

The following is an example of a Bill sent from London to Hamburg, to have Returns on London.

£842 12s. 1d. sterling on Hamburg, at 3 usances, at 31s. 8d. Flemish
per £ sterling, 10,000 Mks. bco.

	Mks. bco.	Sh.
Commission, $\frac{1}{2}$ per cent.	50	0
Double brokerage, 2 per mille	20	0
Postage	3	4
Discount, 82 days, at 5 per cent.	112	4
	<hr/>	<hr/>
	185	8

Net proceeds in Marks banco 9814 8

Returns made in 3 Bills, namely:

£500 0 0 sterling, at 3 us. at 30s. 10 $\frac{1}{2}$ d.....	5789	1
200 0 0 at 2 us. at 30s. 11d.	2318	12
146 16 4 at 2 us. at 31s. 0d.....	1706	11
	<hr/>	<hr/>
846 16 4 Returns.	9814	8
842 2 1 Remittance.		

£4 14 3 Gain, which is not quite equivalent to the discount and postage of the Returns; but had the course of Hamburg on London been 30s. 9d. it would have produced the regular profit. Thus, 10d. Flemish per £ sterling may be reckoned a *Fair Difference* between London and Hamburg at usance.

When the Returns are to be made directly, the remittances are discounted as above; but it may be remarked, that the interest of money on the Continent is not limited as in England, but fluctuates according to the plenty or scarcity of cash or the credit of paper. In exchange operations it is generally reckoned at $\frac{1}{2}$ per cent. per month.

ARBITRATION OF EXCHANGE.

ARBITRATION OF EXCHANGE is a comparison between the courses of exchange of several places, in order to ascertain the most advantageous method of drawing or remitting Bills. It is distinguished into Simple and Compound Arbitration: the former comprehends the exchanges of three places only, and the latter of more than three places.

SIMPLE ARBITRATION

Is a comparison between the exchanges of two places with respect to a third—that is to say, it is a method of finding such a rate of exchange between two places as shall be in proportion to the rates quoted between each of them and a third place. The exchange thus determined is called the *Arbitrated Price*.

If, for example, the course between London and Paris be 24 Francs for £1 sterling, and between Paris and Amsterdam 54d. Flemish for 3 Francs, (that is, 36s. Flemish for 24 Francs,) the arbitrated price between London and Amsterdam through Paris, is evidently 36s. Flemish for £1 sterling; for as 3 Fr. : 54d. Flem. :: 24 Fr. : 36s. Flem.

Now, when the actual or direct price (as seen by a quotation or otherwise advised) is found to differ from the arbitrated price, advantage may be made by drawing or remitting indirectly; that is, by drawing on one place through another, as on Amsterdam through Paris: which may be performed in three different ways.

1.—London may draw on Paris, and order his correspondent there to draw on Amsterdam.

2.—London may draw on Paris, and order his correspondent in Amsterdam to remit the same sum to Paris.

3.—London may order his correspondent at Paris to draw on Amsterdam, and to remit the value to London.

The operation of remitting indirectly, or of remitting to one place through another, as to Amsterdam through Paris, may be likewise performed in three different ways.

1.—London may remit to Paris, and order his correspondent there to remit the sum to Amsterdam.

2.—London may remit to Paris, and order his correspondent in Amsterdam to draw on Paris.

3.—London may take Bills on Paris, and remit them to Amsterdam, there to be negotiated.

In the foregoing questions, the profit or loss is ascertained on an operation already completed: but in arbitration it is ascertained beforehand, and the different results are compared, in order to determine the most advantageous mode of proceeding.

To exemplify this by familiar illustrations, suppose the arbitrated price between London and Amsterdam to be, as before stated, 36s. Flemish for £1 sterling; and suppose the direct course to be 37s. Flemish; then London, by drawing directly on Amsterdam, must give 37s. Flemish for £1 sterling; whereas, by drawing through Paris he will give only 36s. Flemish for £1 sterling: it is therefore the interest of London to draw indirectly on Amsterdam through Paris.

On the contrary, if London remits directly to Amsterdam he will receive 37s. Flemish for £1 sterling; whereas, by remitting through Paris, he will receive only 36s. Flemish: it is the interest of London, therefore, to remit directly to Amsterdam.

Example 2.—Suppose the exchange of London and Lisbon to be at 68d. per Milree, and that of Lisbon on Madrid 500 Rees per Dollar, the arbitrated price between London and Madrid is 34d. sterling per Dollar; for, as 1000 Rees : 68d. :: 500 Rees : 34d. But if the direct exchange of London on Madrid be 35d. sterling per Dollar, then London, by remitting directly to Madrid, must pay 35d. for every Dollar; whereas, by remitting through Lisbon, he will pay only 34d.: it is, therefore, the interest of London to remit indirectly to Madrid through Lisbon.

On the contrary, if London draws directly on Madrid, he will receive 35d. sterling per Dollar; whereas by drawing indirectly through Lisbon, he will receive only 34d.: it is, therefore, the interest of London to draw directly on Madrid.

From these examples, combined with the principles laid down in page 105, the two following rules are manifest.

RULE 1.—*Where London gives the CERTAIN PRICE, draw through that place which produces the lowest arbitrated price, and remit through that which produces the highest.*

RULE 2.—*Where London gives the UNCERTAIN PRICE, draw through that place which produces the highest arbitrated price, and remit through that which produces the lowest.*

What is here said of London will equally apply to any other place from whence the operation is made.

In order further to exemplify Simple Arbitration of Exchange, the following places are selected as having the most frequent communication with each other in business of this kind ; and London is made the centre of operations.

LONDON AND AMSTERDAM.

PROPORTIONAL EXCHANGE.

LONDON QUOTATION.

(Explained page 19.)

ON AMSTERDAM . . . 34 7

GENOA 47

HAMBURGH 34 2

LEGHORN $51\frac{1}{2}$

LISBON 68

MADRID 42

PARIS 23 8

AMSTERDAM QUOTATION.

(Explained page 28.)

. 86

. $33\frac{1}{8}$

. $92\frac{1}{2}$

. 48

. 96

. $53\frac{1}{2}$

The arbitrated or proportional price of exchange between London and Amsterdam, with respect to any of the above places, is found either by the Rule of Three, or by the Chain Rule, as in the following examples ; and from such proportional prices, compared with the direct or actual prices, as stated in the quotations, rules are deduced and examples given, for drawing and remitting to the greatest advantage.

LONDON AND AMSTERDAM THROUGH GENOA.

If the exchange of London on Genoa be 47d. sterling per Pezza of $5\frac{1}{2}$ Lire, and that of Amsterdam on Genoa 86 Grotes Flemish per Pezza, what is the proportional exchange between London and Amsterdam through Genoa? that is, how many Shillings and Grotes Flemish are equal to £1 sterling?

Because 47d. give 1 Pezza, and this Pezza in Amsterdam gives 86 Grotes Flemish, say—

d.	Grotes	£	Sh.	Gr. Flem.
As 47	: 86	::	1	: 36 7
	240			
	———12)			
	47)20640(439 $\frac{7}{47}$			
	188			
	———Ans. 36 Sh. 7 Gr. Flemish			
	184 &c.			for £1 sterling.

By the Chain Rule.

	=	1 Pound sterling.
1 Pound sterling	=	240 Pence.
47 Pence	=	1 Pezza.
1 Pezza	=	86 Grotes Flemish.
12 Grotes	=	1 Shilling Flemish.

Hence, 1 Pound or 240 Pence multiplied by 86, and divided by 47 and by 12, will give the answer in Shillings Flemish, as above.

Thus, 86
240
———
564)20640(36,7
1692
———
3720
3384
———
336 = 7 Gr. nearly.

LONDON AND AMSTERDAM THROUGH HAMBURGH.

If the exchange of London on Hamburg be 34 Shillings 2 Grotes Flemish banco per £ sterling, and that of Amsterdam on Hamburg $33\frac{3}{8}$ Stivers per Rixdollar of 2 Marks, required the proportional exchange between London and Amsterdam through Hamburg?

Because £1 sterling gives 34 Shillings 2 Grotes Flemish in Hamburg, and 2 Marks give $33\frac{3}{8}$ Stivers in Amsterdam, say (reducing the Marks and the Stivers into Flemish money)—

Marks	Stivers	Sh.	Gr. Fl.	Sh.	Gr. Fl.
As 2	: $33\frac{3}{8}$	::	34 2	:	35 7 $\frac{1}{2}$
16	2		12		
———	———		———		
32	$66\frac{3}{8}$		410		
2			$66\frac{3}{8}$		
———			———12)		
64			64)27367 $\frac{1}{2}$ (427 $\frac{3}{8}$		
			256		
			———Ans. 35 Sh. 7 $\frac{1}{2}$ Gr. for £1		
			176 &c.		sterling.

By the Chain Rule.

	=	1 Pound sterling.
1 Pound sterl.	=	34 Shil. 2 Grotes in Hamburg.
8 Shill. Flem.	=	3 Marks.
2 Marks	=	$33\frac{3}{8}$ Stivers.
6 Stivers	=	1 Shill. Flemish in Amsterdam

Hence, 34 Shillings 2 Grotes Flemish multiplied by 3 and by $33\frac{3}{8}$, and divided by 6, by 2, and by 8: or, (expunging the common divisors,) multiplied by 267, and divided by 256, will give the answer in Shillings Flemish, as above.

LONDON AND AMSTERDAM THROUGH LEGHORN.

If the exchange of London on Leghorn be 51½d. sterling per Pezza, and that of Amsterdam on Genoa 92¾ Grotes Flemish per Pezza, what is the proportional exchange between London and Amsterdam through Leghorn?

Because 51½d. in London give 1 Pezza, and this Pezza in Amsterdam gives 92¾ Grotes Flemish, say—

d.	Grotes	:	:	d.	Sh.	Grotes
As 51½	: 92¾	:	:	240	:	36 0½
2				92¾		
<hr/>						
103				22260		
<hr/>						
				2		
<hr/>						
				103)44520(432 ²⁴ / ₁₀₃		
<hr/>						
				412&c.		
<hr/>						
						Ans. 36 Sh. 0½ Gr. for £1 sterling.

By the Chain Rule.

			£1 sterling.
£1 sterling	=	240 Pence.	
51½ Pence	=	1 Pezza.	
1 Pezza	=	92¾ Grotes Flemish.	
12 Grotes	=	1 Shilling Flemish.	

Result as above.

LONDON AND AMSTERDAM THROUGH LISBON.

If the exchange of London on Lisbon be 68d. sterling per Milree, and that of Amsterdam on Lisbon 48 Grotes Flemish per old Crusado, what is the proportional exchange between London and Amsterdam through Lisbon.

Because 68d. in London give 1 Milree, and 1 old Crusado, or 400 Rees, give 48 Grotes Flemish in Amsterdam, say—

	Rees	Grotes	:	:	Rees	Grotes
As 400	: 48	:	:	1000	: 120	
d.	Grotes	:	:	d.	Sh.	Gr. Fl.
And as 68	: 120	:	:	240	: 35 3½	
<hr/>						
				120		
<hr/>						
				68)28800(423 ¹⁶ / ₆₈		
<hr/>						
				272&c.		
						Ans. 35 Sh. 3½ Gr. for £1 sterling.

By the Chain Rule.

			£1 sterling.
£1 sterling	=	240 Pence.	
68 Pence	=	1000 Rees.	
400 Rees	=	48 Grotes Flemish.	
12 Grotes	=	1 Shilling Flemish.	

Result as above.

LONDON AND AMSTERDAM THROUGH MADRID.

If the exchange of London on Madrid be 42d. sterling per Dollar of plate, and that of Amsterdam on Madrid 96 Grotes Flemish per Ducat of plate, what is the proportional exchange between London and Amsterdam through Madrid?

Because 42d. in London give 1 Dollar or 272 Maravedis, and because 1 Ducat or 375 Maravedis give 96 Grotes in Amsterdam, say—

Maravedis	Grotes	:	:	Maravedis	Grotes	
As 375	: 96	:	:	272	: 69 ² / ₃	
d.	Grotes	:	:	d.	Sh.	Gr. Fl.
And as 42	: 69 ² / ₃	:	:	240	: 33 2	
<hr/>						
				69 ² / ₃		
<hr/>						
				42)16720(398		
<hr/>						
				126&c.		
						Ans. 33 Sh. 2 Gr. for £1 sterling.

By the Chain Rule.

			£1 sterling.
£1 sterling	=	240 Pence.	
42 Pence	=	272 Maravedis.	
375 Maravedis	=	96 Grotes Flemish.	
12 Grotes	=	1 Shilling Flemish.	

Result as above.

LONDON AND AMSTERDAM THROUGH PARIS.

If the exchange of London on Paris be at 23 Livres 8 Sous per £ sterling, and that of Amsterdam on Paris 53½ Grotes Flemish per Ecu of 3 Francs, what is the proportional exchange between London and Amsterdam through Paris?

Because £1 sterling gives 23 Livres 8 Sous in Paris, and because 3 Francs give 53½ Grotes Flemish in Amsterdam, say—

	Livres	Sous	:	:	Francs	Cen.
As 81	: 80	:	:	23 8	: 23 11	
Francs	Grotes	:	:	Francs	Sh.	Gr. Fl.
And as 3	: 53½	:	:	23,11	: 34 4½	
<hr/>						
				53½		
<hr/>						
				3)1236,38(412,12		
						Ans. 34 Sh. 4½ Gr. for £1 sterling.

By the Chain Rule.

			£1 sterling.
£1 sterling	=	23 Livres 8 Sous.	
81 Livres	=	80 Francs.	
3 Francs	=	53½ Grotes.	
12 Grotes	=	1 Shilling Flemish.	

Result as above.

RECAPITULATION.

LONDON AND AMSTERDAM.

RECAPITULATION of the proportional exchanges, as calculated in the three preceding pages, with rules for drawing and remitting to the greatest advantage.

	Sh.	Grotes	
The arbitrated price through GENOA is	36	7	Flemish—see page 110
through HAMBURGH	35	7½	. . . . . 110
through LEGHORN	36	0¼	. . . . . 111
through LISBON	35	3½	. . . . . 111
through MADRID	33	2	. . . . . 111
through PARIS	34	4¼	. . . . . 111
And the direct course of LONDON on AMSTERDAM	34	7	. . . . . 109

As London gives the certain price to Amsterdam, that is, £1 sterling for a variable number o. hilling, Flemish, the most advantageous place through which to remit is that which gives the highest price; and, on the contrary, the most advantageous place through which to draw is that which gives the lowest price; according to RULE 1, page 108.

From the above statements, therefore, it appears—1st, that if London has to *remit* to Amsterdam, the indirect courses through Hamburg, Genoa, Lisbon, and Leghorn, are more advantageous than the direct course, and that Genoa is the most advantageous place through which to remit:—2dly, that if London has to *draw* on Amsterdam, the indirect courses through Madrid and Paris are more advantageous than the direct course, and that Madrid is the most advantageous place through which to draw.

The profit or loss per cent. occasioned by one mode of operation, instead of another, may be known in the following manner.

Shill. Grotes Shill. Grotes

Thus, in the case of Genoa—As 34 7 : 36 7 :: 100 : 105⅙, or 105⅓ nearly.

Hence it appears, that 5⅓ per cent. will be gained by remitting to Amsterdam through Genoa, instead of remitting directly to Amsterdam; and that the same profit will accrue by drawing directly on Amsterdam, instead of drawing through Genoa; but in computations of this kind allowance should be made for the difference of charges between direct and indirect operations.

The foregoing rules respecting Amsterdam will equally apply to Hamburg, Paris, or any other place to which London gives the certain; but where London gives the uncertain, the rules must be reversed, as in the following examples of Genoa.

LONDON AND GENOA.

PROPORTIONAL EXCHANGE.

QUOTATION AT LONDON,
(Explained page 19.)

QUOTATION FROM GENOA,
(Explained page 61.)

ON GENOA.....	47	.....
AMSTERDAM	36 7	.....	85
HAMBURGH.....	34 2	.....	45½
LEGHORN.....	51½	.....	123¾
LISBON.....	68	.....	718
MADRID	42	.....	617
PARIS	23 8	.....	94½

From the above quotations, it is required to find the proportional exchange between London and Genoa, with respect to each of the other places, and thence to determine through what place it may be most advantageous for London to remit to, or draw on, Genoa, and whether direct or indirect exchange is most favourable.

LONDON AND GENOA THROUGH AMSTERDAM.

If the exchange of London on Amsterdam be 36 Shillings 7 Pence Flemish per £ sterling, and that of Genoa on Amsterdam 85 Grotes Flemish per Pezza of 5½ Lire, what is the proportional exchange between London and Genoa through Amsterdam—that is, how many Pence sterling are equal to 1 Pezza?

Because £1 sterling gives 36 Shillings 7 Grotes Flemish in Amsterdam, and 85 Grotes Flemish in Genoa give 1 Pezza, say—

Shillings	Grotes	Pence	Grotes	Pence
As 36	7	: 240	:: 85	: 46½
12		85		
<hr/>				
439	439)	20400	(46½)	1756
<hr/>				
2840 &c.				

Answer 46½ Pence nearly for 1 Pezza.

By the Chain Rule.

		1 Pezza.
1 Pezza	=	85 Grotes Flemish.
12 Grotes	=	1 Shilling Flemish.
36 Shillings 7 Grotes	=	240 Pence sterling.

Hence, 85 Grotes multiplied by 240, and divided by 12, and by 36 Shillings 7 Grotes—that is, divided by 439, will give the answer in Pence sterling, as above.

LONDON AND GENOA THROUGH LEGHORN.

If the exchange of London on Leghorn be 51½d. sterling per Pezza of 8 Reals, and that of Genoa on Leghorn 123½ Soldi fuori banco per Pezza of 8 Reals, what is the proportional exchange between London and Genoa through Leghorn?

Because 51½d. give 1 Pezza in Leghorn, and this same Pezza in Genoa gives 123½ Soldi, say—

Soldi	Pence	Pezza of Genoa	Soldi	Pence
As 123½	: 51½	:: 1 or	115	: 47½
4	4		206	
<hr/>				
495	206	495)	23690	(47½)
<hr/>				
1980 &c.				

Ans. 47½d. nearly.
By the Chain Rule.

		1 Pezza in Genoa.
1 Pezza in Genoa	=	115 Soldi.
123½ Soldi	=	1 Pezza in Leghorn.
1 Pezza in Leghorn	=	51½d. sterling.

Result as above.

LONDON AND GENOA THROUGH HAMBURGH.

If the exchange of London on Hamburg be 34 Shillings 2 Grotes Flemish per £ sterling, and the exchange of Genoa on Hamburg 45½ Soldi per Mark banco, what is the proportional exchange between London and Genoa through Hamburg?

Because £1 sterling gives 34 Shillings 2 Grotes Flemish in Hamburg, and 1 Mark or 32 Grotes in Genoa give 1 Pezza, say—

Shillings	Grotes	Pence	Grotes	Pence
As 34	2	: 240	:: 32	: 18½
12		32		
<hr/>				
410	410)	768,0	(18½)	41
<hr/>				
358 &c.				

Soldi	Pence	Pezza	Soldi	Pence
And as 45½	: 18½	:: 1 or 115	: 47½	nearly
3		× 18½ × 3		
<hr/>				
136	136)	6468	(47½)	544 &c.

Ans. 47½ Pence for 1 Pezza.
By the Chain Rule.

		1 Pezza.
1 Pezza	=	115 Soldi.
45½ Soldi	=	1 Mark.
1 Mark	=	32 Grotes Flemish.
410 Grotes	=	240 Pence sterling.

Result as above.

LONDON AND GENOA THROUGH LISBON.

If the exchange of London on Lisbon be 68d. per Milree, and that of Genoa on Lisbon 718 Rees per Pezza of 5½ Lire, what is the proportional exchange between London and Genoa through Lisbon?

Because 1000 Rees give 68d. in London, and 718 Rees in Genoa give 1 Pezza, say—

Rees	Pence	Rees	Pence
As 1000	: 68	:: 718	: 48½
		68	
<hr/>			
		1,000)	48,824

Ans. 48½d. nearly.
By the Chain Rule.

		1 Pezza.
1 Pezza	=	718 Rees.
1000 Rees	=	68 Pence.

Result as above.

LONDON AND GENOA THROUGH MADRID.

If the exchange of London on Madrid be 42d. sterling per Dollar of plate, and that of Genoa on Madrid 617 Maravedis of plate per Scudo d'oro, what is the proportional exchange between London and Genoa through Madrid?

Because 42d. sterling give 1 Dollar, or 272 Maravedis of plate, and because 617 Maravedis in Genoa give 1 Scudo d'oro, or 10 Lire 14 Soldi fuori banco, say—

Maravedis	Pence	Maravedis	Pence
As 272	: 42	:: 617	: 95½
		42	

		272)25914(95½, or 95½ nearly.	
		2448	

		1434 &c.	

Lire Sol.	Pence	Pezza	Lire Sol	Pence
And as 10 14	: 95½	:: 1 or 5 15	: 51½	
20		20		
-----		-----		
214		115		
		95½		

		214)10953 (51½, or 51½ nearly.		
		1070		

		253 &c.		

Ans. 51½d. sterling for 1 Pezza nearly.

By the Chain Rule.

	1 Pezza.	
1 Pezza	=	115 Soldi.
214 Soldi	=	617 Maravedis.
272 Maravedis	=	1 Dollar of plate.
1 Dollar	=	42 Pence.

Result as above.

LONDON AND GENOA THROUGH PARIS.

If the exchange of London on Paris be 23 Livres 8 Sous per £ sterling, and the exchange of Genoa on Paris 94½ Sous in Francs per Pezza of 5½ Lire, what is the proportional exchange between London and Genoa through Paris?

Because £1 sterling gives 23 Livres 8 Sous, and because 94½ Sous in Francs give 1 Pezza in Genoa, say—

As 81	: 80	::	Livres	Sous	Sous in Francs
			23	8	: 462½
				20	

				468	
				80	

			81)37440(462½		
			324		

			504 &c.		

And as	Sous	Pence	::	Sous	Pence
462½	: 240	::	94½	: 49	
9			94½		
-----			-----		
4160			22640		
			9		

			416,0)20376,0(49		
			1664		

			3736		

Ans. 49d. sterling for 1 Pezza.

By the Chain Rule.

	1 Pezza.	
1 Pezza	=	94½ Sous in Francs.
80 Sous in Francs	=	81. Sous in Livres.
468 Sous in Livres	=	240 Pence sterling.

Result as above.

RECAPITULATION.

LONDON AND GENOA.

RECAPITULATION of the proportional exchanges, or arbitrated prices, as calculated in the two preceding pages, with rules for drawing and remitting to the greatest advantage.

The arbitrated or indirect price through AMSTERDAM is.	46½	Pence—see page	114
through HAMBURGH	47½	.....	114
through LEGHORN	47½	.....	114
through LISBON	48½	.....	114
through MADRID	51½	.....	115
through PARIS	49	.....	115
And the direct course of LONDON ON GENOA is	47	.....	113

As London gives the uncertain price to Genoa, that is, a variable number of Pence for 1 Pezza, the most advantageous place through which to remit is that which gives the lowest price; and, on the contrary, the most advantageous place through which to draw is that which gives the highest price; according to **RULE 2**, page 108.

From the above statements, therefore, it appears—1st, that if London has to *remit* to Genoa, the indirect course through Amsterdam is more advantageous than the direct course:—2dly, that if London has to *draw* on Genoa, the indirect courses through any of the above places, except Amsterdam, are more advantageous than the direct course, and that Madrid is the most advantageous place of all to draw through.

The profit or loss per cent. occasioned by one mode of operation, instead of another, may be thus found, as in the case of Madrid.

$$\text{As } 47 : 51\frac{1}{2} :: 100 : 109$$

Hence it appears, that 9 per cent. may be gained by drawing on Genoa through Madrid, instead of drawing directly on Genoa; and that the same profit will be made by remitting directly to Genoa, instead of remitting through Madrid: but in computations of this kind allowance should be made for the difference of charges between direct and indirect operations.

The foregoing rules for negotiating Bills are given after the manner of the most approved writers on Exchange, and though it is presumed they are sufficiently clear as well as correct, yet the following rules and illustrations are added, with a view of reducing the question of Arbitration to a still greater degree of simplicity.

SIMPLE ARBITRATION

Further explained; with new Rules and Illustrations.

SIMPLE ARBITRATION ought to be well understood before any higher Rule is attempted. It is not only the foundation and principle of Compound Arbitration, but is in itself a problem of more real utility and general application, as few speculations in Exchange are extended to more than three places in one operation.

It has been already shewn, that whether the arbitrated price is above or below the advised price, an advantage is equally to be made, and the greater the difference is, the greater will be the profit; but as the Courses of Exchange are liable to continual fluctuation, despatch is necessary in order to secure any favourable prices that may offer; and as an operation between three places can be performed sooner than between any greater number, it is evidently the most safe, as well as the most easy and practicable kind of Arbitration.*

* The following comparison between Simple and Compound Arbitration, made by *M. Corbaux*, in his *Dictionnaire des Arbitrages*, seems here to deserve quotation.

“ It is very easy to fancy problems and theories in Compound Arbitration, where great advantages might be made by numerous combinations of Exchange, but seldom does any opportunity occur in practice of realizing such speculations. On the contrary, men of experience are satisfied with combining the Exchanges of three places only (as in Simple Arbitration,) and there are few instances of the kind that will not afford room for a reasonable profit.”

The *Dictionnaire des Arbitrages* may be considered the most elaborate work ever published on this subject. It was printed at Paris in 1802, in two large volumes quarto, and contains, among other useful matter, about 900 pages of tables, which shew the arbitrated price (*pair proportionnel*) between the principal places of exchange in Europe, taken two by two with respect to Paris, this city being made the centre of operation.

Various other tables, both of natural numbers and logarithms, have been published by different persons for the more easy solution of Arbitration, and even triangles have been constructed for this purpose (see *Postlethwayt's Dictionary of Commerce*, vol. 1, page 94); but geometrical diagrams do not seem at all to illustrate the Problem.

A graphic operation, however of a very useful and ingenious description, was published in London a few years ago, in which, scales of the monies of exchange of the principal places in Lloyd's List, are so graduated and arranged, that the arbitrated price between any two of those places with respect to a third, may be immediately found by the application of a right line. The invention is by *William Hyde Wollaston, M.D.—S. and F.R.S.*

Another kind of scale, for facilitating operations in Exchange, &c. has been lately invented by *William Blake, Esq. F.R.S.* entitled a Logometric Scale of Exchanges, Bullion, Stocks, Monies, Weights, and Measures. It is constructed on the principle of Gunter's sliding-rule, and is well adapted for the ready solution of many useful problems.

In dwelling so long on the explanations of this problem, numerous repetitions must occur, which are, however, more excusable than omissions. Indeed, in a large work, repetitions are unavoidable where perspicuity is the chief object; and it has been the Author's principal endeavour to render Arbitration of Exchange more easy and accessible than it has been hitherto considered, especially in England, where merchants are said to be inferior to their neighbours on the continent in this branch of commercial science, and perhaps in this alone.

As every branch of science is difficult, in proportion as it is complex, the best mode of simplifying a problem is to divide it, so as to distinguish its component parts, and then to consider each division separately. Now the question before us may be distinguished under the three following heads.

- 1 —To find the arbitrated price of exchange.
- 2.—To compare it with the advised price.
- 3.—To draw and remit according to the comparison.

The arbitrated price would be always obvious without any calculation, if the monies of exchange were of one denomination; for the problem is founded on the FIRST AXIOM OF EUCLID, viz. "*Things that are equal to one and the same thing are equal to one another.*"

Thus, if the exchange of London on Amsterdam be 33 Shillings Flemish, and on Hamburg 34, these two sums, according to the Axiom, are equal to one another, being both equal to the Pound sterling. Hence the arbitrated price would be 33 Shillings Flemish of Amsterdam for 34 Shillings Flemish of Hamburg, if those places exchanged with each other in Shillings; but Amsterdam gives Hamburg an uncertain number of Stivers for the Dollar of Exchange, and therefore the proportion between these different denominations of money must be found by the rule of proportion. Thus, as 33s. of Hamburg : 34s. of Amsterdam :: 1 Dollar : $31\frac{1}{7}$ Stivers. Hence the arbitrated price is $31\frac{1}{7}$ Stivers of Holland, for 2 Marks of Hamburg.

The following example contains all the variety that can occur in finding the arbitrated price.

If the exchange of London on Paris be 25, and on Cadiz 40, what is the arbitrated price between Paris and Cadiz—that is, how many Francs should equal the Doubloon of 4 Piastres?

Here the Pound sterling equals 25 Francs, and the same Pound equals 6 Piastres; for, as 40d. : 1 Piastre :: 240d. : 6 Piastres. Hence (per the Axiom,) 6 Piastres = 25 Francs; and therefore 4 Piastres (the Doubloon) = $16\frac{2}{3}$ Francs, the arbitrated price; for, as 6 Piastres : 25 Francs :: 4 Piastres : $16\frac{2}{3}$ Francs.

Or thus, by the Chain Rule.

1 Doubloon.

1 Doubloon = 4 Piastres.

1 Piastre = 40 Pence sterling.

240 Pence = 25 Francs.

Hence, $\frac{4 \times 40 \times 25}{240} = \frac{4000}{240} = 16\frac{2}{3}$ Francs.

The second part of this problem, that of comparing the arbitrated and advised prices, is no more than to observe which price is cheapest or dearest to a place, the same as to an individual.

Thus, suppose the arbitrated price between Paris and Cadiz be, as above, $16\frac{2}{3}$ Francs for the Doubloon, and the advised price 16, the latter is evidently best for Paris, and the former for Cadiz; it being the interest of Paris to buy the Doubloon at the lowest price, and the interest of Cadiz to sell it at the highest price. This being understood, the following is the rule to be observed.

GENERAL RULE.

Draw upon the place where the arbitrated price is better for that place than the advised price; and remit to the place where it is worse.

Thus, in the foregoing comparison, London should draw on Cadiz, where the arbitrated price is better than the advised price; and should remit to Paris, where it is worse.

Suppose London exchanges on Amsterdam at 34 10, and on Hamburgh at 33 5; and suppose the advised course of exchange between Amsterdam and Hamburgh is 32 Stivers for the Dollar; how should London draw and remit, and what profit presents on a bill of £100?

As 33s. 5d. : 34s. 10d. :: 2 Marks : $33\frac{2}{3}$ Stivers, the arbitrated price, which is better for Hamburgh than the advised price; therefore, (according to the above Rule,) draw on Hamburgh, and remit to Amsterdam. Thus, your draft, which sells for £100 at 33 5, will amount to 1253 Marks 2 Sols: this sum, turned into Dutch money at 32 Stivers, will produce 1002 Guilders 10 Stivers; and a bill on Amsterdam for the amount at 34 10 will cost only £95 18s. 8d.

For, as £1 sterling : 33s. 5d. :: £100 : 1253 Marks 2 Sols.

And, as 2 Marks : 32 Stivers :: 1253 Marks 2 Sols : 1002 Guilders 10 Stivers.

Again, as 34s. 10d. : £1 sterling :: 1002 Guilders 10 Stivers : £95 18s. 8d.

Hence, the profit which presents in a draft of £100 sterling is £4 1s. 4d. The money you receive for your draft will pay for your remittance, with the above surplus, and your debit at Hamburgh will be paid by your credit at Amsterdam.

But if, on the contrary, the advised price of exchange had been 34½, this would be better

than the arbitrated price for Hamburg, and therefore you should draw on Amsterdam: thus—£100 at 34 10 = 1045 Guilders, which, at 34½ Stivers = 1220 Marks 7 S. 6 F.; and this bill at 33 5 will cost only £97 7s. 10d.; the profit, therefore, is £2 12s. 2d. The money you receive for your draft will pay for your remittance, with this surplus, and your debit at Amsterdam will be paid by your credit at Hamburg.

The following example, which is taken from a real operation, contains as much variety as can occur in Problems of this kind.

In March, 1802, the exchanges were (according to Lloyd's List,) London on Amsterdam 10 16, and on Cadiz 37; and, according to the Quotation of Amsterdam, the exchange of that place on Cadiz was 107.

London purchased bills to the amount of 10,000 Piastres, and remitted them to Cadiz, desiring to have returns in bills on Amsterdam; but when the remittance reached Cadiz, the exchange with Amsterdam had fallen to 104.

London also drew on Amsterdam for the amount, and the operation stood thus—
10,000 Piastres at 37d. = £1541 13s. 4d. which sum, converted to Florins at

10 Florins 16 Stivers per £ sterling	=	Fl. Curr. Stiv. 16,650 0
10,000 Piastres reduced to Ducats of 375 Maravedis	=	Ducats 7,253 ¹ / ₃
Commission, brokerage, and discount	=	217 ² / ₃
		7,036
7,036 Ducats at 104, drawn for, deducting 3 per cent. discount		17,734 15
		Gain 1,084 15

Hence, the profit on this operation was about 7 per cent.; and had the exchange kept up, that is, had the Ducat been negotiated at 107 per Ducat, the gain would have been above 10 per cent.—which shews the necessity of despatch in such speculations.

The reason for thus drawing and remitting is founded on the General Rule, and the arbitrated price is determined in the following manner:

First, find how many Pence sterling the Ducat is worth; thus—

$$\begin{array}{ccccccc} \text{Maravedis} & \text{Pence sterling} & \text{Maravedis} & \text{Pence sterling} & \text{£} & \text{Florins Stivers} & \text{Pence sterling} & \text{Pence Flemish.} \\ \text{As } 272 & : & 37 & :: & 375 & : & 51 & \text{—Then, as } 1 & : & 10 & 16 & :: & 51 & : & 91\frac{2}{3} \end{array}$$

Or thus, 1 Ducat.

$$\begin{array}{l} 1 \text{ Ducat} = 375 \text{ Maravedis.} \\ 272 \text{ Maravedis} = 37 \text{ Pence sterling.} \\ 240 \text{ Pence sterling} = 432 \text{ Pence Flemish.} \end{array}$$

Reduced gives 91½d. nearly.

Here the arbitrated price is 91½d. Flemish for the Ducat, but the real price is 104. Thus the former is the most favourable for Amsterdam, and therefore, (according to the Rule, page 119,) London should draw on Amsterdam and remit to Cadiz.

COMPOUND ARBITRATION

Is a comparison between the exchanges of more than three places, in order to find how much a remittance passing through them all will amount to in the last place; or to find the arbitrated price between the first place and the last, in order to determine on the most advantageous mode of negotiating bills.

Compound arbitration is therefore a repetition of simple arbitration, and may be solved by a continuation of several statings in the Rule of Proportion, as in the following example:

Suppose the exchange between London and Amsterdam to be 35 Shillings Flemish for £1 sterling; between Amsterdam and Lisbon, 42 Pence Flemish for 1 Old Crusade, and between Lisbon and Paris, 480 Rees for 3 Francs, what is the arbitrated price between London and Paris?

First, As 35s. Flemish : £1 :: 42d. Flemish, or 3½s. Flemish : 2s. sterling = 1 Old Crusade.

Secondly, As 1 Old Crusade, or 400 Rees : 2s. sterling :: 480 Rees : 2s. 4¼d. sterling = 3 Francs.

Thirdly, As 2s. 4¼d. sterling : 3 Francs :: £1 sterling : 25 Francs.

Hence the arbitrated price is 25 Francs for £1 sterling.

But all such operations are best performed in the following manner by the Chain Rule:

		1 Pound sterling
1 Pound sterling	=	35 Shillings Flemish
3½ Shillings Flemish	=	1 Old Crusade
1 Old Crusade	=	400 Rees
480 Rees	=	3 Francs

Reduced = 25 Francs as above.

Suppose London has a sum of money to receive in Cadiz, the exchange being at 38d.; but, instead of drawing directly on this place, he draws on Amsterdam, ordering his agent there to draw on Paris; and Paris to draw on Cadiz; the exchange between London and Amsterdam being at 35 Shillings Flemish per Pound sterling; between Amsterdam and Paris 53½ Grotes Flemish per Ecu of 3 Francs; and between Paris and Cadiz, 15 Francs 50 Centimes per Doubloon of Plate; what is the arbitrated price between London and Cadiz?

		1 Dollar of Plate
4 Dollars of Plate	=	1 Doubloon do.
1 Doubloon	=	15½ Francs
3 Francs	=	53½ Grotes Flemish
12 Grotes	=	1 Shilling Flemish
35 Skillings Flemish	=	240 Pence sterling
Reduced, gives 39½d. sterling per Dollar of Plate.		

The circular operation would, therefore, be most advantageous, as London would get 39½d. instead of 38d. for each Dollar, which he had to receive in Cadiz.

London having a sum to receive in Lisbon, when the exchange is at 64d. sterling per Milree, draws on Lisbon, but remits his bill to Hamburgh to be negotiated; and directs the returns to be made to him in bills on Leghorn—the exchange between Hamburgh and Lisbon being 45 Grotes Flemish per Old Crusade, between Hamburgh and Leghorn 85 Grotes Flemish per Pezza, and between London and Leghorn 52d. sterling per Pezza, what is the arbitrated price between London and Lisbon?

		1000 Rees
400 Rees	=	1 Old Crusade
1 Old Crusade	=	45 Grotes Flemish
85 Grotes	=	1 Pezza
1 Pezza	=	52 Pence sterling
Reduced, gives 68¼d. sterling per Milree.		

This circular operation would, therefore, be more advantageous than the direct exchange of London on Lisbon, viz. 68¼d., instead of 64d.

London has a sum to pay in Petersburg, and another to receive in Genoa; but there being no regular exchange between these places, London draws on Hamburgh, and remits his bill to Petersburg, directing Hamburgh to draw on Genoa—the exchange between London and Genoa, being 46½d. sterling per Pezza; between Hamburgh and Genoa, 81 Grotes Flemish per Pezza; and between Petersburg and Hamburgh, 23 Schillings Lubs per Ruble; what is the exchange between London and Petersburg resulting from the operation—that is, how many Pence sterling does London pay for the Ruble?

		1 Ruble
1 Ruble	=	23 Schillings Lubs
1 Schilling Lubs	=	2 Grotes Flemish
81 Grotes	=	1 Pezza
1 Pezza	=	46½ Pence sterling
Reduced, = 26 ⅓d. sterling per Ruble.		

London has a sum to remit to Paris, the exchange being at 24 Livres 5 Sous per Pound sterling; but instead of taking a bill on Paris, London draws on Hamburg, and remits his bill to Paris to be negotiated; Hamburg is directed to draw on Venice, and Venice to draw on London; the exchange between Paris and Hamburg being 190 Francs per 100 Marks Banco, between Hamburg and Venice 4 Lire 5 Soldi Piccoli per Mark Banco, and between Venice and London 55 Lire Piccole per Pound sterling; what is the arbitrated price between London and Paris?

		1 Pound Sterling
1 Pound Sterling	=	55 Lire Piccole
4½ Lire Piccole	=	1 Mark
100 Marks	=	190 Francs
80 Francs	=	81 Livres

Reduced, gives 24 Livres 18 Sous per Pound sterling.

The circular operation is, therefore, more advantageous than the direct exchange, as London pays 24 Livres 18 Sous, with £ 1 sterling, instead of 24 Livres 5 Sous.

Hitherto we have only examined one combination of the exchanges between several places in order to discover one result. In the following example we shall examine different combinations of the same exchanges, to find which is most favourable; and what is here performed with four places only, may be done with any greater number, in the same manner—that is, by trial and comparison.

Suppose the following to be the quotations of exchange:

London on	Amsterdam	35	Shillings Flemish per Pound sterling
	Madrid	38	Pence sterling per Dollar of Plate
	Paris	24	Livres per Pound sterling
Amsterdam on	London	34	Shillings Flemish per Pound sterling
	Paris	53	Grotes per Ecu of 3 Francs
	Madrid	92	Grotes per Ducat of Plate
Paris on	London	23½	Livres per Pound sterling
	Madrid	16	Francs per Doubloon of Plate
	Amsterdam	54	Grotes Flemish per Ecu of 3 Francs
Madrid on	London	39	Pence sterling per Dollar of Plate
	Amsterdam	94	Grotes per Ducat of Plate
	Paris	16½	Francs per Doubloon of Plate.

Now if London has a sum to receive in Madrid, what would be the most advantageous mode of operation?

By drawing directly on Madrid as above, London will receive 38d. sterling per Dollar.

First.—Let London draw on Amsterdam, directing Amsterdam to draw on Paris, and Madrid to remit to Paris; then the operation will be as follows:

		1 Dollar of Plate
4 Dollars	=	1 Doubloon of Plate
1 Doubloon	=	16½ Francs
3 Francs	=	54 Grotes Flemish
12 Grotes	=	1 Shilling Flemish
35 Shillings Flemish	=	240 Pence sterling
Reduced, gives the Dollar equal to 42¾d. sterling.		

Secondly.—Let London draw on Paris, directing Paris to draw on Amsterdam, and Madrid to remit to Amsterdam; then,

		1 Dollar of Plate
1 Dollar of Plate	=	272 Maravedis
375 Maravedis	=	1 Ducat of Plate
1 Ducat	=	94 Grotes Flemish
53 Grotes	=	3 Francs
80 Francs	=	81 Livres
24 Livres	=	240 Pence sterling
Reduced, gives the Dollar = 39⅙d.		

Thirdly.—Let London draw on Madrid, and remit the bill to Paris to be negotiated, and let the returns be made in a bill on Amsterdam; then

		1 Dollar of Plate.
4 Dollars	=	1 Doubloon of Plate
1 Doubloon	=	16 Francs
3 Francs	=	54 Grotes Flemish
12 Grotes	=	1 Shilling Flemish
35 Shillings Flemish	=	240 Pence sterling.
Reduced, gives 41¾d. sterling per Dollar.		

Fourthly.—Let London draw on Madrid, and remit to be negotiated in Amsterdam, and order the returns to be made in a bill on Paris; then

		1 Dollar of Plate
1 Dollar	=	272 Maravedis

375 Maravedis	=	1 Ducat of Plate.
1 Ducat	=	92 Grotes Flemish
53 Grotes	=	3 Francs
80 Francs	=	81 Livres
24 Livres	=	240 Pence sterling.
Reduced, gives $38\frac{1}{4}$ d. sterling per Dollar nearly.		

Fifthly.—Let London draw on Amsterdam, Amsterdam on Paris, and Paris on Madrid ; then

		1 Dollar of Plate
4 Dollars	=	1 Doubloon of Plate
1 Doubloon	=	16 Francs
3 Francs	=	53 Grotes Flemish
12 Grotes	=	1 Shilling Flemish
35 Shillings Flemish	=	240 Pence sterling.
Reduced, gives $40\frac{5}{11}$ d. per Dollar.		

Sixthly.—Let Madrid remit to Paris, Paris to Amsterdam, and Amsterdam to London ; then

		1 Dollar of Plate
4 Dollars	=	1 Doubloon of Plate
1 Doubloon	=	$16\frac{1}{2}$ Francs
3 Francs	=	54 Grotes Flemish
12 Grotes	=	1 Shilling Flemish
34 Shillings Flemish	=	240 Pence sterling.
Reduced, gives 44d. per Dollar nearly.		

Several other combinations might be made ; but the foregoing are sufficient for the present illustration.

In recapitulating the different combinations here proposed, we find that

The First	gives	$42\frac{3}{7}$	Pence sterling per Dollar of Plate.
The Second	—	$39\frac{1}{11}$	— — per Ditto.
The Third	—	$41\frac{1}{7}$	— — per Ditto
The Fourth	—	$38\frac{1}{4}$	— — per Ditto
The Fifth	—	$40\frac{5}{11}$	— — per Ditto
The Sixth	—	44	— — per Ditto

Whilst the direct course gives 38 — — per Ditto

Hence, it is evident, according to the rule laid down in pages 105 and 108, that the 6th operation would be most advantageous for the London drawer, as he would receive more

Pence for the Dollar than by any other combination; but it must be observed, that in this case, he would have to wait about six months for the remittance from Madrid through Paris and Amsterdam; whereas, by drawing directly on Madrid, he would receive the money immediately—consequently, interest should be deducted from the profit, besides commission, postage, &c. The Profit is, however, so great in this case, as far to exceed the additional expenses; thus—

As 38 : 44 :: 100 : $115\frac{2}{3}$. Profit, $15\frac{2}{3}$ per cent. nearly.

It is also evident, that if London was the debtor, and had to remit to Madrid, the lowest course of exchange, which is here the direct one, should be adopted.

CHARGES ON EXCHANGE OPERATIONS.

In the foregoing examples, no notice is taken of the expenses incident to exchange operations, such as commission, brokerage, interest, &c.; but it is necessary to make allowance for those charges, which is generally done by computing them at so much per cent.; and then adding the per-centage if the money is to be paid, or subtracting it if to be received. Suppose the charge to be 1 per cent.; if on a Draft it is 101 for 100, but if on a Remittance, 99 for 100.

Example I.—Suppose a merchant in Liverpool has 10,000 Marks to pay in Hamburgh, for which purpose he orders bills to be bought in London at 34s. 8d. besides which he is charged $\frac{1}{2}$ per cent. for commission and brokerage, how much sterling will he have to pay?

s.	d. Flem.	£ ster.	Marks.	£	s.	d. ster.
As 34	8	:	1	:	10,000	:
				769	4	$7\frac{1}{2}$

£	s.	d. ster.	£	s.	d. ster.
And as 100	:	$100\frac{1}{2}$	:	769	4
				$7\frac{1}{2}$:
			773	1	$6\frac{1}{2}$

Example II.—A merchant in London negotiates a bill on Leghorn of 6592 Pezze 10 Soldi at $49\frac{1}{2}$ d. sterling per Pezza; and pays as usual 1 per 1000 brokerage; how much sterling does he receive?

Pezza	d. ster.	Pezza Soldi	£	s.	d. ster.
As 1	:	$49\frac{1}{2}$	:	6592	10
			1359	14	$0\frac{3}{4}$

£	s.	d.	£	s.	d.
And as 1000	:	999	:	1359	14
			$0\frac{3}{4}$	:	1358
			6	$10\frac{1}{2}$	

When the operation is performed by the Chain Rule, the charges per cent. must be deducted

from 100 the last consequent, if it tends to the diminution of the result, but if to its increase, the same remainder must be an antecedent.

Example III.—London, having a sum to pay in Lisbon, buys bills on Hamburg at the exchange of 35s. 4d. and remits them to Lisbon, where they are negotiated at 43 Grotes Flemish per Old Crusade. The charges in Lisbon for brokerage, commission, and postage are $\frac{3}{4}$ per cent; what is the arbitrated price between London and Lisbon, resulting from the operation—that is how many Pence sterling should be given for the Milree?

		1000 Rees
400 Rees	=	43 Grotes Flemish
424 Grotes	=	240 Pence sterling
100 Pence	=	100 $\frac{1}{4}$ Pence, adding charges.
Answer, 61 $\frac{1}{10}$ d. sterling per Milree.		

In the above question the charges are added to the last consequent as they increase the price of the Milree, which must be the case, the charges being against the Payee.

Example IV.—London takes bills on Madrid at 33 $\frac{1}{2}$ d. per Dollar of exchange, remits them to Amsterdam with orders to negotiate at 90 $\frac{1}{4}$ Grotes Flemish per Ducat of exchange, and to make the returns in bills on Paris at 51 $\frac{3}{8}$ Grotes per Ecu of 3 Francs: these bills on Paris are negotiated in London at 25 Livres 18 Sous per Pound sterling; and all the charges (including interest) amount to 1 $\frac{1}{8}$ per cent.; how much per cent. is gained or lost by this operation—that is, how much will 100d. sterling produce?

		100 Pence Sterling
33 $\frac{1}{2}$ Pence	=	272 Maravedis or 1 Dollar of exchange
1 Ducat of exchange, or 375 Maravedis	=	90 $\frac{1}{4}$ Grotes
51 $\frac{3}{8}$ Grotes	=	3 Francs
80 Francs	=	81 Livres
1 Livre	=	20 Sous
518 Sous	=	240 Pence
100 Pence	=	98 $\frac{7}{8}$ Pence deducting charges.

The result is 105,85d. The profit is, therefore, 5,85 or nearly 5 $\frac{7}{8}$ per cent.

In the last example, the interest was to be deducted from the profits, but an example will now be given, in which the interest is to be added, because the drawer gains it; and, in such case, it is to be added to the antecedent instead of being subtracted.

Example V.—London draws bills on Hamburg at 34 Shillings Flemish per Pound sterling, and orders Hamburg to draw for his reimbursement on Leghorn, which is done at 86 Grotes Flemish per Pezza; Leghorn draws in the same way on Cadiz at 140 Dollars of

Plate per 100 Pezze; and lastly, Cadiz draws on London at 39 Pence sterling per Dollar; what is the profit or loss on the operation, supposing that the charges in each of the above three foreign places are $\frac{3}{4}$ per cent. (in all $2\frac{1}{4}$ per cent.); but that London, by keeping the money in his hands about 8 months, gains 3 per cent. by the interest?

		100 Pence sterling
240 Pence	=	34 Shillings Flemish
1 Shilling Flemish	=	12 Grotes
86 Grotes	=	1 Pezza
100 Pezze	=	140 Dollars of Plate
1 Dollar of Plate	=	39 Pence
97 $\frac{3}{4}$ Pence deducting charges	=	100 Pence
103 Pence with interest	=	100 Pence

The Answer is 107,2d. The loss is, therefore, $7\frac{1}{2}$ per cent. nearly.

As the above example comprehends all the varieties that generally occur in questions of this kind, it is here solved by a series of statings in the Rule of Three, which serves at once to explain the nature of the operation, and to prove the correctness of the Chain Rule. Such illustrations must be highly useful in all problems of arbitration.

London, we will suppose, receives 100 Pence, or any other denomination, by drawing on Hamburg at 34s. Flemish per Pound sterling.

$$\begin{array}{ccccccc} & \text{d.} & & \text{s.} & & \text{d.} & \text{Grotes Flem.} \\ \text{As } 240 & : & 34 & :: & 100 & : & 170 \end{array}$$

Hamburg must, therefore, draw on Leghorn for that sum,—thus

$$\begin{array}{ccccccc} & \text{Grotes} & & \text{Pezza} & & \text{Grotes} & \text{Pezza} \\ \text{As } 86 & : & 1 & :: & 170 & : & 1,977 \end{array}$$

Leghorn in the same way reimburses on Cadiz.

$$\begin{array}{ccccccc} & \text{Pezza} & & \text{Doll. Plate} & & \text{Pezza} & \text{Doll. Plate} \\ \text{As } 100 & : & 140 & :: & 1,977 & : & 276,78 \end{array}$$

For which Cadiz thus finally draws on London—

$$\begin{array}{ccccccc} & \text{Doll.} & & \text{d.} & & \text{Doll.} & \text{d.} \\ \text{As } 1 & : & 39 & :: & 276,78 & : & 107,94 \text{ which the drawer must pay.} \end{array}$$

Then to add the expense to the loss, say

$$\begin{array}{ccccccc} & \text{d.} & & \text{d.} & & \text{d.} & \text{d.} \\ \text{As } 97,75 & : & 100 & :: & 107,94 & : & 110,42 \end{array}$$

And to deduct the interest from the loss, say

$$\begin{array}{ccccccc} & \text{d.} & & \text{d.} & & \text{d.} & \text{d.} \\ \text{As } 103 & : & 100 & :: & 110,42 & : & 107,2 \end{array}$$

If, in the above statement, the drawer or seller had been the buyer or remitter, then the expenses and interest must have been reversed as to their places, both in the Chain Rule and in the Rule of Three.

LOGARITHMS IN EXCHANGE.

OPERATIONS in exchange may be sometimes greatly facilitated by the help of Logarithms. Thus, in a statement of arbitration—if the sum of the Logarithms of the Antecedents, be subtracted from the sum of the Logarithms of the Consequents, the remainder will be the Logarithm of the Answer.

To apply this rule to Example IV. page 127, let like numbers on both sides be struck out as before; to reduce them to a lower denomination is useless, as the Logarithm of a large number is as easily found as that of a small one: thus—

Antecedents.	Logarithms.	Consequents.	Logarithms.
33,5	.....1,525045	272	.....2,434569
125	.....2,096910	90,25	.....1,955447
51,375	.....1,710752	3	.....0,477121
518	.....2,714330	81	.....1,908484
	.....	20	.....1,301030
	.....	98,875	.....1,995086
	8,047037		
		Sum of Log. of Con.	10,071737
		Sum of Log. of Ant.	8,047037
		Answer, 105,85 =	2,024700

The reason of the above operation will be understood by considering that Multiplication and Division of common numbers are performed by Addition and Subtraction of their Logarithms. Laborious calculations, therefore, must be greatly facilitated by the help of Logarithms, and their application in Exchange seems too obvious to require any further illustration.

FIXED NUMBERS IN EXCHANGE.

IN every long statement of an exchange operation, there are both fixed numbers and variable numbers: the latter are generally the prices of exchange, and the fluctuating agios, or values of different sorts of money, with the amount of charges, &c.; and the former, that is, the fixed numbers, are the permanent proportions between certain denominations of money, as the number of Pence in a Pound sterling, &c. Now when opera-

tions between the same places are to be repeated several times, and at such intervals, as to admit of alterations in the variable numbers, the work may be considerably abridged by reducing all the invariable terms into a fixed number, which may be afterwards used as a constant factor in all such questions.

Thus, in Example III., page 127, among the Antecedents, 400 expressing the number of Rees in an Old Crusade, and 100, which is assumed, in order to find a per centage on the operation, are fixed numbers; and, among the Consequents, 1000, the number of Rees in a Milree, and 240, the number of Pence in a Pound sterling, are likewise fixed numbers. The variable numbers are the exchanges between London and Hamburgh, and between Hamburgh and Lisbon, and the amount of the charges. Then let the fixed numbers be cast up, thus—

$$\begin{array}{r} 400 \\ 100 \end{array} \quad \begin{array}{r} 1000 \\ 240 \end{array}$$

By expunging the cyphers, and dividing both sides by 4, the result, or *fixed number*, will be 6 in all questions of the same kind. Then multiply the constant number 6 by the course of exchange of Hamburgh on Lisbon, and by 100 more the charges, and divide by the course of exchange of London on Hamburgh expressed in Grotes Flemish: or, by Logarithms,—to the constant Logarithm of 6, add the Logarithms of the two first-mentioned variable quantities, and subtract the Logarithm of the last: thus—

$$\begin{array}{r} \text{Logarithm of } 6 \quad \dots 0,778151 \\ \quad \quad \quad 43 \quad \dots 1,633468 \\ \hline \quad \quad \quad 100,75 \dots 2,003245 \end{array}$$

$$\hline 4,414864$$

$$\text{Logarithm of } 424 \dots 2,627366$$

$$\hline 1,787498 \text{ Log. of } 61,3 \text{ the arbitrated price,} \\ \text{(found page 127.)}$$

Now let the exchange of London on Hamburgh be at 34s. 8d. (or 416 Grotes per Pound sterling, and that of Hamburgh on Lisbon at 44 Grotes per Crusade; let also the charges amount to $\frac{1}{2}$ per cent.

$$\begin{array}{r} \text{Fixed Logarithm} \quad \dots 0,778151 \\ \text{Logarithm of } 44 \quad \dots 1,643453 \\ \quad \quad \quad 100,5 \dots 2,002166 \end{array}$$

$$\hline 4,423770$$

$$\text{Logarithm of } 416 \quad \dots 2,619093$$

$$\hline 1,804677 \text{ Log. of } 63,78, \text{ or } 63\frac{1}{2} \text{ nearly.}$$

In Example IV. page 127, on one side 375 and 80 ; and on the other side 272, 3,81, 240 are invariable numbers (besides 100 which may be cancelled on both sides), which may be reduced as before to

$$\begin{array}{r}
 125 \dots\dots 272 \\
 \left. \begin{array}{l} 3 \\ 81 \\ 20 \end{array} \right\} \text{ give } \frac{1321920}{125} = 10575,4 \text{ Fixed Number.}
 \end{array}$$

The fixed Logarithm is then found as follows :

Logarithm of 272.....	2,434569
3.....	0,477121
81.....	1,908484
20.....	1,301030

6,121204

Logarithm of 125.....2,096910

Fixed Logarithm4,024294 = 10575,4 Fixed Number.

This may be applied to the questions, page 127, as follows :

Antecedents.	Logarithms.	Consequents.	Logarithms.
33,5	1,525045	90,25	1,955447
51,375	1,710754	98,875.....	1,995086
518,	2,714330	Fixed Logarithm	4,024294
	5,950127	Sum of Log. of Con.	7,974827
		Sum of Log. of An.	5,950127

Answer, Log. 105,852,024700 as before.

ARBITRATION OF SPECIE AND BULLION.

THE state of the exchange between two countries is sometimes such, that it is found more advantageous, instead of drawing or remitting bills, to import or export specie or bullion. The profit or loss on operations of this kind may be determined by calculations similar to those used in arbitration of exchange.

By this rule also the course of exchange is determined from the price of bullion, and *vice versa*.

Example I.—London has a sum to receive in Lisbon, the exchange being at 62; but instead of drawing on Lisbon, he orders a quantity of Johanesees to be bought there, the discount on paper money in Portugal being at the time 12 per cent.; these Johanesees are sold in London at £4 sterling per ounce; the charges, namely, commission, freight, and insurance, amount to 2½ per cent.;—what is the exchange between London and Lisbon resulting from the operation; that is, how many Pence sterling should be given for the Milree, legal money?

		1000 Rees
100 Rees legal money	=	94 Rees effective
6400 Rees effective	=	1 Johanese
1 Johanese	=	220½ Grains
480 Grains in Johanese	=	4 Pounds sterling
1 Pound	=	240 Pence sterling
100 Pence	=	97½ Pence deducting charges.
Reduced, gives 63,15d. per Milree.		

The circular operation would therefore be most advantageous to the London Drawer.

Example II.—A quantity of Dollars is imported from Cadiz, for which bills are drawn on London at the exchange of 38½, and the charges amount to 3 per cent.;—how much per ounce will these Dollars cost in London, supposing 1000 Dollars to weigh 866 Ounces Troy?

		1 Ounce of Dollars
866 Ounces	=	1000 Dollars
1 Dollar	=	10½ Reals of Plate
8 Reals of Plate	=	1 Dollar of Exchange
1 Dollar of Exchange	=	38½ Pence sterling
100 Pence	=	103 Pence with charges.
Reduced, gives 61,21d. or 61¼d. per Ounce nearly.		

Example III.—London has a sum to pay in Hamburgh, the exchange being at 34; but instead of remitting bills, he buys a quantity of Spanish Dollars at 60½d. sterling per Ounce, which are sent to Hamburgh, and there sold at 28 Marks Banco per Mark fine; the charges amount to 1½ per cent.;—what is the arbitrated price, or course of exchange, between London and Hamburgh, the Dollars being 10 oz. 15 dwts. fine, and 60 Marks in Hamburgh being equal to 451 Ounces Troy?

		1 Pound Sterling.
1 Pound Sterling	=	240 Pence
60½ Pence	=	1 Ounce in Dollars
120 Ounces in Dollars	=	107 Ounces fine
451 Ounces	=	60 Marks Hamburgh weight
1 Mark fine	=	28 Marks Banco
3 Marks Banco	=	8 Shillings Flemish banco
100 Shillings Flemish	=	98½ Shillings deducting charges.

Answer, 34s. 7¼d. Flemish per Pound Sterling.

The operation would therefore be preferable to the course of exchange; for, with £1 sterling, London here pays 34s. 7¼d. Flemish, whereas, by remitting bills to Hamburgh, with £1 sterling, he would have paid only 34 Shillings Flemish.

Example IV.—Gold in bars is bought in Hamburgh at 98 Shillings Lubs per Ducat of gold (67 of which Ducats make a Cologne Mark, 23½ carats fine); this gold is conveyed to England, and Hamburgh draws on London for the value at 34s. 6d. Flemish per Pound sterling; the charges amount to 1¼ per cent.;—how much does this gold cost in London per Ounce standard?

		1 Ounce Standard
47 Ounces Standard	=	44 Ounces, 23½ carats fine
451 Ounces	=	60 Cologne Marks
1 Cologne Mark	=	67 Ducats
1 Ducat	=	98 Shillings Lubs
6 Shillings Lubs	=	1 Shilling Flemish
34½ Shillings Flemish	=	1 Pound Sterling
100 Pounds	=	101¼ Pounds with charges.

Answer, £4 sterling per Ounce, very nearly.

Example V.—Silver in bars is bought at Cadiz at 105 Reals of Plate per Spanish Mark of fine silver; this silver is sent to England, and sold at 5s. 4d. sterling per Ounce of standard silver; the charges amount to 2 per cent.;—what is the arbitrated price between London and Cadiz, reckoning that 12 Spanish Marks equal 89 Ounces Troy, or what should be the course of exchange resulting from this operation?

		1 Dollar of Plate
1 Dollar of Plate	=	8 Reals of Plate
105 Reals of Plate	=	1 Mark of fine silver.
222 Marks Fine	=	240 Marks standard silver
12 Marks	=	89 Ounces Troy
1 Ounce Standard	=	64 Pence sterling
100 Pence	=	102 Pence with charges.

Answer, 39¾d. per Dollar of exchange, nearly.

Example VI.—Gold in bars is bought in Lisbon at 1700 Rees legal money per Outava of Gold, 22 carats fine; this gold is sold in London at £4 per Ounce; the charges amount to $1\frac{1}{2}$ per cent.;—what is the arbitrated price between London and Lisbon, reckoning that 400 Ounces of Portugal equal 369 Ounces Troy; that is, what should be the course of Exchange resulting from this operation?

	1000 Rees	
1700 Rees	=	1 Outava of Standard Gold
8 Outavas	=	1 Ounce of Portugal
400 Ounces of Portugal	=	369 Ounces Troy
1 Ounce Troy	=	4 Pounds Sterling
1 Pound Sterling	=	240 Pence
100 Pence	=	101½ Pence with charges
Answer, 56d. $\frac{9}{188}$ per Milree.		

ARBITRATION OF MERCHANDIZE.

ARBITRATION of merchandize consists chiefly in determining, when the price of any kind of goods in one place is known, what it would come to in another place; and consequently, the price at which it should be sold in order to obtain a certain profit. In most cases, there are various charges and expenses to be taken into account, which are commonly reckoned at so much per cent.; or sometimes a certain proportion is deducted from the weight or the measure. Strict accuracy is not in general required in such calculations, but only such an estimate as will enable the merchant to judge how he may, with the greatest advantage, export or import any particular kind of goods.

Example I.—Suppose a certain kind of woollen cloth to cost in London $16\frac{1}{2}$ s. per yard; the exchange of London on Hamburgh being 34s. $2\frac{1}{2}$ d. Flemish Banco per Pound Sterling; and the agio on the Bank $21\frac{1}{2}$ per cent.;—what will this cloth come to in Hamburgh currency per Brabant Ell, 49 of which equal 37 English yards?

	1 Brabant Ell	
49 Brabant Ells	=	37 English yards
1 Yard	=	$16\frac{1}{2}$ Shillings Sterling
20 Shillings Sterling	=	$410\frac{1}{2}$ Grotes Flemish Banco
32 Grotes Flemish	=	1 Mark
100 Marks Banco	=	$121\frac{1}{2}$ Marks currency
Answer, 9 Marks 11 Shillings 4 Pfenings currency per Ell.		

Example II.—Suppose the cwt. of coffee in London to cost 65 Shillings on board, and the exchange on Hamburg to be 34s. 8d.; commission 2 per cent.; and insurance 1 per cent.;—what will the lb. of such coffee come to in Hamburg Banco, reckoning for freight, brokerage, and other charges $4\frac{1}{2}$ Pfenings Banco per Pound,—112lb. avoirdupois being equal to 105lb. of Hamburg?

	1 lb. of Hamburg
105 lb. of Hamburg	= 1 Hundred Weight Avoirdupois
1 Hundred Weight	= 65 Shillings Sterling
20 Shillings Sterling	= 416 Grotes Flemish Banco
2 Grotes Flemish	= 1 Schilling Lubs
100 Schillings	= 102 Schillings with Commission
100 Schillings	= 101 Schillings with Insurance
Answer, 6 Schillings $7\frac{1}{2}$ Pfenings Banco	nearly.
Add.....	$4\frac{1}{2}$ Pfenings for Charges in Hamburg
<hr style="width: 20%; margin: 0 auto;"/>	
Ans. 7 Schillings per lb.	

Example III.—Irish butter sells at Cork for 50 Shillings Irish per cwt. the exchange of Cork on London is $9\frac{1}{4}$; and that of London on Hamburg 35;—what price will the cask of 224 lb. come to in Hamburg currency, reckoning commission and insurance together at $3\frac{1}{7}$ per cent., the charges in Hamburg at 5 Marks current per cask, and the agio on the Bank 22 per cent?

	224 lb. of Hamburg
105 lb. of Hamburg	= 1 Hundred Weight Avoirdupois.
1 Hundred Weight	= 50 Shillings Irish
$109\frac{1}{2}$ Shillings Irish	= 100 Shillings Sterling
20 Shillings Sterling	= 35 Shillings Flemish Banco.
8 Shillings Flemish	= 3 Marks
100 Marks Banco	= 122 Marks current.
100 Marks current	= $103\frac{1}{2}$ Marks current with Comm. and Inse.
Answer, 80 Marks $14\frac{1}{2}$ Schillings	current nearly.

Charges in Hamburg.... 5 Marks

85 Marks $14\frac{1}{2}$ Schillings per Cask.

Example IV.—Pepper is bought in London at $11\frac{1}{2}$ d. per lb. net weight, which, with the allowances for draft and tare, comes to $10\frac{1}{4}$ d. per lb. gross weight. This pepper is exported to Amsterdam, the exchange being at 36 Shillings Flemish Banco per Pound Sterling; $1\frac{2}{7}$ per cent. is allowed for tare in Amsterdam: freight, insurance, and other charges

amount to $6\frac{1}{2}$ per cent. and it is sold there at 28 Grotes Flemish per Pound; but 2 per cent. is allowed for Rabat on the price;—what is the profit or loss on the operation,—56 lb. of Amsterdam being equal to 61 lb. avoirdupois?

	1 lb. Avoirdupois
61 lb. Avoirdupois	= 56 lb. of Amsterdam
101 $\frac{1}{2}$ lb. Gross Weight	= 100 lb. Net Weight in Amsterdam
1 lb. Net Weight	= 28 Grotes Flemish
102 Grotes	= 100 Grotes, with Rabat
106 $\frac{1}{2}$ Grotes	= 100 Grotes, with Charges
12 Grotes	= 1 Shilling Flemish
36 Shillings Flemish	= 240 Pence Sterling

Reduced, gives	a.	d.	
	12	9	sterling per lb.
Prime Cost	11	5	

Profit . 1 4 per lb. or $12\frac{4}{11}$ per cent.

Example V.—The Last of wheat at Dantzic costs 620 Florins, and it is computed that it might be sold in London at 90 Shillings per Quarter; Dantzic may draw on Hamburgh for the amount at 166 Groschen per Rixdollar Banco, and the exchange of Hamburgh on London is 34s. 6d.;—what would be the profit or loss on the importation of such wheat, reckoning that the Last of Dantzic equals $10\frac{1}{2}$ English Quarters, that the charges at Dantzic will amount to $12\frac{1}{2}$ per cent., and that the freight, insurance, and all the charges to be paid in London (including commission to the Hamburgh correspondent) will amount to 20 per cent.?

	1 English Quarter
10 $\frac{1}{2}$ Quarters	= 1 Last in Dantzic
1 Last in Dantzic	= 620 Florins
100 Florins	= 112 $\frac{1}{2}$ Florins, with charges in Dantzic
1 Florin	= 30 Groschen
166 Groschen	= 1 Rixdollar Hamburgh Banco
1 Rixdollar	= 8 Shillings Flemish
34 $\frac{1}{2}$ Shillings Flemish	= 1 Pound Sterling
100 Pounds	= 120 Pounds, with Charges
1 Pound	= 20 Shillings

Reduced, gives $65\frac{1}{2}$ Shillings per Quarter.

If therefore the wheat can be sold at 90s. the profit will be $24\frac{1}{2}$ s. per Quarter, or about 38 per cent.

The following question will show how to determine between two or more places, in order to find which will give the most advantageous result.

Example VI.—A quantity of Spanish wool has been bought at Bilboa at 325 Reals Vellon per Arroba of 25 lb. with an intention to export it either to London or to Amsterdam; the price of such wool in London is found to be 4 Shillings per lb. allowing 6 months credit; and in Amsterdam 58 Stivers per lb. allowing 21 months rabat, *i. e.* 14 per cent. and 1 per cent. for prompt payment: the exchange of Bilboa on London is 37d. per Dollar, and on Amsterdam 87 Grotes Flemish per Ducat;—which of the two places is the most advantageous to export to?

By a reference to the first volume, it will be found that 100 lb. of Bilboa are equal to 108 lb. avoirdupois, which answer to $99\frac{1}{2}$ lb. of Amsterdam: and that the allowances on Spanish wool in London are 22 lb. per bale of 2 cwt. And suppose the allowances in Amsterdam amount to 20 per cent.

And, to simplify the question, we will suppose the charges to be the same in London as in Amsterdam, so that they need not be taken into account:

Beginning with London, say

	1 lb. Avoirdupois.
202 lb. Net Weight	= 224 lb. Gross Weight.
108 lb. Avoirdupois	= 100 lb. of Bilboa.
25 lb. of Bilboa	= 325 Reals Vellon.
32 Reals Vellon	= 17 Reals of Plate.
8 Reals of Plate	= 1 Dollar of Exchange.
1 Dollar of Exchange	= 37 Pence Sterling.

Reduced, gives 2s. $8\frac{3}{4}$ d. sterling per lb.

This wool will therefore come to 2s. $8\frac{3}{4}$ d. per lb. in London, where it is sold at 4s. per lb. from which, however, six months discount must be deducted; then

As 100 : $97\frac{1}{2}$:: 4s. : 3s. $10\frac{3}{4}$ d. the real price.

And as 2s. $8\frac{3}{4}$ d. : 3s. $10\frac{3}{4}$ d. :: 100 : $142\frac{2}{3}$ d.

The profit on the operation to London is therefore $42\frac{2}{3}$ d. or nearly $42\frac{2}{3}$ per cent.

Then for Amsterdam, say

	1 lb. of Amsterdam.
100 lb. Net Weight	= 120 lb. Gross Weight.
$99\frac{1}{2}$ lb. of Amsterdam	= 100 lb. of Bilboa.
25 lb. of Bilboa	= 325 Reals Vellon.
1 Real	= 34 Maravedis.

EXCHANGE CIRCULATIONS.

32 Maravedis Vellon	=	17 Maravedis of Plate.
375 Maravedis of Plate	=	1 Ducat of Exchange.
1 Ducat of Exchange	=	87 Grotes Flemish.
2 Grotes Flemish	=	1 Stiver.

Reduced, gives 32,96 Stivers per lb.

This wool will, therefore, come to 32,96 Stivers per lb. in Amsterdam, where it is sold at 58 Stivers per lb.; but from this 15 per cent. must be deducted for Rabat and prompt payment; then

As 100 : 85 :: 58 Stivers : 49,3 Stivers, the real price.

And as 32,96 : 49,30 :: 100 : $149\frac{37}{112}$.

The profit on the operation to Amsterdam is $49\frac{37}{112}$, which is 7 per cent. more than in London; and, therefore, supposing, as we have done, that the freight, insurance, duty on importation, and other charges would amount to the same sum in both places, Amsterdam must be a more advantageous place to export to than London.

By the foregoing examples may be seen the great advantages which merchants may derive from a knowledge of arbitration, whether of merchandize, bullion, or exchanges; and the following article will likewise show the utility and importance of this science when judiciously applied, on a large scale, to national or political purposes.

EXCHANGE CIRCULATIONS.

EXCHANGE CIRCULATIONS are a kind of arbitration, in which a merchant negotiates his bills on his correspondent in a foreign place, directing him to draw on a third person for his reimbursement; and further ordering the operation to be continued on the same plan from one place to another, until the last correspondent reimburses himself by drawing on the original negotiator or drawer.

Thus, circular exchange is carried on among several persons on the same principle as drawing and redrawing between two correspondents; that is, when one draws upon the other directing the correspondent to draw on him again for his reimbursement, and each sells his draft for ready money.

Operations in circular exchange afford not only immediate resources, but also con-

siderable profits when judiciously managed. In order, however, to carry on this kind of business with proper effect, it is necessary for the original drawer to establish a proper credit in every place where the bills are to be negotiated; and to be provided likewise with funds to make good, in the end, all his engagements.

Exchange Circulations may be distinguished under two heads :

1st. Operations by which individuals or houses possessed of limited capitals may undertake large negotiations, and thus make their credit supply both immediate funds and future profit.

2dly. Operations to which governments and public establishments have occasional recourse, either to remit subsidies, or to effect a rise or fall in exchanges.

The first kind of circulation has been already explained in compound arbitration; and it is particularly illustrated in Example V. page 127.

The second kind of circulation is carried on precisely on the same principle as the first; but as this is a subject of considerable importance in political economy, as well as commercial speculation, we shall here further illustrate it by a real example.

In 1804 Spain was bound to pay to France a large Subsidy; and, in order to do this, three direct methods presented themselves:—

1. To send Dollars to Paris by land.
2. To remit Bills of Exchange directly to Paris.
3. To authorise Paris to draw directly on Spain.

The first of these methods was tried, but it was found too slow and expensive; and the second and third plans were considered as likely to turn the exchange against Spain. The following method by circular exchange was, therefore, adopted:—

A Merchant, or Banquier, at Paris, was appointed to manage the operation, which he thus conducted: he chose London, Amsterdam, Hamburgh, Cadiz, Madrid, and Paris, as the principal hinges on which the operation was to turn, and he engaged correspondents in each of those cities to support the circulation. Madrid and Cadiz were the places in Spain from whence remittances were to be made, and Dollars were, of course, to be sent where they bore the highest price, for which Bills were to be procured on Paris, or on any other places that might be deemed more advantageous.

The principle having been thus established, it only remained to regulate the extent of the operation so as not to issue too much paper on Spain, and to give the circulation as much support as possible from real business. With this view, London was chosen as a place to which the operation might be chiefly directed, as the price of Dollars was then high in England; a circumstance which rendered the proportional exchange advantageous to Spain. The business was commenced at Paris, where the negotiation of drafts issued on Hamburgh and Amsterdam served to answer the immediate demands of the State; and orders

were transmitted to those places to draw for their reimbursements on London, Madrid, or Cadiz, according as the courses of exchange were most favourable. The proceedings were all conducted with judgment and attended with considerable success.

At the commencement of the operation the course of exchange of Cadiz on London was 36d. but by the plan adopted, Spain obtained $39\frac{1}{4}$ d. as may be seen by the following computation:—

The several charges of the consignments of Dollars from Cadiz to London amounted to 11 per cent. and they were sold at 5s. 7d. per oz.—Hence,

		1 Dollar of Exchange.
85 Dollars of Exchange	=	64 Hard Dollars.
1000 Hard Dollars	=	866 Ounces (by common estimate).
1 Ounce	=	67 Pence.
111 Pence	=	100 Pence with charges.

Reduced, gives the exchange $39\frac{1}{4}$ d.

Thus Spain, instead of getting 36d. for the Dollar of Exchange, received $39\frac{1}{4}$ d. and, therefore, gained above 8 per cent. by the remittance of Dollars to London, and considerable advantages were likewise made by the circulation of Bills through the several places on the Continent. Time was also gained for the payment of the subsidy; and the course of Exchange, instead of being turned against Spain, as it must have been by direct remittances, was rather turned in her favour by this circular method of operation.

PAR OF EXCHANGE.

As the Par of Exchange has been already explained under various views, (p. 13,) it remains here to show how the intrinsic Par is computed; which is exemplified between London and the principal trading places of Europe by comparing gold with gold, and silver with silver, which may be done either from the Mint Regulations of each place, or from Assays such as are contained in the Tables of Gold and Silver Coins in this Volume.

In computing the Par of Exchange by the Chain Rule the *certain money* should be the leading term, or first consequent, and the *uncertain money* the term of demand, or last consequent, as in the following examples.

LONDON AND AMSTERDAM.

Required the Par of Exchange between London and Amsterdam resulting from the new 10 Florin Piece, weighing 6,729 Grammes $\frac{9}{10}$ fine, and the British Sovereign, or 20 Shilling Piece? Here the latter is the *certain* and the former the *uncertain* money.

	1 Pound Sterling.
1 Pound Sterling	= 240 Pence.
934½ Pence	= 1 Ounce Standard.
12 Ounces Standard	= 11 Ounces fine Gold.
1 Ounce	= 480 Grains.
15434 Grains	= 1000 Grammes.
6,729 Grammes × $\frac{9}{10}$	= 10 Florins.

Result, 12 Florins 9 Cents. for £1 Sterling, or 40 Shillings 3 Pence Flemish.

The Par of Exchange may be found with less labour than by the above method from Tables of Coins. Thus, in the following Table of Gold Coins it will be seen that the 10 Florin Piece contains 93,46 Grains, and the Sovereign 113 Grains of fine Gold:—then say,

Gr.	Fl.	Gr.	Fr.	Cent.
As 93,46	: 1	: :	113	: 12 09 as above.

LONDON AND AMSTERDAM.—SILVER.

Required the Par of Exchange between London and Amsterdam, resulting from a comparison of the new Silver Florin and the Pound Sterling?

By a reference to the Table of Coins it will be seen that the Florin contains 148,38 Grains of fine Silver, and the Pound 1718,7 Grains;—hence,

Gr.	Fl.	Gr.	Fl.
As 148,38	: 1	: :	1718,7 : 11,58

Thus the Par in silver is 11 Florins 58 Cents. for the Pound Sterling, which differs about 4½ per cent. from the gold Par:—they might, however, be made to agree by valuing the English silver at 5s. 3½d. per ounce, instead of 5s. 2d.

LONDON AND HAMBURGH.—GOLD.

Required the Par of Exchange resulting from a comparison of the Hamburgh Ducat containing 53 English Grains of pure Gold, and the Sovereign containing 113 Grains, supposing that the Ducat equals 6 Marks Banco, or 16 Shillings Flemish.

Gr.	Sh.	Gr.	Sh.	d.
As 53	: 16	: :	113	: 34 1,35

Thus the gold Par is 34 Shillings 1,35 Pence Flemish per £1 Sterling; but, from the fluctuating value of the Ducat, the Par cannot be considered permanent: by taking the average price of the Ducat for the last four years, which is $6\frac{1}{4}$ Marks, the Par would be 35 Shillings 6 Pence Flemish per Pound Sterling.

LONDON AND HAMBURGH.—SILVER.

The Cologne Mark of fine Silver is generally worth $27\frac{1}{2}$ Marks Banco, and 60 Marks Cologne weight are equal to 451 ounces Troy;—what is the Par between London and Hamburgh Banco in Silver?

	1 Pound Sterling.
1 Pound Sterling	= 240 Pence.
62 Pence	= 1 Ounce Standard.
40 Ounces Standard	= 37 Ounces fine Silver.
451 Ounces	= 60 Cologne Marks.
1 Cologne Mark fine	= $27\frac{1}{2}$ Marks Banco.
3 Marks Banco	= 8 Shillings Flemish Banco.
Reduced, gives 35s. 1d. Flemish Banco, per £ sterling.	

But on account of the fluctuations in the prices of the Ducat and of the Mark of fine silver, no permanent Par can be determined between London and Hamburgh.

LONDON AND PARIS.—GOLD.

Required the Par of Exchange between London and Paris, resulting from the Mint Regulations, as stated under the articles France and London, vol. i.

	1 Pound Sterling.
1 Pound Sterling	= 240 Pence.
62 Pence	= 1 Ounce Standard.
40 Ounces Standard	= 37 Ounces fine Silver.
1 Ounce	= 480 Grains.
15434 Grains	= 1 Kilogramme.
1 Kilogramme	= 3444 Francs 44 Cen. 444.

Reduced, gives the Pound Sterling equal to 25 Francs 22 Centimes.

The Par deduced from the Table of Assays is 4 Centimes more than the above:—

	Gr.		Fr.		Gr.		Fr.	Cen.
For as	89,5	:	20	::	113	:	25	26

See Table of Gold Coins.

LONDON AND PARIS.—SILVER.

Required the Par of Exchange between England and France, resulting from the Mint Regulations.

		1 Pound Sterling.
1 Pound Sterling	=	240 Pence.
62 Pence	=	1 Ounce Standard.
40 Ounces Standard	=	37 Ounces fine.
1 Ounce fine	=	480 Grains.
15434 Grains	=	1 Kilogramme.
1 Kilogramme	=	222 Francs 222 Cen. 222.

Reduced, gives the Pound Sterling equal to 24 Francs 73 Centimes.

If English Silver be valued at $63\frac{1}{2}$ the Pars of both metals will be alike.

The Par in Silver from the Table of Assays is 24,91.

LONDON AND GENOA.—GOLD.

The new gold Genovina contains 357,7 English grains of fine gold, and it passes for 96 Lire fuori Banco ;—what is the Par between London and Genoa in gold?

		1 Pezza.
1 Pezza	=	$5\frac{3}{4}$ Lire.
96 Lire	=	1 Genovina.
1 Genovina	=	357,7 Grains of fine Gold.
480 Grains	=	1 Ounce.
11 Ounces fine Gold	=	12 Ounces Standard.
1 Ounce Standard	=	$934\frac{1}{2}$ Pence Sterling.

Reduced, gives $45\frac{1}{2}$ d. Sterling per Pezza.

LONDON AND GENOA.—SILVER.

The silver Scudo contains $457\frac{1}{2}$ English grains of fine silver, and it passes for 8 Lire fuori Banco ;—what is the Par between London and Genoa in silver?

		1 Pezza.
1 Pezza	=	$5\frac{3}{4}$ Lire.
8 Lire	=	$457\frac{1}{2}$ Grains of fine Silver.
480 Grains	=	1 Ounce.
37 Ounces fine Silver	=	40 Ounces Standard.
1 Ounce	=	62 Pence Sterling.

Reduced, gives 45,92d. Sterling per Pezza.

LONDON AND LEGHORN.—GOLD.

The Sequin contains 53,6 English grains of fine gold, and it passes for $13\frac{1}{2}$ Lire Moneta Buona;—what is the Par between London and Leghorn in gold?

		1 Pezza.
1 Pezza	=	$5\frac{3}{4}$ Lire Moneta Buona.
$13\frac{1}{2}$ Lire Moneta Buona	=	1 Sequin.
1 Sequin	=	53,6 Grains of fine Gold.
480 Grains	=	1 Ounce.
11 Ounces fine Gold	=	12 Ounces Standard.
1 Ounce Standard	=	$934\frac{1}{2}$ Pence Sterling.

Reduced, gives 49,09d. Sterling per Pezza.

LONDON AND LEGHORN.—SILVER.

The Silver Scudo, or Leopoldone, contains 384 English grains of fine silver, and it passes for $6\frac{1}{2}$ Lire Moneta Buona;—what is the Par between London and Leghorn in silver?

		1 Pezza.
1 Pezza	=	$5\frac{3}{4}$ Lire Moneta Buona.
$6\frac{1}{2}$ Lire Moneta Buona	=	1 Scudo.
1 Scudo	=	384 Grains of fine Silver.
480 Grains	=	1 Ounce.
37 Ounces fine Silver	=	40 Ounces Standard.
1 Ounce Standard	=	62 Pence Sterling.

Reduced, gives 46 $\frac{1}{2}$ d. Sterling per Pezza.

LONDON AND SPAIN.—GOLD.

The Quadruple of 1772 contains 372 English grains of fine gold, and it passes for 320 Reals Vellon;—what is the Par between London and Spain in gold?

		1 Dollar of Plate.
1 Dollar of Plate	=	8 Reals of Plate.
17 Reals of Plate	=	32 Reals Vellon.
320 Reals Vellon	=	1 Quadruple.
1 Quadruple	=	372 Grains of fine Gold.
480 Grains.	=	1 Ounce.
11 Ounces fine Gold	=	12 Ounces Standard.
1 Ounce Standard	=	$934\frac{1}{2}$ Pence Sterling.

Reduced, gives 37,16d. sterling per Dollar of Plate.

LONDON AND SPAIN.—SILVER.

The Dollar contains 371 English grains of fine silver, and it passes for 20 Reals Vellon ;—what is the Par between London and Spain in silver?

		1 Dollar of Plate.
1 Dollar of Plate	=	8 Reals of Plate.
17 Reals of Plate	=	32 Reals Vellon.
20 Reals Vellon	=	1 Hard Dollar.
1 Hard Dollar	=	371 Grains of fine Silver.
480 Grains	=	1 Ounce.
37 Ounces fine Silver	=	40 Ounces Standard.
1 Ounce Standard	=	62 Pence Sterling.

Reduced, gives 39d. Sterling per Dollar of Plate.

LONDON AND LISBON.—GOLD.

The piece of 6400 Rees contains 203 English grains of fine gold ;—what is the Par between London and Lisbon in gold?

		1000 Rees.
6400 Rees	=	203 Grains of fine Gold.
480 Grains	=	1 Ounce.
11 Ounces fine Gold	=	12 Ounces Standard Gold.
1 Ounce Standard	=	934½ Pence Sterling.

Reduced, gives 67,36d. Sterling per Milree.

According to the above methods, the other Pars, which are contained in the following Table, have been computed ; but the statements and operations are left for the exercise of the learner.

It has been already shown (page 141) that when the quantity of pure metal in the monies of exchange is known, the Par is found by division ; and it may be also found, by a similar operation, from the Table of Monies of Account, (page 149,) when the monies of exchange are of the same denomination. Thus, to find the Par between France and England, the Franc is worth 9,7 Pence in Silver, and 9,52 Pence in Gold, and therefore, 240 divided by these sums respectively will give the Pars in Gold and Silver as before.

Suppose it were required to find the Par between France and Spain, that is, how many Francs should be given for the Doubloon of Exchange of 4 Piastres? The Sterling value of the Doubloon, according to Table III. is 156 Pence, and this divided by 9,7 (the sterling value of the Franc) will give 16 Francs 19 Centimes, which is the Silver Par between those two countries. By the same method, the Par in Gold will be found to be 15 Francs 60 Centimes.

Thus, the monies of exchange may be found in the foregoing quotations, p. 19 to 103, and their values in the following Tables, by which the Pars may always be determined with sufficient accuracy by a simple operation as above.

TABLE I.

A TABLE of the PAR OF EXCHANGE between England and the principal Places in Lloyd's List; computed from the intrinsic Value of their Coins, by comparing Gold with Gold and Silver with Silver, according to their Mint Regulations, and to Assays made at the London and Paris Mints, valuing English Gold at £3 17s. 10½d. per Oz. Standard, and English Silver at 5s. 2d. per Oz. Standard.

	GOLD.		SILVER.		EXPLANATIONS.
	Mint Regulations.	Assays.	Mint Regulations.	Assays.	
Amsterdam, in Flemish..	40 3	—	38,6	—	Shillings and Pence Flem. per £1 Sterl.
Ditto, in Florins	12 09	—	11,58	—	Florins and Cents. per £1 Sterling.
Hamburgh	34 3,5	34 1,5	35 1	35 1,3	Shillings and Pence Flem. per £1 Sterl.
Paris	25 22	25 26	24 75	24 91	Francs and Centimes per £1 Sterling.
Madrid	37,3	37,2	39,2	39 0	Pence Sterling per Piastre.
Lisbon.....	67,4	67,5	—	—	Pence Sterling per Milree.
Leghorn	49,1	49,0	46,46	46,5	Pence Sterling per Pezza.
Genoa.....	45,5	45,5	45,92	45,92	Pence Sterling per Pezza fuori Banco.
Naples.....	41,2	—	41,2	—	Pence Sterling per Ducat.
—otherwise.....	582	—	582	—	Grains per £1 Sterling.
Venice.....	46,3	46,0	47,5	49,0	Lire Piccole per £1 Sterling.
—otherwise.....	23,44	23	24,30	25,07	Italian Livres per £1 Sterling.

These Tables (I. and II.) were originally computed by the author of this work, in 1810, by order of the Bullion-Committee of the House of Commons, and are printed in the Appendix to their Report.

They have been likewise inserted in that of the House of Lords, in 1819, with revisions which became necessary on account of recent alterations in the monies of Holland and Naples.

A further revision is now made in the Par of Exchange between England and France, in consequence of the error lately discovered in their relative weights; as explained vol. i. pp. 135 and 140.

This correction is two Centimes per Pound sterling in favour of England.

TABLE II.

THE RELATIVE VALUE OF GOLD AND SILVER in the principal Trading Places of the World; computed from the proportional Quantity of pure Metal in their principal Coins, and the legal or current Price of those Coins respectively.

	By Mint Regulations.	By Assays.	Names of the Coins from which the Proportions are taken.
England, } By Old Coinage } By New Coinage }	15,2096 to 1 14,2878 to 1	{ Proved correct by the Trials of the Pix.	{ Per Guinea and Old Shilling. Per Sovereign and New Shilling.
Amsterdam	15,8735 to 1		{ Per 10 Guilder Piece decreed in 1816, and Silver Florin of the same Date.
Hamburgh	15 to 1 nearly	14,83 to 1	{ Per Ducato reckoned at 6 Marks Banco and Rixdollar.
Paris	15,5 to 1	15,5 to 1	Per 20 Franc Piece and 5 Franc Piece.
Madrid	16 to 1	{ 15,85 } 16,46 } to 1	Per Doubloon and Dollar of different Coinages.
Lisbon	13,56 to 1	13,33 to 1	Per Joannese and New Silver Crusado.
Leghorn	14,65 to 1	14,32 to 1	Per Ruspono and Francescone.
Genoa	15,34 to 1	15,35 to 1	Per Genovina and Scudo.
Naples	15,21 to 1	—————	Per Oncetta and Ducato. (Coinage of 1818.)
Venice	15 to 1 nearly	14,35 to 1	Per Sequin and Ducat.
Petersburgh	15 to 1 nearly	15,25 to 1	Per Ducat and Ruble.
United States	15 to 1	15,94 to 1	Per Eagle and Dollar.
Bengal	14,857 to 1	14,827 to 1	Per Gold Mohur and Sicca Rupee.
Madras	13,872 to 1	13,857 to 1	Per Star Pagoda and Current Rupee.
Bombay	15 to 1	15 to 1	Per Gold Rupee and Silver Rupee.
China	14,25 to 1	—————	{ Per Tale of Gold, and the Average Price of Spanish Dollars.

The foregoing Table may be computed by the Chain Rule, in the following manner.

Required the relative proportion between Gold and Silver in the English Coins, according to the Mint Regulations both of the Old and New System?

The question is, to compare the value of any certain quantity, suppose an ounce of pure Gold, with an ounce of pure Silver, at the Mint Price.

Old System.

1 Ounce pure Gold.
 11 Ounces pure = 12 Ounces Standard.
 1 Ounce Standard = $934\frac{1}{2}$ Pence.
 62 Pence = 1 Ounce Standard Silver.
 40 Ounces Standard = 37 Ounces Pure.

Reduced, gives $15\frac{2859}{13640}$. Thus Gold, decimally expressed, is to Silver as 15,2096 to 1.

New System.

1 Ounce Pure Gold.
 11 Ounces Pure = 12 Ounces Standard.
 1 Ounce Standard = $934\frac{1}{2}$ Pence.
 66 Pence = 1 Ounce Standard Silver.
 40 Ounces Standard = 37 Pure.

Reduced, gives $14\frac{1393}{3840}$. Thus Gold, decimally expressed, is to Silver as 14,2878 to 1.

The operation is more simple when the rate of fineness of both metals is expressed in the same manner. Thus, in the coinage of France, the 20 Franc Piece in Gold weighs 6,4516 Grammes in pure Gold, and 20 Francs in Silver weigh 100 Grammes: hence, the latter divided by the former will give 15,5, as in the Table, p. 147.

When the fineness differs in expression, the comparison may be made from the quantity of pure Gold and of pure Silver in any particular sum, found either by the Mint Regulations or by Assays. Thus, the English Sovereign contains 113 Grains of fine Gold; and 20 Shillings (new coinage) 1614,54 Grains of fine Silver: hence, the latter divided by the former will give the relative value very nearly as above.

MONIES OF ACCOUNT.

In the following Table of Monies of Account it may be observed that some of these monies are real coins, the value of which may be computed from the Mint Regulations or from Assays; but when they are imaginary monies, which is generally the case, their value must be found by their established proportion to real coins.

TABLE OF MONIES OF ACCOUNT.

TABLE III.

Containing the Value of the Monies of Account of different Places, (expressed in Pence Sterling and Decimals of Pence,) according to the Mint Price both of Gold and Silver in England; that is, £3 17s. 10½d. per Oz. Standard for Gold, and 5s. 2d. per Oz. Standard for Silver. (See vol. i. p. 217)

		Value in Silver.		Value in Gold.	
		d.		d.	
AIX LA CHAPELLE..	Rixdollar current.....	31,	40	31,	43
ALICANT	Libra or Peso	39,	40	37,	38
AMSTERDAM	Rixdollar	52,	54	variable*	
	Florin (Old).....	21,		ditto	
	Florin (New)	20,	72	ditto	
	Pound Flemish	124,	32	ditto	
ANTWERP	Pound Flemish (money of exchange)	123,	25	123,	87
	Florin (money of exchange)	20,	54	20,	64
	Pound Flemish current	105,	65	106,	18
	Florin current	17,	60	17,	70
ARRAGON.....	Libra Jaquesa	49,	25	46,	75
AUGSBURG.....	Florin Giro, or money of exchange	32,		31,	83
	Florin current	25,	20	25,	07
BARCELONA	Libra Catalan	28,	14	26,	70
BASIL	Rixdollar, or Ecu of exchange.....	47,	27	47,	
	Rixdollar current.....	42,	45	42,	20
BERGAMO	Scudo of 7 Lire	35,	67	36,	50
BERLIN	Pound Banco	47,	25	variable	
	Rixdollar current	36,		ditto	
	Rixdollar in Fredericks.....	—	†	39,	68

* In the places marked *variable*, the price of the coins is not fixed; and, therefore, the intrinsic value in gold of the monies of account cannot be ascertained for any length of time.

† Where the columns are marked with a dash, it is to be understood that there is no coin in the metal of that column by which the monies of account can be computed.

TABLE OF MONIES OF ACCOUNT.

		Value in Silver.	Value in Gold.
		<i>d.</i>	<i>d.</i>
BERN	Ecu of 3 Livres	42, 64	42, 90
	Crown of 25 Batzen	35, 53	35, 75
BOLOGNA	Lira corrente	10, 86	10, 62
	Lira, money of exchange	11, 12	10, 89
BOLSANO.....	Florin Giro, or money of exchange.....	33, 26	33, 08
	Florin moneta lunga, or currency.....	25, 20	25, 06
BREMEN	Rixdollar current.....	37, 80	variable
	Rixdollar in Carl d'ors	—	39, 68
CANARY ISLANDS..	Real current	3, 95	3, 66
CASSEL.....	Rixdollar current.....	37, 80	variable
COLOGNE.....	Rixdollar specie of 80 Albuses.....	21, 38	ditto
	Rixdollar current of 78 Albuses	30, 60	ditto
CONSTANTINOPLE..	Piastre, or Dollar, 1819.....	9, 45	uncertain
DANTZIC.....	Gulden or Florin.....	9,	9,
DENMARK	Rixdollar specie	54, 72	—
	Rixdollar Sundish specie	53, 21	—
	Rixdollar Crown money.....	48, 37	—
	Rixdollar Danish currency.....	44, 27	44, 88
	Rixdollar Holstein currency	43, 78	44, 16
ENGLAND	Pound Sterling	240,	240,
FLORENCE	Lira	8, 12	8, 53
	Ducat, or Crown current	56, 84	59, 71
	Scudo d'oro, or Gold Crown.....	—	63, 97
FRANCE	Livre Tournois.....	9, 58	9, 40
	Franc (new system).....	9, 70	9, 52
FRANCFORT.....	Rixdollar, Convention money	37, 80	37, 65
	Rixdollar Muntze, or in small coins.....	31, 50	—
GENEVA	Livre current	16, 13	16, 93
	Florin	4, 60	4, 84
GENOA.....	Lira fuori Banco	7, 99	7, 83
	Pezza, or Dollar of exchange	45, 92	45, 50
	Scudo di cambio, or Crown of exchange.....	36, 75	36, 02
	Scudo d'oro marche.....	85, 49	83, 77

TABLE OF MONIES OF ACCOUNT.

		Value in Silver.		Value in Gold.	
		d.		d.	
GERMANY	Rixdollar current	37,	80	....	variable
	Rixdollar specie	50,	40	....	ditto
	Florin of the Empire	25,	20	....	ditto
	Rixdollar Muntze	31,	50	....	ditto
	Florin Muntze	21,		....	ditto
HAMBURGH	Mark Banco (at a medium)	18,	22	....	variable
	Pound Flemish Banco	136,	65	....	ditto
	Mark current	14,	82	....	ditto
	Pound Flemish current	111,	15	....	ditto
HANOVER	Rixdollar, in cash	42,		....	42, 26
	Rixdollar, gold value	39,		....	39, 24
IRELAND	Pound Irish	221,	54	....	221, 54
KONIGSBERG	Gulden or Florin	12,		....	variable
LEGHORN	Pezza of 8 Reals	46,	25	....	49, 16
	Lira moneta buona	8,	13	....	8, 55
	Lira moneta lunga	7,	79	....	8, 19
LEIPSIC	Rixdollar Convention money	37,	80	....	variable
	Rixdollar in Louis d'ors or Fredericks	—		....	39, 68
LUCCA	Lira	7,	40	....	7, 77
	Scudo d'oro	55,	50	....	58, 27
	Scudo corrente	51,	80	....	54, 39
MALTA	Scudo, or Crown	21,	32	....	23, 34
MILAN	Lira Imperiale	10,	41	....	10, 53
	Lira corrente	7,	45	....	7, 30
	Scudo Imperiale	60,	90	....	61, 60
	Scudo corrente	42,	32	....	42, 78
MODENA	Lira	3,	72	....	33, 15
MUNICH	Gulden or Florin	21,		....	21, 28
NANCY	Livre (money of Lorraine)	7,	38	....	7, 26
NAPLES	Ducato di regno	41,	20	....	uncertain
NAVARRE	Real	4,	90	....	4, 67
	Libra	8,	20	....	7, 79
NEUFCHATEL	Livre Tournois	13,	63	....	13, 40
	Livre foible	5,	45	....	5, 36

TABLE OF MONIES OF ACCOUNT.

		Value in Silver.		Value in Gold.	
		<i>d.</i>		<i>d.</i>	
NOVI.....	Scudo d'oro marche.....	85,	49	....	83, 77
PARMA.....	Lira	2,	35	....	2, 30
PERSIA	Toman of 100 Mamoodis	287,	60	....	—
POLAND	Gulden or Florin.....	6,	03	....	6, 27
PORTUGAL	Milree	uncertain		....	67, 34
	Old Crusado.....	uncertain		....	26, 04
PRAGUE	(See Vienna.)				
RIGA.....	Rixdollar Alberts	52,	54	....	variable
	Rixdollar currency, (agio at 40 per cent.)	37,	53	....	ditto
ROME	Scudo, or Crown.....	52,	05	....	51, 63
	Scudo di Stampa d'oro	79,	37	....	78, 73
RUSSIA	Ruble	variable			
ST. GALL.....	Florin, money of exchange	27,	44	....	variable
	Florin current.....	22,	76	....	ditto
ST. REMO	Lira	8,	46	....	8, 90
SARDINIA	Lira	18,	21	....	18, 82
SICILY.....	Ounce	123,	54	....	124, 80
	Scudo, or Crown.....	49,	02	....	49, 92
SPAIN	Real of old plate.....	4,	88	....	4, 57
	Real of new plate	5,	18	....	4, 86
	Real of Mexican plate	6,	48	....	6, 07
	Real Vellon.....	2,	59	....	2, 43
	Dollar of old plate or of exchange	39,		....	37, 30
STREALSUND.....	Rixdollar of account	28,	35	....	variable
	Pomeranian Gulden	14,	18	....	ditto
STRASBURG.....	Livre and Franc (see France.)				
	Florin	19,	08	....	18, 76
SWEDEN	Rixdollar.....	55,	41	....	56, 43
SWITZERLAND	Franc (new system).....	22,	14	....	—
TRIESTE	Florin, Austrian currency.....	25,	20	....	25, 05
	Lira, Trieste currency	4,	76	....	4, 73
	Lira di Piazza.....	4,	65	....	4, 63
TURIN	Lira	11,	28	....	11, 23
VALENCIA	Libra	30,	45	....	36, 59

		Value in Silver.	Value in Gold.
		<i>d.</i>	<i>d.</i>
VENICE	Lira piccola (in the old coins)	5, 07	variable
	Lira piccola (in the coins introduced by the Austrians)	4, 25	ditto
VIENNA	Florin	25, 20	25, 05
ZANTE	Lira	4, 06	variable
ZURICH	Florin, money of exchange	25, 85	ditto
	Florin current	23, 50	ditto

The foregoing Table has been computed from the proportion which the monies of account bear to the coins of each place respectively, valued according to the Mint Regulations, as stated in the first volume of this work. Thus, the intrinsic par of exchange may be calculated both in gold and silver, where the monies of exchange are the same as those of account; but dealers in bills, coin, and bullion generally prefer computations from actual assays, such as are given in the following Tables.

TABLES OF COINS FROM ASSAYS.

The first of the following Tables was computed under the direction of Sir Isaac Newton, in 1717, when he was Master of the Mint, and it served long as a Rule or Standard for Bullion and Exchange Merchants; but, however correct this Table might have originally been, it is no longer to be depended on, as many of the Coins are out of circulation, while others have been considerably altered; and it may be further remarked, that the art of assaying Metals, and even of weighing accurately, has been much improved since the above period.

Although these Assays are now become, in a great measure, obsolete, yet it is thought proper to insert them in this Work by way of introduction to the New Tables which follow, and which may be considered as a revision of Sir Isaac Newton's Tables, and a continuation of his plan.

N.B. In the Assay Column in the following Tables, B. means better, and W. worse than the English Standard. Thus, in the Gold Table, B. 1 2 means 1 Carat 2 Grains better than English standard; that is, 23 Carats 2 Grains fine: and W. 0 1½ means 1½ Grain worse than the English standard, that is, 21 Carats 2½ Grains fine.

Again, in the Silver Table, B. 7 Dwt. means 11 Oz. 9 Dwt. fine, and W. 3 Dwt. is 10 Oz. 19 Dwt. fine. For the English Standards, see vol. i. p. 217.

TABLE IV.

Sir Isaac Newton's Assays, Weights, and Values of most Foreign Silver and Gold Coins, actually made at the London Mint, by Order of the Privy Council, before the Year 1717. First published in 1719, and re-published, by Authority, in 1740.

FOREIGN SILVER COINS.

	Assay.	Weight.	Stand. Weight.	Value.
	dw.	dw. gr.	dw. gr. mi.	d.
The Piastre of Spain, or Seville Piece of 8 Reals, now reduced to 10..	W. 1	17 12	17 10 2	54
The New Seville Piece of Eight	W. 1½	14	13 21 15	43.11
The Mexico Piece of Eight.....	W. 1	17 10½	17 8 14	53.83
The Pillar Piece of Eight.....	Stand.	17 9	17 9	53.87
The Peru Piece of Eight, coarser but of uncertain allay				
The Old Ecu of France, or Piece of 60 Sols Tournois	W. 1	17 12	17 10 2	54
The New Ecu, or Piece of 5 Livres, or 100 Sols.....	W. 1½	19 14½	19 11 12	60.39
The Crusado of Portugal, or Ducat worth 400 Rees, now marked } and raised to 480 Rees	W. 2	11 4	11 1 13	34.31
The Patacks, or Patagons of Portugal, worth 500 Rees, now } marked and raised to 600				
The Ducatoon of Flanders, or Piece of 60 Sols or Patars	B. 4½	20 22	21 8 2	66.15
The Patagon of Flanders, or Cross Dollar, or Piece of 48 Patars..	W. 12	18 1	17 1 13	52.91
The Ducatoon of Holland, or Piece of 63 Stivers	B. 3	20 21	21 3 15	65.59
The Patagon Legdollar, or Rixdollar of Holland, or Piece of } 50 Stivers.....	W. 14	18	16 20 17	52.28
The Three Guilder Piece of Holland, or Piece of 60 Stivers.....	W. 2	20 8	20 3 12	62.46
The Guilder, Florin, or Piece of 20 Stivers.....	W. 2	6 18½	6 17 1	20.08
The Ten Shilling Piece of Zeland, or Piece of 60 Stivers	W. 2	20 6	20 1 13	62.21
The Lion Dollar of Holland, or ⅔ of the Ducatoon	W. 44	17 14	14 2 7	43.07
The Ducatoon of Cologne.....	B. 3	20 18	21 — 15	65.02
The Rixdollar, or Patagon of Cologne	W. 13	18	16 22 14	52.53
The Rixdollar, or Patagon of the Bishop of Liege	W. 12	17 22½	16 22 5	55.48
The Rixdollar of Mentz	W. 6½	18 8	17 10 18	55.27
The Rixdollar of Francfort	W. 9	18 8	17 14 4	54.53
The Rixdollar of the Elector Palatine of the Rhine and Bavaria } before 1620.....	—	18 5		
The Rixdollar of Nuremberg	W. 6	18 10	17 22 1	55.55
The Old Rixdollar of Lunenburg	W. 10	18 11	17 15 2	54.65
The Old Rixdollar of Hanover	W. 8	18 12	17 20 2	55.03
The Double Gulden of the Elector of Hanover.....	W. 7	18 18	18 3 16	56.29
The Gulden of the Elector of Hanover, or Piece of ⅔	B. 17½	8 10	9 1 18	28.14
The Half Gulden of the Elector of Hanover, or Piece of ⅓	B. 17½	4 5	4 12 19	14.07
The Gulden of the Duke of Zell, or Piece of 16 Gute Groshen ..	W. 43	11 2	8 22 10	27.07
The Gulden of the Bishop of Hildesheim, or Piece of 24 Marien } Grosh, now raised to 26.....	W. 40½	11 22	9 17 17	30.21
The Rixdollar of Magdeburgh.....	W. 10	18 12	17 16 1	54.27
The Gulden or Guilder of Magdeburgh	W. 44	11 14	9 6	28.67
The Old Rixdollar of the Elector of Brandenburg.....	W. 9	18 13	17 19 1	55.17
The Old Gulden of Brandenburg, now raised from 24 to 26 } Marien Grosh	W. 43	12 4	9 19 9	30.41
The Gulden of Brandenburg, or Piece of ⅔.....	W. 43	11 3	8 23 6	27.81
The Half Gulden of Brandenburg, or Piece of ⅓	W. 43	5 13	4 11 14	13.09
The Gulden of the Elector of Saxony, or Piece of ⅔	W. 41	11 3	9 1 14	28.12

FOREIGN SILVER COINS.

	Assay.	Weight.	Stand. Weight.	Value.
	dw.	dw. gr.	dw. gr. mi.	d.
The Old Bank Dollar of Hamburgh.....	W. 8	18 9	17 17 4	54.92
The Old Rixdollar of Lubec.....	W. 8½	18 16	17 22 17	55.54
The Four Mark Piece of Denmark of coarser allay.....	W. 61	14 8	10 9 10	32.23
The Four Mark Piece of Denmark of finer allay.....	W. 21	11 13½	10 11 5	32.45
The Eight Mark Piece of Sweden.....	Stand.	20	20	62
The Four Mark Piece of Sweden.....	W. 58	13 12	9 23 7	30.92
The Two Mark Piece of Sweden.....	W.	6 19		
The Old Dollar of Dantzic.....	W. 10½	18 9	17 12 4	54.27
The Old Rixdollar of Thorn near Dantzic.....	W. 12	18 8½	17 8 15	53.85
The Rixdollar of Sigismund III. and Vladislaus IV. Kings of Poland.....	W. 10	18 9	17 13 14	54.04
The Rixdollar of the late Emperor Leopold.....	W. 10½	18 9	17 12 4	54.27
The Rixdollar of his Predecessor Ferdinand III.....	W. 10½	18 9	17 12 4	54.27
The Rixdollar of Ferdinand, Archduke of Austria.....	W. 10½	18 5	17 8 7	53.78
The Rixdollar of Basil.....	W. 7½	18 18½	18 3 6	56.24
The Rixdollar of Zune.....	W. 13	18 1	16 23 13	52.65
The Old Ducat of Venice, with the words <i>Ducatus Venetus</i> upon it, a Piece of 6 Old Livres, afterwards raised, I think, to 6 Livres 4 Sols de Piccoli.....	W. 23½	14 15	13 1 17	40.50
The Half Ducat.....	W. 23½	7 7½	6 12 8	20.25
The New Ducat, with the No. 124 upon it, signifying 124 Sols, or 6 Livres 4 Sols de Piccoli.....	—	18 2		
The Half thereof.....	—	9 1		
The Crusado, Crosaid, or St. Mark of Venice, with the No. 140 upon it, signifying 140 Sols, or 7 Livres de Piccoli.....	—	20 6		
The Half Crusado of the same form.....	—	10 3		
The Quarter Crusado of the same form.....	—	5 1		
Another Coin of Venice.....	W. 46	17 10	13 19 8	42.08
The Piece of two Jules.....	B. 6	3 15	3 17 7	11.05
The Ducat de Banco of Naples, or Piece of 5 Tarins, or 10 Car-lins, or 100 Grains.....	W. 3	14 0¼	13 1	40.43
The Half Ducat.....	W. 3	7 0⅛	6 12 10	20.21
The Tarin, or Fifth Part of the Ducat.....	W. 3	2 10¼	2 14 12	8.09
The Carlin, or Tenth Part of the Ducat.....	W. 3	1 9½	1 7 6	4.04
The Escudi, Ecu, or Crown of Rome, or Piece of 10 Julios, or 100 Bayoches.....	—	20 14½		
The Teston of Rome, or Piece of 3 Julios.....	W. 1	5 21½	5 20 17	18.32
The Ducat of Florence and Leghorn, or Piece of 7 Lires, or 10½ Julios.....	B. 8	20 3	20 20 6	64.62
The Julio of Rome.....		2 5		
The Piastre Ecu, or Crown of Ferdinand II. Duke of Tuscany.....	W. 1	17 12	17 10 2	54
The Piastre Ecu, or Crown of Cosmus III. present Duke of Tuscany, whose monies are about 4 per cent. lighter than those of his father's; this Piece is 8½ Julios.....	W. 1	16 18	16 16 4	51.69
The Croisat of Genoa, or Piece of 7½ Lires.....	B. 7	24 15	25 9 11	78.74
The Ecu d'Argent of Genoa, or Piece of 7 Lires 12 Sols.....				
The Piastre Ecu, or Crown of Milan.....	—	17 21		
The Philip of Milan, or Piece of 7 Livres.....	—	20 20		
The Livre, or 20 Sols Piece of Savoy.....	—	3 22		
The 10 Sols Piece of Savoy.....	—	1 23		
A Roupee.....	B. 16½	7 10	7 23 4	24.07
A Gout Gulden, or Florin d'Or, a Dutch Coin of 28 Stivers.....	W. 75	12 19	8 11 5	26.26
Another Gout Gulden.....	W. 48	11 00	8 14 18	26.72
Another.....	W. 48	12	9 9 15	29.15