quarter-year, the average of available weekly observations in BPP is taken, and an annual series is obtained by averaging the available quarterly observations for the year. Using this technique, the missing quarterly observations are 1800 (1Q) – 1804 (1Q), 1806 (1Q) – 1810 (3Q), 1811 (2Q-3Q), and 1812 (3Q). Then there are no annual data for 1800-1803 and 1806-1809. For these years, linear interpolation is used to generate the observations. Whether this method of deriving missing observations is superior to that of BDG or indeed that of Tooke (see section A) is a matter of judgment. The position here is that only information on the price of bar gold should be used to estimate the missing annual observations.

1841-1869: £3 17s 9d. BDG have an unchanged price of £3.888, which is £3 17s 9d (£3.8875, rounded up to £3.888 by BDG).

1870-1918: The source is Mint *Report*, 1944.

The resulting series for 1718-1918 is also expressed in £ per fine ounce, via the formula (12/11) X ((240 X £-component + 12 X s-component + d-component)/240))

2. £, s, d per fine ounce (1919-1949)

1919-1943: The source, again, is Mint *Report*, 1944.

1944-1949: The uniform price of £8 8s for 1940-1943 in the Mint *Report* is extended to 1949, as Jastram has an unvarying index number for 1940-1949.

The resulting series for 1919-1949 is also expressed in £ per fine ounce, via the formula (240 X £-component + 12 X s-component + d-component)/240).

3. $ per fine ounce (1950-2001)

1950-1953: $34.71. IFS has this unvarying figure for 1948-1953.

1954: $34.96. This figure is the weighted average of $34.71 (80 days, January 1 to March 21) and $35.025 (285 days, March 22 to December 31), where $35.025 is the average of the minimum and maximum price in the renewed free London market during that part of the year (*The Economist*, February 12, 1955, p. 569).[10]

1955: $35.01—the average of the minimum and maximum price for the year (*The Economist*, January 21, 1956, p. 234).

1956: $35.00. The price exhibited a narrow range about $35.00 during the year. This is inferred from two facts reported in *The Economist* (March 16, 1957, p. 940). First the range between minimum and maximum price during the year was only 1/3 of one percent. Second, price falling below (rising above) $35.00 induced buying (selling) orders from the central banks of European debtor (creditor) countries before the monthly European Payments Union settlements.

1957-2001: The annual average of end-of-month figures in International Monetary Fund (2001) is computed, to complete the series through 2001.

IV. New York Market Price of Gold

A. Nature of Market

The New York market for gold differs from the London market in several respects:

1. The market for bars to this day has not had the structure of the London market. In particular, trade is over-the-counter rather than on an organized exchange, and there are no rules on exchange hours or on delivery date.[11]

2. The New York market until the late 19th century pertained primarily to gold coin and not to bars.

3. The role of the government in price determination was much greater than in Britain. Indeed, there were long periods in which the New York market did not exist, or at least had no price-determining role (because the official price of gold applied).

4. In the period 1933-1974, there were restrictions on ownership of gold by U.S. residents—in contrast to the shorter period (1939-1954) during which the London market was closed.

For all the above reasons, the New York market has never had the importance of the London market, or indeed of some other world markets.

B. Existing Compilations

There are only three existing compilations of the New York market price, and these are summarized in Table 7. The Warren and Pearson series is basically sound, but is subject to two criticisms. First, no annual figure is provided when gold is at a premium (with respect to the official price) for part of a year (1814, 1817, 1857). Second, the 1933-1934 data are the product of the London market price and the dollar-sterling exchange rate at New York—a London rather than New York price of gold.

Table 7
Compilations of New York Market Price of Gold

Source	Period	Frequency	Observation	Denomination	Decimal Places
Warren and Pearson (1935, pp. 153-155)	1792-1934	monthly, annual	average of daily, monthly rates	dollars per fine ounce	2
Jastram (1977, pp. 143-144)	1800-1976	annual	unstated	index number of $ per fine ounce (1930 = 100)	1
U.S. Dept. of the Interior, *Minerals Yearbook*	1968[a]-	annual	average of daily rates	dollars per fine ounce	2

[a]Price stated as $35 from 1934 (January 31) to 1967.

The Jastram series has a larger number of limitations: (1) Sources are unstated (except for 1862-1878). (2) The price change from $20.67 to $35 is taken at January 1 rather than July 31, 1934. (3) It is not always true that the official-price portions of Jastram's series are Treasury buying prices, as Jastram (1977, p. 136) declares. Rather, for the 1934-1967 period, the $35 price is the average of the Treasury buying and selling price (see section C). (4) For 1814-1817, 1837-1838, and 1857, deviations of the market from official price are ignored. (5) Just as for Jastram's London series, with only one decimal place, the index-number format could be imprecise.

The *Minerals Yearbook* data are excellent, but are of use only for the period since 1968.

C. New Series

1. 1791: $19.39. Alexander Hamilton, in his 1791 Report to the Treasury, asserts that 24¾ grains of fine gold have a market value of one Spanish dollar, the predecessor to the U.S. dollar.[12] That gold content of the dollar was established in the 1792 Mint Act, and implies a price of $19.39 per fine ounce (see section II.C above and Table 5).

2. April 2, 1792- March 5, 1933: During this period, the United States was on a legal gold standard (under bimetallism via the Mint Act of 1792, under monometallism from the Act of June 22, 1874). Further, it was always a coin standard—that ended on March 6, 1933, when President Roosevelt suspended gold redemption of currency and prohibited banks from paying out gold. So it is not surprising that, regarding price determination, coin was the gold of interest. Any market for bars was inconsequential, except via government transactions.[13]

For most of this period, the "market" price of gold coin was simply the official price, with both on a fine-ounce basis.. However, when there was a "suspension of specie payments," markets developed in which the notes of suspending banks (or of the Treasury) traded at a discount in terms of gold (or silver, under bimetallism).[14] These suspensions did not generally occur in all regions of the country; they were localized phenomena.[15]

For 1791-1932, the official price of gold is used for the "market" price, with the following exceptions due to the events headed:

a. official price change in mid-year

1834: $19.94—a weighted average of the official price for January 1- July 30 (211 days) and that for July 31 – December 31 (154 days). (Again see section II.C.) It should be recalled that the official-price series is end-of-year, whereas the market-price series pertains to the entire year (as does the London market-price series).

b. suspension of specie payments in New York

1814-1817: Gallatin (1831, p. 106) provides a monthly series of the percent depreciation of banknotes in New York, during the suspension of August 30, 1914 – February 19, 1817 (Officer, 1996, p. 16).[16] He has depreciation of zero for August 1814 and 2.5 percent for February 1817. It is assumed that the figure for February 1817 pertains only during the suspension; therefore the figure for that month is adjusted by substituting a weighted average of 2.5 (February 1-19, 19 days) and 0 (February 20-28, 9 days). Also, a value of zero is applied during months of specie payments: January-July 1814 and March-December 1817. The annual averages of the monthly figures are taken; the result is a series (D) of currency depreciation with respect to gold. Following the implicit arithmetic of Warren and Pearson (1935, p. 154), the currency value of gold is computed as 100/(100 – D), where par (D = 0, market price = official price) is unity. The product of the currency value of gold and the official price (19^{13}/_{33}$) yields the market price of gold.[17]

1837-1838: The second suspension of specie payments in New York occurred for exactly one year, May 10, 1837 – May 9, 1838 (Officer, 1996, p. 16). A monthly series of the currency value of gold in New York is in Warren and Pearson (1932, p. 76; 1935, p. 154). They properly have January-April 1837 at unity (actually at 100.0); this value is imposed here also for June-December 1838[18] For May-December 1837, the product of

the currency value of gold and the official price (20^{260}/_{387}$) yields the market price of gold.

For January-April 1837, with the currency value of gold unity, the official price applies; but the official price changed from 20^{20}/_{29}$ to 20^{260}/_{387}$ on January 18. So for January a weighted average of 20^{20}/_{29}$ (17 days) and 20^{260}/_{387}$ (14 days) is taken. The average for the 12 months of 1837 is $21.64.

The market price for January-May 1838 is generated as the product of the currency value of gold and the official price (20^{260}/_{387}$), while the official price applies to June-December. The 12-month average is $20.86, the price for 1838.[19]

1857: The third suspension in New York was for the period October 14 to December 13, 1857 (Officer, 1996, p. 16). The currency value of gold in New York for these months is again in Warren and Pearson (1935, p. 154). Multiplication by the official price yields the official price for these months, with the official price itself applying to January-September. The 12-month average is $20.70, the price for 1857.

1862-1878: The fourth suspension was December 30, 1861 – December 31, 1878, the greenback period. Mitchell (1908, p. 4) offers an annual series (average of all daily rates) of the price of gold in greenbacks (that is, the currency price of gold) for 1862-1878. Multiplying his series by the official price yields the market price.[20]

3. March 6, 1933 – January 31, 1934

This was a period of transition, during which the old gold standard was abandoned, but the new official price of gold had not yet been fixed. By executive orders of April 5 and August 28, 1933, all gold (coin, bullion, certificates) domestically held, with minor exception, was required to be sold to the Federal Reserve Banks at the official price of $20.67 per fine ounce.[21] Further, until August 28, 1933, the Treasury or Federal Reserve Banks continued to sell gold bars to domestic industry and the arts at the official price of $20.67.[22]

With no free market, it is logical to define the "private" or "market" price as the price at which the Treasury or Federal Reserve transacted with private parties (which indeed was the criterion of section 2 for the market price under the functioning gold standard). Then the official price of 20^{260}/_{387}$ can be extended to August 28, 1933, as representing the market price.

Between September 8, 1933 and January 31, 1934, (1) the Secretary of the Treasury, (2) succeeded on October 25 by the Reconstruction Finance Corporation, (3) succeeded on January 15, 1934, by the Federal Reserve Bank of New York, purchased newly mined domestic gold at a price that was fixed daily. This "variable limited official price" constituted the private ("market") price for the present purpose, and its daily values for September 8, 1933 – January 31, 1934 are in Mint *Report* 1980, p. 69. The average of these values for September 8 – December 31, 1933 is $32.313085. Then the

market price for 1933 is the weighted average of $20.671835 (240 days, January 1 to August 28) and $32.313085 (115 days, September 8 to December 31): $24.44.

The average of the "variable limited official price" for January 1-31, 1934, is $34.27. The market price for 1934, then, is the weighted average of $34.27 (31 days, January 1-31) and the new official price, $35 (334 days, February 1 to December 31): $34.94.

4. February 1, 1934 – March 17, 1968

Under regulations issued by the Treasury on January 31, 1934, the government purchased newly minded domestic gold, unmelted scrap gold, and imported gold at $35 less ¼ of one percent ($34.9125) per fine ounce and less mint charges. Thus the Treasury purchased gold bars from all comers at $34.9125. However, the Treasury sold gold only to licensed domestic industrial users and to foreign monetary authorities, at $35 plus ¼ of one percent ($35.0875) per fine ounce. So the *average* price at which the Treasury transacted with domestic industry was $35, and that is the private ("market") price for the period February 1, 1934 – March 17, 1968, specifically for 1935-1967 for the New York market price.

5. March 18, 1968 –

On March 18, 1968, a free market for gold bars in the New York market was established.[23] From then on, the market price was determined in the marketplace and not by the government. A series of the annual average of daily prices is in U.S. Department of the Interior, *Minerals Yearbook*, and it is the source of the market-price data for that time period. It should be noted that the value for 1968 is correctly computed in the source, as the official price of $35 is applied to January 2 - March 15 and the free-market price to March 20 - December 31.

V. Gold/Silver Price Ratio

A. Existing Compilations

An ideal gold/silver price series would be the annual average of true market prices for all days on which the market is open. The location would be chosen so the world market price would thereby be represented, and the prices of both gold and silver would be expressed per fine ounce. Table 8 summarizes the existing compilations of the gold/silver price ratio.

Table 8 Compilations of Market Ratio of Gold Price to Silver Price						
Source	Location	Period	Frequency	Observation	Denomination	Decimal Places
Ingham (1830, p. 23)[a]	London	1760-1829	annual	unstated	unstated	2
White (1830, pp. 93-94)[b]	London	1760-1829	annual	unstated	standard ($37/40^{th}$ fine) ozs. of silver per standard ($11/12^{th}$ fine) oz. of gold	2
Soetbeer (1879, p. 126)[c]	Germany, Netherlands, France	1501-1680	20-year periods	unclear	unstated	2
Soetbeer (1879 pp. 128-131)[d]	Hamburg 1687-1832, London 1833-1878	1687-1878	annual	1687-1832: average of twice-weekly quotations	unstated	2
Laughlin (1900, p. 291)	London	1833-1895	annual	unstated	unstated	2
Mint *Report* (1944, p. 91; 1951, p. 66; 1962, p. 49; 1967, p. 57)[e]	Hamburg 1687-1832, London 1833-1914, New York 1915-1967	1687-1967	annual	1879-1967: average of daily quotations	1915-1967: fine ounces of silver per fine ounce of gold	2

[a]Reprinted in *International Monetary Conference* (1879, p. 583) and in Laughlin (1900, pp. 289-290).
[b]Reprinted in *International Monetary Conference* (1879, pp. 647-648) and in Laughlin (1900, pp. 289-290).
[c]Reprinted in Laughlin (1900, p. 288).
[d]1701-1832 reprinted in Horton (1879, pp. 708-709), 1687-1832 reprinted in Laughlin (1900, pp. 289-290).
[e]Reprinted 1789-1951 in U.S. Bureau of the Census (1949, pp. 277-278; 1954, p. 36), and 1694-1932 in Shrigley (1935, pp. 90-91).

Although the Ingham series slightly precedes the White series, it is the latter series that has been assessed by later scholars. The two series are similar, and the criticisms of White apply also to Ingham.[24] Soetbeer (1879), as quoted by Horton (1879, p. 649) observes three weaknesses of the White series: (1) The nature of the data is unstated. (2) It is not revealed how the annual averages are calculated. (3) Suspension of specie payments during 1797-1821 (the Bank Restriction Period) makes the quotations less reliable than at Hamburg. (4) There are evident errors for certain years, unbelievable levels and movements of the ratio, in light of the Hamburg data.[25] Laughlin (1900, p. 291) notes that there are obvious errors also for other years.

Horton (1879, p. 649) concludes that the White series "must be characterized as unfit for use and merely deceptive, in spite of its adoption in official documents." Laughlin (1900, p. 291) similarly judges: "But the [Ingham] table, as well as the White table, can be regarded as not sufficiently trustworthy to base any conclusions upon."

The Soetbeer series for 1501-1680 is compiled from many different sources, and it is not clear how the various data are combined. Presentation only as 20-year figures (which may or may not be averages in some sense) might reflect Soetbeer's qualms about the reliability of the data.

In contrast, the Soetbeer series for 1687-1878 is of high quality. For 1687-1832, the series is an annual average of twice-weekly official market quotations in Hamburg, "a solidity of foundation which it will be difficult for the commercial records of other cities to surpass" (Horton, 1879, p. 708). For 1833-1878, Soetbeer uses the London market ratio provided in annual-average form by the bullion firm of Pixley and Abell, deemed superior even to the Hamburg data.[26] Laughlin presents the Pixley and Abell data for 1833-1895.

The Mint *Reports* provide an excellent series, with various data sources:

1687-1832: Soetbeer data
1833-1878: Pixley and Abell's tables
1879-1896: daily cabled prices from London to the Bureau of the Mint
1897-1914: daily London quotations
1915-1967: daily New York quotations

The only problem of the series is that for 1915-1967, the price of gold that enters the ratio is the official price: $20.67 for 1915-1933, $35 for 1934-1967. Two criticisms follow. First, the official-price change occurred on January 31 rather than January 1, 1934. Second, the "variable limited official price" in effect September 8, 1933- January 31, 1934 is ignored.

B. New Series

The Mint series is used as the basis; but two tasks remain. First, the ratios for 1933 and 1934 must be corrected. This is accomplished by multiplying the Mint figure by

the ratio of the New York market gold price to the official price (the numerator of the ratio being the "variable limited official price" for the year). Thus the corrective factor is 24.442944/20.671835 for 1933 and 34.938/35 for 1934.

Second, the series must be extended beyond 1967. This is done by adopting the Mint computation of the preceding years. The ratio for 1968 onward is constructed from New York market prices of gold and silver as follows: the ratio of the price of gold to the product of 1000/999 and the price of silver. The reason for the 1000/999 factor is that the price of silver is per ounce 999/1000 fine, whereas the price of gold is per fine ounce. The data sources for the price of silver are Mint *Report* 1980, p. 77, for 1968-1980, and Department of the Interior, *Minerals Yearbook*, subsequently.

Notes

1. In fairness, one should acknowledge that the purposes of these three authors in their compilations were more complex than presentation of an official-price series.

2. In defense of Challis, he simply followed the denomination of the mint indentures. The Tower pound (sometimes called "mint pound") was the weight used for minting until 1526, when it was replaced by Troy weight. The Tower pound consisted of 5400 grains, and was lighter than the Troy pound (of 5760 grains or 12 ounces): 1 Tower pound = 15/16 Troy pound = 11¼ Troy ounces.

3. In so doing, of course, he was faithful to the purpose of his compilation.

4. The weight is the weight of gold and alloy together, called "standard weight." If only the pure-gold component of the weight is desired, this "fine weight" is the product of (i) the inverse of the fineness and (ii) the standard weight.

5. In fact, this fineness had been in existence since 1526, though not exclusively.

6. For some entries, more than one criterion applies. The coins *rejected* under criterion d are excluded from the list.

7. In fairness to BDG, their goal is to complete a semi-weekly series rather than to develop an annual one (the objective of **What Was the Price of Gold Then?**).

8. The source is not stated; but it presumably is Feavearyear (1963), as Jastram mentions this work elsewhere in his book.

9. On the other hand, Jastram is correct in representing the market price for 1841-1869 by the then Bank of England buying price of £3 17s 9d. See section B below. The other satisfactory portion of his series is 1870-1932, for which Shrigley is the source.

10. The last date on which there had been a market-determined price (that is, a price set by the London bullion firms in accordance with demand and supply) was September 1, 1939, two days before Britain declared war on Germany. After World War II, the London market continued to be closed, in the sense that transactions were limited and the traditional setting of price forbidden. Indeed, on July 24, 1947, the government banned all dealings in foreign gold in the market at prices above $35 per fine ounce, thus continuing to prevent the re-emergence of a free market. On March 22, 1954, the market reopened to the traditional free-market price determination. See *The Times*, July 25, 1947, p.8; March 13, 1954, p. 11; March 21, 1955, p. 11.

The same absence of a market-determined price happened also during World War I and thereafter. With the outbreak of war, in early August 1914, the London market was closed. All gold newly produced within the British Empire (primarily South Africa) was purchased by the Bank of England at the fixed price of £3 17s 9d per standard ounce. From December 5, 1916 to March 31, 1919, gold imports were prohibited by Royal Proclamation except for gold sold to the Bank. Beginning September 12, 1919, gold could again be freely imported and sold in a free market. See Brown (1929, pp. 6, 20, 41-42) and Officer (1996, p. 44).

11. See O'Callaghan (1993, p. 24).

12. See the Hamilton Report in *International Monetary Conference* (1879, p. 456), and also Officer (1996, p. 14).

13. From June 1, 1882, to March 5, 1933, the New York Assay Office (and later the Federal Reserve Bank of New York) provided an immediate exchange of bars for U.S. coin. The Assay bars were provided at a premium that varied from zero (no "bar charge") to infinity (the Treasury refusing to sell bars). Assay bars were also purchased at par and without charge, by the Treasury and Federal Reserve Bank. For a history, see Officer (1996, pp. 132, 137-138, 157).

14. During the greenback period (1862-1878)—the final suspension (prior to termination of the gold standard in 1933)—a free market for gold not only developed but also was institutionalized, with a formal gold market in New York. In contrast, during the suspension of April 6, 1917 to March 17, 1922, no market for gold occurred. The reasons are that (1) this suspension by the Treasury and Federal Reserve Banks was informally based, and (2) the commercial banks cooperated by converting their notes and deposits only into currency and not gold, a perfectly legal restriction. For an overview of the history of suspensions in the United States, see Officer (1996, pp. 28-33).

15. For a complete list of suspensions by time period and location, see Officer (1996, pp. 16-17).

16. While Gallatin's numbers are not always consistent with those of White (1830, p. 92), his figures are accepted by Warren and Pearson (1933, p. 351; 1935, p. 154).

17. The resulting numbers are compatible with those of Warren and Pearson (1935, p. 155); but are more precise, because more significant digits are used.

18. Warren and Pearson provide values slightly above unity for these months (as well as for 1839-1843).

19. Again, the 1837 and 1838 figures in **What Was the Price of Gold Then?** have greater precision than those of Warren and Pearson.

20. Warren and Pearson also use the Mitchell data. The figures here differ from those of Warren and Pearson by at most one cent per fine ounce, due to slightly better precision or perhaps better rounding.

21. On December 28, 1933, completing the process of nationalization of gold, the Secretary of the Treasury ordered that all gold be delivered to the Treasury under the same terms of exchange.

22. The following are excellent histories of the 1933-1934 period: Paris (1938, pp. 12-32, 118-122), Friedman and Schwartz (1963, pp. 462-471), and Yeager (1976, pp. 346-353). Mint *Report* 1980, p. 69, may also be consulted.

23. See U.S. Department of the Interior, *Minerals Yearbook* 1968, vol. 1, p. 535.

24. "Although in every ratio the [Ingham] figures are different from White's, yet the differences are usually very slight (except for 1812), and follow the same general direction. Even in the exceptional figures of 1781-1783, and 1816, there is the same trouble as in White's table."—Laughlin (1900, p. 291).

25. Laughlin (1900, p. 290) observes that "Soetbeer has pointed out what seem to be palpable errors in the White table."

26. Horton (1879, p. 708) notes that "since 1833 down, the London quotations have been recorded with great care," and Laughlin (1900, p. 289) states that "after 1833, Pixley and Abell's London tables are accepted by every one."

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