
Currency and the Exchange Rate in Sixteenth-century England

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In his review of my book *The Great Debasement* Dr C. E. Challis has raised many points worthy of extended comment.¹ Revised estimates of the money supply, prompted in part by Dr Challis' observations, have already been published elsewhere.² The present article refers to the subject matter of Chapter 5 of *The Great Debasement*, which deals with the foreign exchanges; Dr Challis' criticisms of that chapter are contained in Section III of his article. Although it is easy to show that Dr Challis' chief criticism does not carry the force he supposes, and indeed is almost totally misguided, his article has served to reveal a major conceptual error perpetrated in *The Great Debasement*. Scholarship demands that this error (which Dr Challis himself did not notice) be brought to the reader's attention and its implications discussed. The opportunity is also seized to make a few minor revisions to the detailed calculations of Chapter 5 of *The Great Debasement*, and to carry a little further the discussion of the strengths and weaknesses of the analysis it offered.

The attempt in Chapter 5 to fashion an explanation of the movement of the specie points proceeded in three stages. First, a deductively-fashioned « theory » was propounded claiming to show how these points were determined. Secondly, this theory, in conjunction with data on the English coinage taken from earlier chapters of the book, was used to calculate indices of the movement over time of the export and import points (i.e. to calculate the

¹ C. E. CHALLIS, *Currency and the Economy in Mid-Tudor England*, « Economic History Review », 2nd ser. XXV (1972), pp. 313-322; J. D. GOULD, *The Great Debasement: Currency and the Economy in Mid-Tudor England* (Oxford, 1970).

² J. D. GOULD, *The Great Debasement and the Supply of Money*, in « Australian Economic History Review », vol. XIII, n. 2 (September 1973).

shape — but not the position — of the curves charting the trend of the specie export and import points). Finally, these curves were located on the *y* axis with the help of inferences drawn from details of the coinage in 1542. Dr Challis' criticisms relate entirely to the third stage of this analysis, and are based on the belief that *The Great Debasement* posits an incorrect value for the Mint price of gold in 1542. Conceivably this is so; though it is fair to point out that one of the sources to which one naturally turns for evidence on such a point, the Mint indenture in question, supports my view and not his — as Dr Challis freely concedes.

But in any event Dr Challis' belief could be granted and yet no amendment either to the graph of the specie points, or to the discussion of the significance of their movements, would be called for. Dr Challis argues that if the 1542 value is adjusted as he proposes, the effect is to « alter substantially the overall pattern of movement of the specie points ». This is quite incorrect. If one alters the value attributed to any one observation in a time series, only the ratio of that value to others in the series is affected; the ratios between all other pairs of observations remain completely unchanged. Thus were Dr Challis correct about the Mint price of gold in 1542, only the 1542 specie import point and that portion of the import point curve lying between 1542 and 1544 would need adjustment. From 1544 onwards the curve would follow exactly the same path as on the graph in *The Great Debasement*. The specie export point would remain unaffected by the alteration proposed both in 1542 and at all other times.

An apparently better foundation for Dr Challis' criticism is that in *The Great Debasement* 1542 served as the base year. His contention is that if the 1542 value of the specie import point were moved downwards — closer, that is, to the specie export point — it would be necessary to move both curves higher on the *y* axis throughout their course by some two or three per cent, in order that the observed exchange rate in 1542 should lie midway between the specie points. As a glance at the graph at the end of *The Great Debasement* makes plain, an adjustment of this magnitude would in any event inflict only a minor deterioration on the « fit » between the specie import and export points and the observed exchange rate. But it is neither necessary nor desirable to make such an adjustment. At no stage in the argument of Chapter 5 was the *absolute* value of either the specie import or export point calculated, either for 1542 or for any other date. The logic of that chapter was simply to construct *indices* of the movement of each of those points over time, and then to position the curves on the *y* axis in the way which gave the best « fit » with the observed exchange rate. Such a fit happened to be well achieved by supposing that the observed exchange rate in 1542 lay midway between the specie import and export points. But nothing is known which justifies a confident assertion that this was so; the actual rate may have lain closer to one or the other specie point, or outside them, and it

would be absurd to move the curves up or down on the *y* axis along their whole length, to the detriment of the *overall* fit, merely in order to secure that the observed rate for 1542 was positioned equidistantly between the specie points.³ In view of the uncertainty surrounding the price of gold and therefore the specie import point in 1542, an obvious procedure is to forget 1542 altogether, and instead to use as a base 1544, in respect of which no such uncertainty exists. Recalculating on base 1544, not only the shape but the vertical position of both the specie import and export curves stay exactly as plotted on the graph in *The Great Debasement*.

The irony is that in plotting that graph the years 1542 to 1544 *were in fact omitted*, partly as a concession to the printer, and partly because nothing interesting seemed to be happening to the exchanges anyway until 1544 onwards. It is therefore literally true to say that the graph at the end of my book and the analysis based on it would not need to be amended in even the smallest particular, even were Dr Challis' view of the Mint price of gold in 1542 to prevail — which is itself, of course, far from settled. Dr Challis' solemn warning that « it is imperative for the success of his argument that his facts in respect of this year (*sc.* 1542) are not in question » is completely unwarranted.

While Dr Challis' central criticism can thus easily be countered, the error in the argument of Chapter 5 which his exposition unwittingly brings to light is more serious and calls for discussion. Recognition of the error is prompted by that passage in his article (p. 321) in which he uses a formula from *The Great Debasement* to calculate the effect on the specie points of adopting his alternative Mint price of gold in 1542. In *The Great Debasement* (p. 109) it had been argued that in that year the specie import point was some 7.5% above the specie export point, before allowing for costs of transport and insurance. This result was arrived at by dividing the Mint price of gold (£28.16s.) by the Mint equivalent (of the best silver coins) of 11 lbs. of fine silver (£26.16s.), these being respectively the determinants of the specie import and export points. Dr Challis replaces the first of these values by £27.5s., his proposed alternative Mint price of gold, and thus finds that the new specie import point is some 5% lower than the original, narrowing the gap between the points to some 1.7% (again before transport is allowed for).

This result at once suggests that something is wrong, for to those who have understood the « theory » of the specie points offered in Chapter 5 it is apparent that a lower Mint price of the metal favoured for import leads to a *higher* specie import point, not a lower one, and thus *widens* rather than narrows the gap between the points. (It should be remembered that sixteenth century exchange rates in London were quoted in shillings Flemish to the

³ The « observed rate for 1542 » is in fact the annual average rate; *monthly* average rates varied between 27s 2d. and 25s. 3½d., and individual quotations yet more widely.

pound sterling.) The humiliating fact is that the fraction in *The Great Debasement* defining the ratio of the specie import point to the specie export point is *upside down*. This can readily be checked by simple algebra.

Let

F = the value in Antwerp of 11 lbs. of silver or 1 lb. of gold (assumed equal);

X = the specie export point, and

M = the specie import point, both in shillings Flemish to £1 Sterling;

P_m = the Mint price of 1 lb. of gold or 11 lbs. of silver, whichever was favoured for import, and

Q_x = the Mint equivalent of 1 lb. of gold or 11 lbs. of silver, whichever was favoured for export.

Then

$$F = M \cdot P_m = X \cdot Q_x$$

So that

$$\frac{M}{X} = \frac{Q_x}{P_m}$$

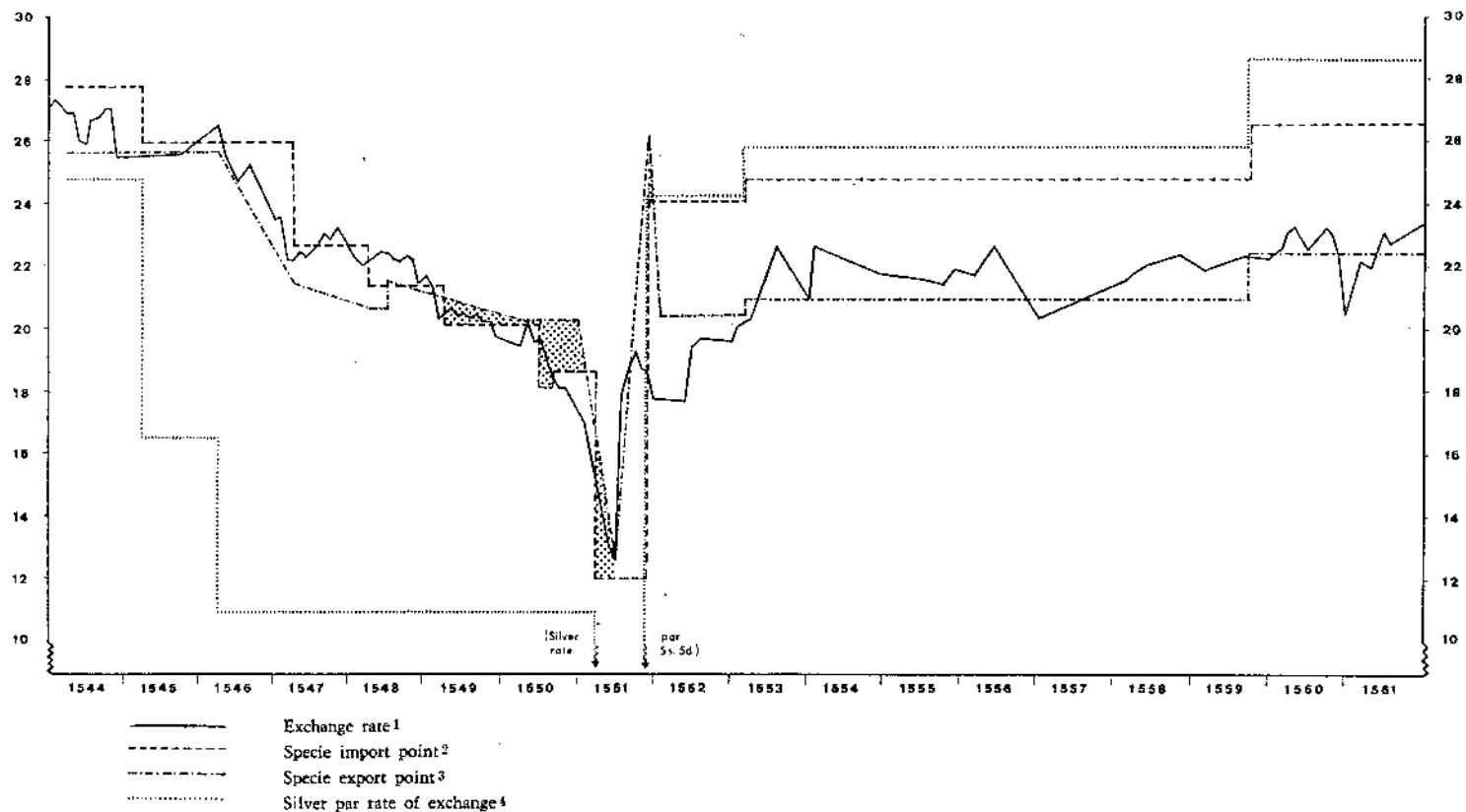
which, taking the values assumed in *The Great Debasement*,

$$= \frac{26.8}{28.8} = 0.93.$$

In other words, according to the data assumed in Chapter 5 of *The Great Debasement*, the specie import point, before allowing for transport costs, lay approximately 7% below the specie export point rather than 7.5% above it.

It can be seen that making allowance for the costs of shipping specie across the channel as stipulated in *The Great Debasement*, that is 2.3% each way, the import point would still be below the specie export point. There is nothing impossible in this during a period of substantial changes in the currency; what such a juxtaposition would imply is that conditions favoured a bimetallic flow, the outflow of the metal determining the specie export point being balanced by an inflow of that determining the specie import point. Indeed, it is clearly desirable that the normal position of the points *should* be reversed in this way in 1549 and 1550, to correspond with and to account for the large bimetallic flow in those years, and it was a failing of the graph of the exchanges published in *The Great Debasement*

THE LONDON-ANTWERP EXCHANGE RATE, 1544-1561



Source:

¹ GOULD, *The Great Debasement*, Table IX, p. 89.

² Table 1.

³ Table 2.

⁴ Calculated from data in GOULD, *The Great Debasement*, Table I, p. 11, and VAN DER WEE, *Growth of the Antwerp Market*, Vol. I, Table XV, p. 128.

Note: Shaded areas indicate the period during which a bimetallic flow (export of gold, import of silver) as profitable; this ended when the minting of 3 oz. silver ceased in July, 1551.

that the specie import and export curves did *not* overlap at that time, though they moved very close together in the summer months of 1550. This should have alerted me to the fact that the curves were set too far apart in the book; and in the revised calculations which follow, a distance between the two curves has been postulated which allows for a substantial overlapping in the later stages of the debasement.

But it is unlikely that the specie import point was below the export point throughout the period of debasement, as would be the case if their respective positions in 1542 or 1544 were those indicated by the calculation just performed. It therefore seems probable that the calculation fails to take account of all relevant factors, and that some influences were at work which caused the specie import point to be rather higher and/or the specie export point to be rather lower at the beginning of the debasement than that calculation suggests.

It is not at all difficult to envisage what these influences were. First, the costs of transporting the precious metals between London and Antwerp, allowing for insurance, interest foregone and all other direct and indirect costs, may have been greater than the 2-3% assumed in *The Great Debasement*, which was arrived at only by crude and rather *a priori* reasoning. Secondly, there are several reasons why the English coin (gold or silver) favoured for export should have been valued for purposes of export at a rather lower value (in foreign currency) than the official Mint equivalent of the coin in question would have warranted. This could occur (a) because of uncertainty and distrust of English coins in the Low Countries which might cause them to be discounted below their intrinsic value; (b) because the heavier coins of the earlier issues were quickly culled for reminting into baser coins, so that only remaining coins which had a smaller fine gold or silver content than indicated were left for export; or (c) because as the debasement proceeded, the remaining coins of older issues, particularly of gold coins, were liable to circulate at a *de facto* value higher than their official rating.⁴ Any one of these three circumstances would cause the foreign currency value of a collection of exportable coins of given Sterling face value to be *lower* than their Mint equivalent indicated, so that in turn the specie export point would be correspondingly lower.

Thirdly, it is almost certainly desirable to allow for a time lag before the specie import point responded to changes in the Mint price. Partly this is because the Mints often did not start immediately to buy gold or silver at the

⁴ This last feature was allowed for in *The Great Debasement* by calculating the specie export point on the basis of the *de facto*, not the official, Mint equivalent of exportable coin. However, some evidence suggests that the gap between these two in the case of gold coins may have been greater, and developed earlier, than assumed in *The Great Debasement*.

new or full price authorized by the indenture in question. Moreover, the new Mint price would have to become known in Antwerp before the indicated impact on the specie import point could occur. But in *The Great Debasement* and in the graph which follows the value of the specie import point has been charted as though each change occurred simultaneously with each new indenture, without any lag. A more realistic plotting might require the specie import curve to be shifted, as it were, bodily to the right by (say) an average of two months. Since both of the points were moving downwards from 1544 until mid-1551, and upward thereafter, this would have the effect of making the specie import point *higher* in relation to the specie export point at most points of time between 1544 and 1551, and *lower* in relation to the specie export point at some points of time between 1551 and 1561. It can be seen at a glance that such an adjustment would help to overcome the difficulty in question, and would improve the fit on the graph both before and after 1551.

In translating the indices of the specie import and export points as calculated in the tables which follow into actual values to be plotted on the graph, it has been arbitrarily assumed that the specie import point in 1544 was approximately 8% above the specie export point. It can be seen that this implies a roughly 10% allowance for the influence of one or more of the factors discussed in the two preceding paragraphs; I believe that an influence of this magnitude is well within the bounds of possibility. The word « arbitrarily » is in fact a shade too strong since the points have been set as close together in 1544 as would be consistent with a bimetallic flow operating (as much evidence suggests it did) only from about April 1549 onwards. It may be that to make this 10% adjustment throughout the period 1544 to 1561 is incorrect. It is certainly plausible to believe that some of the influences just discussed, notably nos. 2(a) and 2(b) above, would have operated powerfully during the actual period when debased coin was being issued, that is until the summer of 1551, but less powerfully or not at all thereafter. This would mean that a more appropriate adjustment would be to « open out » the specie points, as has actually been done, only up to 1551, and to allow them to close somewhat in the remainder of the 1550's. Further, it has already been shown that point 3 above, which refers to an adjustment the need for which is extremely probable on *a priori* grounds, would have the same effect of widening the gap to 1551 but closing it thereafter. Nevertheless, these refinements have not been adopted on the graph on page 5, and the reader is left free to form his own opinion as to the cogency of the case for such adjustments.

The opportunity has been seized to make two other minor alterations to the calculation of the indices of the specie import and export points. First, the multiplier in column 3 of each table (which allows for the ratio between the two metals in the Low Countries) has been set at 11.5, not 11.0 as in

the book. Dr van der Wee's evidence suggests silver/gold ratios in Antwerp as follows:

1 July	1539	10.92
11 July	1548	11.47
16 Dec.	1551	12.03
23 March	1553	11.28
24 Oct.	1559	10.47

and it thus seems that a figure rather higher than 11.0 is appropriate during most of the period under study.⁵ It may be pointed out that the choice between the two multipliers does not make a great difference to the result; since one is calculating an *index*, not absolute values, it matters nothing what constant one multiplies the Mint price or Mint equivalent of silver by, so long as the specie point in question is determined either entirely on a silver or entirely on a gold basis. The magnitude of the constant becomes relevant only when there is a switch from one metal to the other, or when both metals influence the specie point in question. (In the latter event the size of the constant affects the *weighting* of the joint determinants.)

The other new feature of the calculations is that more systematic allowance has now been made for changes in the precious metal content of the currency in the Low Countries. As was stated in *The Great Debasement* (p. 107) it would ideally be desirable to examine financial and Mint affairs in the Netherlands as thoroughly as those in England, in order to see what influences may have been brought to bear on the determination of the specie points by changes across the Channel. In particular, it would be desirable to chart the course of the *de facto* values of the many foreign coins which circulated in the Low Countries. It has not been possible to undertake such a survey. However, a rough allowance for monetary changes in the Low Countries may be made by using Dr van der Wee's table of changes in the fine gold and fine silver equivalents of the Brabant groat. This is not an ideal adjustment, any more than the changing Mint equivalent of newly-minted English coins is a satisfactory measure of the influence bearing on the specie points from the English side of the Channel. Nevertheless, it is probably better than nothing.

In *The Great Debasement* the specie import and export points were adjusted to take account of the changes in the fine silver equivalent of the Brabant groat in March 1553 and October 1559. But the restriction to silver is really indefensible; there is an equally strong case for taking account of

⁵ H. VAN DER WEE, *The Growth of the Antwerp Market and the European Economy* (The Hague, 1963), Vol. I, Table XV, p. 128. A *changing* multiplier is scarcely warranted in view of the comments in the text on this and the following page.

changes in the fine gold equivalent of the Brabant groat, changes which occurred in July 1548, December 1551 and October 1559. I have therefore computed what might be called « adjustment factors », λ_m and λ_x , which have been applied in the final stage of calculating the specie import and specie export point respectively. These « adjustment factors » make an appropriate allowance for the deteriorating quality of the Brabant groat, but only in respect of that metal (or metals) which actually determined the specie point in question from time to time. Specifically, I have computed

$$\lambda_m \text{ (or } \lambda_x) = \alpha \left(\frac{B_t^s}{B_o^s} \right) + \beta \left(\frac{B_t^g}{B_o^g} \right)$$

where B_o^s and B_o^g are the number of grams of fine silver and fine gold respectively in the Brabant groat in 1542, B_t^s and B_t^g the corresponding values in each subsequent year, and α and β are coefficients which take the value of 1 when the metal concerned was uniquely favoured for import (or export), 0 when the metal concerned was disfavoured and 0.5 when either metal indifferently might be used.

Tables 1 and 2 which follow are on similar lines to Tables X and XI in *The Great Debasement*. The indices of the specie import and export points shown in the final column of each table have then been plotted on the graph with the starting values taken as respectively 104% and 96% of the annual average observed exchange rate for 1544. It can be seen that the course of the specie points is in general quite similar to that already presented at the end of *The Great Debasement*. This relative insensitivity of the calculations to the modifications just summarized reflects the fact that the really decisive determinants of the specie points, namely the changing Mint price of importable metal and Mint equivalent of the best exportable coin, have been correctly identified.

Further, while the need for further refinements to these calculations has been made apparent in the discussion of the preceding pages, there seems to be no need to adopt a defensive or apologetic attitude towards the result. For in general the charted specie points are seen to correspond quite closely to the observed movement of the actual exchange rate. For example, only in two periods does the observed exchange rate depart from the relevant specie point by more than 5%, namely in 1552 when the foreign exchange market was still officially closed and reeling from the financial chaos of late 1551, and again in the isolated quotation of January 1561, during a period of severe trade depression and under the impact of Elizabeth's plan to re-mint the base coins. This « fit » may be compared, for example, with the behaviour of the sterling-dollar exchange rate in the middle third of the nineteenth century, when it was commonplace for the exchange rate to fluctuate by several per

TABLE 1

SPECIE IMPORT POINT, 1544-1559

	Mint Price of		(2)×11.5	(1) (2)	Mint Price of Imported coin	Index	λ_m	(6) (7)
	Gold	Silver						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1544	28.8	2.621	30.14	10.99	30.14	100.0	1.0	100.0
1545	30.0	2.8	32.2	10.71	32.2	93.6	1.0	93.6
1546	30.6	2.8	32.2	10.93	32.2	93.6	1.0	93.6
1547	34.8	3.2	36.8	10.875	36.8	81.9	1.0	81.9
April 1548	34.8	3.4	39.1	10.24	39.1	77.1	1.0	77.1
July 1548	34.8	3.4	39.1	10.24	39.1	77.1	1.0	77.1
1549	36.0	3.6	41.4	10.0	41.4	72.8	1.0	72.8
July 1550	36.0	4.0	46.0	9.0	46.0	65.5	1.0	65.5
September 1550	36.0	3.9	44.85	9.2	44.85	67.2	1.0	67.2
April 1551	36.0	6.0	69.0	6.0	69.0	43.7	1.0	43.7
Late 1551	35.84	3.2	36.8	11.2	36.32	83.0	0.954	87.0
March 1553	35.84	3.2	36.8	11.2	36.32	83.0	0.923	89.9
August 1553	35.99	3.19	36.685	11.3	36.34	82.9	0.923	89.8
October 1559	35.99	3.19	36.685	11.3	36.34	82.9	0.862	96.2

TABLE 2

SPECIE EXPORT POINT, 1544-1559

	Mint Equivalent of best		(2)×11.5	(1) (2)	Mint Equivalent of Exported coin	Index	λ_e	(6) (7)
	Gold	Silver						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1544	29.675	2.433	27.98	12.2	27.98	100.0	1.0	100.0
1545	30.9125	2.433	27.98	12.7	27.98	100.0	1.0	100.0
1546	32.15	2.433	27.98	13.2	27.98	100.0	1.0	100.0
1547	33.3875	3.2	36.8	10.4	33.3875	83.8	1.0	83.8
April 1548	34.62	3.2	36.8	10.8	34.62	80.8	1.0	80.8
July 1548	34.93	3.2	36.8	10.9	34.93	80.1	0.952	84.1
1549	35.86	4.8	55.2	7.5	35.86	78.0	0.952	81.9
1550	37.09	4.8	55.2	7.7	37.09	75.4	0.952	79.2
January 1551	37.09	4.8	55.2	7.7	37.09	75.4	0.952	79.2
July 1551	68.35	4.8	52.2	14.2	55.2	50.7	1.0	50.7
Late 1551	36.0	2.4	27.6	15.0	27.6	101.4	1.0	101.4
1552	36.0	3.26	37.5	11.0	36.75	76.1	0.954	79.8
March 1553	36.0	3.26	37.5	11.0	36.75	76.1	0.923	82.4
August 1553	36.19	3.26	37.5	11.1	36.8	76.0	0.923	82.3
October 1559	36.19	3.26	37.5	11.1	36.8	76.0	0.862	88.2

cent outside any feasible value of the specie points.⁶ The more relevant and still more encouraging comparison, however, is with the par rate of exchange required by the theory which holds that it was the respective fine silver contents of the currencies concerned which determined that par rate. This is the theory which was embraced by most analysts of the early modern exchanges from Malynes to Unwin. It can be seen that by mid-1545 the actual rate is already more than 50% above the silver par rate, and a year later about 130% above it. A very wide disparity then continues until the summer of 1551, when a silver par rate of approximately 5s. 4d. is indicated in comparison with the actual minimum observation of 12s. 9d. Throughout the 1550's by contrast, the silver par rate is well above the actual value of the sterling.

In his review article, Dr Challis has complained that I slighted post-Unwin writers on the early modern exchanges in representing the « silver par rate » theory of exchange determination as the « orthodox » one (p. 319). It is perfectly true that later writers have added to our knowledge of, for example, the evolution of the bill of exchange and institutional details of the foreign exchange market in early modern times. It is also true that they have (correctly) stressed the importance of gold as well as of silver in the world of sixteenth century international finance. But I have been unable to discern in any of the writers to whom Dr Challis refers an *operational* theory of exchange determination with which to compare either my own theory or that employed by Unwin. By « operational » I mean a theory sufficiently rigorously specified to allow predicted exchange rates or specie points to be calculated from appropriate trade and monetary data. Both the silver par theory and my own theory do permit precisely this calculation; and I am not aware of any other which does. As between these two contenders, the most casual glance at the graph would suggest that the theory first propounded in *The Great Debasement*, and somewhat refined in this article, is *overwhelmingly* more successful than its only rival.

⁶ L. E. DAVIS and J. R. T. HUGHES, *A Dollar-Sterling Exchange, 1803-1895*, « Economic History Review », 2nd ser. XIII (August, 1960), pp. 62-64.

