

Foreign capital flows in the century of Britain's industrial revolution: new estimates, controlled conjectures¹

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In the traditional history of the British industrial revolution, much emphasis has been placed on the role of saving in capital formation. The theories emphasizing the role of saving are based on the premise that saving was the only way to finance investment; the literature has omitted foreign sources of investment. Therefore, many controversies regarding the industrial revolution omit the role of capital flows: the arguments about Rostow's take-off are based on the rise in the domestic saving rate;² the debate on constraints on the rate of capital accumulation is linked to the relation between saving and investment; and Williamson's argument on crowding out is based on asserting that 'saving significantly constrained British accumulation'.³ However, in an open economy, net flows of capital provide finance for investment in addition to domestic saving.

Crafts has emphasized that this way of financing capital formation during the first stages of industrial development is unique: 'countries with the same per capita income as Britain in the eighteenth century were experiencing a considerable inflow of capital'.⁴ Indeed, development economists have long shown the importance of foreign capital in the industrialization and development process: 'external borrowing is a normal feature of the development strategies of many countries'.⁵

Britain's unique way of financing its capital formation was assumed rather than proved. The assumption that domestic saving was equated with domestic investment is puzzling since the flow of capital from Holland to Great Britain, particularly in the second half of the eighteenth century, is well documented.⁶ However, this has been treated descriptively, and there has been little analysis relating these flows to the economic development of Britain and the industrial revolution. Scholars have assumed, despite the evidence, that inflows of capital were insignificant.

The purpose of this article is to highlight the role played by foreign capital as a source of investment in Britain. In order to show the existence

¹ I am grateful to François Crouzet, Charles Kindleberger, Paul Krugman, David Landes, Peter Temin, and Jeffrey Williamson, as well as participants at the MIT and Harvard Economic History seminars for helpful comments and discussions.

² Rostow, *Stages of economic growth*.

³ Williamson, 'Debating the British industrial revolution', p. 273.

⁴ Crafts, *British economic growth*, p. 52.

⁵ Chenery and Syrquin, *Pattern of development*.

⁶ See Wilson, *Anglo-Dutch commerce*; Carter, 'The Dutch and the English debt'; Sinclair, *History of the public revenue*; Hargreaves, *National debt*. See also Neal, *Rise of financial capitalism*.

of capital inflows and to clarify their relationship to investment, one has to construct the balance of payments and the national income accounts. While Imlah has constructed the balance of payments of the UK for the nineteenth century, the balance of payments of Great Britain has never been estimated for the eighteenth.⁷ Here the balance of payments and the national income accounts of Great Britain for the years 1710-1800 will be reconstructed and used to obtain an estimate of capital flows.⁸ This allows us to verify the respective importance of savings and foreign capital inflows to investment.

It will be shown that in the eighteenth century Great Britain was running a current account deficit and was a net importer of capital, whereas in the next century the UK was running a current account surplus and was a net exporter of capital. The data show that, while domestic saving financed two-thirds of the investment during the second half of the eighteenth century, the current account deficit financed the remaining one-third. Therefore, foreign capital cannot be disregarded in the determination of British investment. This has significant consequences for the dynamics of saving and investment. Running a current account deficit allowed the UK to invest without having to increase national domestic saving. The inflow of foreign capital, as much as domestic thrift, financed the investment which accompanied the industrial revolution of the eighteenth century.

The British experience, therefore, is no different from that of other countries in their first phase of development. Moreover, the reversal in the flows of capital that occurred at the turn of the century is a usual pattern of development for countries in the vanguard. Indeed, Britain borrowed while developing, and at the turn of the century, started lending all over the world as it became the hegemonic power. A similar pattern emerged with the US a century later. Even for hegemonic nations, inflows of capital as well as saving are needed during the first stages of industrialization.

The calculations, like all estimation of macroeconomic data on this period, are very tentative and fraught with errors. However, constructing the balance of payments is the only way to obtain macroeconomic data on capital flows. Imlah has constructed the balance of payments for the years 1816-1900 to obtain estimates on the outstanding capital credit; I have followed his method to estimate the balance of payments for the eighteenth century.

In the first section the balance of payments and the national income accounts are presented for the eighteenth and nineteenth centuries. A full description of the estimation of the balance of payments built for 1710-1800 is given in the appendix.⁹ Section II contains an evaluation of the robustness of the data and investigates whether the estimates are backed up by historical evidence. The impact of these data on the saving-investment relationship is analysed in section III. Section IV concludes.

⁷ Imlah, *Economic elements*.

⁸ More precisely, one must estimate inflows of capital as well as the current account, since national saving is equal to domestic investment plus the current account surplus. The current account surplus is not identical to the outflow of capital: the difference between them is the increase in foreign reserves.

⁹ Since 1800-15 is a period of international restructuring, which should be studied separately, I refrain from presenting estimates for this period.

I

The balance of payments of a nation records the transactions between its residents and foreigners. It is divided into three parts: the current account, the capital account, and the change in foreign reserves. The current account records the international transactions involving export or import of goods and services, while the capital account records all international purchases or sales of assets. A current account deficit must be matched by a depletion of foreign reserves or an inflow of capital. I estimate every item of the current account as well as the change in foreign reserves, and the capital account is then derived from these. Since in Imlah's work the capital account is indeed obtained as a residual and since its estimation is careful and detailed, I follow his procedure for the estimation of the eighteenth-century balance of payments. It also allows us to have a consistent series for the whole of the eighteenth and nineteenth centuries and to analyse the differences between the periods.

The current account is divided into the trade balance, the service account, and transfers. The distinction between the trade and service account is essentially of no consequence, since the allocation of certain items to either the trade or the service account depends on whether the trade balance data are presented c.i.f. (cost, insurance, and freight) or f.o.b. (free on board). The balance of trade and services is presented in table 1. The estimation of each of the series included in table 1 is explained in the appendix. The data are in current prices. The balance of trade is presented in column 4. It includes the net export series presented in column 1, which is based on Deane and Cole's data.¹⁰

The net export series, were it to include sales of ships and smuggling, would be the trade balance.¹¹ These two items are estimated separately. Imlah combines smuggling with tourist expenditures into one series; I have therefore chosen to do the same in order to construct a series consistent with Imlah's one.¹² The data reveal that during most of the eighteenth and nineteenth centuries, Britain ran a trade deficit, importing more goods than were exported.¹³

The service account (invisible exports) is presented in column 8. Services rendered by Britons must be credited to the current account, while services

¹⁰ Deane and Cole, *British economic growth*. The difference with Deane and Cole's data is that, in table 1, net exports are in current prices.

¹¹ Imports and exports of gold and silver are seen as changes in foreign reserves, and thus do not fall under the trade balance.

¹² Tourist expenditures should be included in the service account, and not in the trade account.

¹³ Since the first column is from Deane and Cole, the data displayed in all the tables are: from 1710 to 1770, for England; from 1770 to 1800, for Great Britain; and from 1815 onwards, for the UK. In the text I refer to Great Britain when discussing the eighteenth century, and to the UK for the nineteenth.

Table I. *The British trade and service accounts, 1710-1900 (annual flows, £m, current prices)*

Year	Net exports	Smuggling and tourist expenditures	Sales of ships	Balance of trade	Net credit from shipping	Insurance, etc.	Profits on trade	Service account net of interest payments	Balance of trade and services
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1710	0.32	-0.41	-0.04	-0.13	0.50	0.00	0.57	1.07	0.94
1720	-1.16	-0.63	-0.04	-1.83	0.70	0.00	0.55	1.25	-0.58
1730	-1.86	-0.85	-0.05	-2.76	0.90	0.10	0.64	1.64	-1.12
1740	-1.04	-1.17	-0.07	-2.28	1.20	0.15	0.62	1.97	-0.31
1750	1.68	-1.12	-0.08	0.48	1.50	0.23	1.13	2.86	3.34
1760	0.00	-2.26	-0.10	-2.36	1.80	0.29	1.32	3.41	1.05
1770	-1.20	-3.13	-0.11	-4.44	2.80	0.29	1.14	4.23	-0.21
1780	-2.13	-1.58	-0.11	-3.82	3.20	0.26	1.06	4.52	0.70
1790	-8.44	-1.70	0.00	-10.14	4.20	0.45	1.79	6.44	-3.70
1800	-8.64	-1.60	0.00	-10.24	5.20	0.73	2.92	8.85	-1.39
1816	4.10	-2.50	0.00	1.60	9.00	2.90	5.70	17.60	19.20
1820	-7.40	-2.20	0.00	-9.60	8.40	2.50	5.10	16.00	6.40
1830	-12.00	-2.30	0.00	-14.30	7.90	2.50	5.00	15.40	1.10
1840	-29.80	-3.10	0.00	-32.90	12.60	3.80	7.60	24.00	-8.90
1850	-19.60	-3.60	0.00	-23.20	14.20	4.70	9.30	28.20	5.00
1860	-46.00	-6.90	0.50	-52.40	27.70	9.40	18.80	55.90	3.50
1870	-59.20	-8.00	1.70	-65.50	45.70	13.70	27.40	86.80	21.30
1880	-124.80	-8.90	3.70	-130.00	60.00	15.70	31.40	107.10	-22.90
1890	-92.40	-10.50	6.10	-96.80	60.60	16.90	33.70	111.20	14.40
1900	-168.70	-11.60	1.70	-178.60	68.50	17.50	35.10	121.10	-57.50

Notes: col. (4) = col. (1) + col. (2) + col. (3); col. (8) = col. (5) + col. (6) + col. (7); col. (9) = col. (4) + col. (8)

Sources: see text

rendered by foreigners must be subtracted from the current account.¹⁴ From the end of the seventeenth century the service account presents a surplus which increases during the whole eighteenth and nineteenth centuries. During the seventeenth century most British exports and imports were carried on foreign vessels and most of these were Dutch. During the eighteenth century the services provided by foreigners were still far from negligible, but the importance of the British merchant fleet was on the rise, and its insurance sector was developing. In fact, the purpose of the Navigation Acts may have been to exclude foreigners from the import trade and to compel the development of British shipping, but their immediate impact was negligible. Despite the Navigation Acts, the Dutch maintained their supremacy in the field of merchant shipping well into the eighteenth century. Wilson argues that 'the Acts may possibly have done some little temporary damage [to Dutch shipping], but it was negligible, and even this was counterbalanced by its effects in the Baltic, where its secondary results were to give the Dutch a monopoly of shipping until late in the eighteenth century.'¹⁵ In the nineteenth century the UK already possessed the largest merchant fleet in the world. Some 70 per cent of all entries and clearances in British ports were accounted for by British ships.¹⁶ The data indeed confirm that Britain emerged as an increasingly important shipping power during the course of the eighteenth century. However, the service account, though positive, is not of sufficient magnitude to offset the trade deficit during most of the eighteenth century. For the following century, the data show that the UK ran a large service account surplus, of sufficient magnitude to offset the trade deficit. Therefore the balance of trade and services, column 9, shows a deficit for most of the eighteenth century and a surplus during the nineteenth.

In order to estimate the current account, one has to add transfers and debt service to the balance of trade and services. The estimation of these series is explained in the appendix. The current account excluding net debt service is presented in column 3 of table 2 and including net debt service in column 5. Excluding debt service, the current account is variable in both centuries. However, including debt service it is negative for most of the eighteenth and positive for the entire nineteenth century.

The capital inflow series, that is the capital account, is presented in column 7. It is derived by adding the increase in foreign reserves to the current account. Great Britain increased its foreign reserves throughout both centuries. The increase in foreign reserves during the eighteenth century is uncommon for developing countries during industrialization. However, since nations were frequently waging war during this period, bullion was needed

¹⁴ Given that the trade balance has been calculated taking imports c.i.f. and exports f.o.b., only export and import services (freight and insurance) earned by the British are included. Freight charges on imports earned by the British are not included since they are regarded as domestic transactions. On the other hand, 'earnings of foreign ships in the British imports and exports trade do not need to be considered in these accounts of British balance of payments since the debit charges on imports are already covered in the import valuations c.i.f., while the freight charges on exports normally become a part of the total costs of the goods at the destination abroad': Imlah, *Economic elements*, p. 49.

¹⁵ Wilson, *Anglo-Dutch commerce*, p. 20.

¹⁶ See Davis, *Rise of the English shipping industry*; Imlah, *Economic elements*.

Table 2. *The British balance of payments, 1711-1900 (decade averages, £m p.a.)*

	Trade and services (1)	Transfers (2)	Current account, of debt service (3)	Debt service (4)	Current account (5)	Increase in foreign reserves (6)	Inflow of capital (7)	Balance of foreign debt (8)
1711-20	0.18	0.11	0.29	-0.10	0.19	0.46	0.27	4.70
1721-30	-0.85		-0.85	-0.23	-1.08	0.18	1.26	17.33
1731-40	-0.72	0.02	-0.70	-0.78	-1.48	0.08	1.56	32.91
1741-50	1.52	0.14	1.66	-1.48	0.18	0.04	-0.14	31.57
1751-60	2.20		2.20	-1.42	0.78	0.10	-0.68	24.81
1761-70	0.42	-1.00	-0.58	-1.12	-1.70	0.02	1.72	42.00
1771-80	0.24		0.24	-1.89	-1.65	1.70	3.35	75.45
1781-90	-1.50	2.00	0.50	-1.89	-1.39	1.41	2.80	103.40
1791-1800 (a)	-2.55	0.00	-2.55	-2.58	-5.13	1.28	6.41	167.50
1791-1800 (b)	-2.55	15.00	12.45	-2.58	9.87	1.28	-8.59	-17.54
1801-15								-10.00
1816-20	7.44	-0.36	7.08	1.74	8.82	1.60	-7.22	-46.10
1821-30	3.52	-0.37	3.15	4.43	7.58	1.11	-6.47	-110.76
1831-40	-1.92	-1.04	-2.96	6.65	3.69	-0.78	-4.47	-155.41
1841-50	-1.70	-2.15	-3.85	8.49	4.64	-0.66	-5.30	-208.36
1851-60	8.30	-2.21	6.09	14.11	20.20	3.11	-17.09	-379.23
1861-70	12.15	-1.58	10.57	26.17	36.74	5.61	-31.13	-690.49
1871-80	0.58	-1.41	-0.83	53.17	52.34	2.62	-49.72	-1187.67
1881-90	2.50	-1.73	0.77	74.47	75.24	0.66	-74.58	-1933.44
1891-1900	-44.11	-0.74	-44.85	96.48	51.63	5.15	-46.48	-2398.22

Notes: col. (1) is the decade average of col. (9) of table 1. For the eighteenth century the average of the two limit years is taken, while for the nineteenth an average of all the years in the decade is used; col. (3) = col. (1) + col. (2); col. (4) at time t equals col. (8) at time $t - 1$ multiplied by the interest rate; col. (5) = col. (3) + col. (4); col. (7) = col. (6) - col. (5); col. (8) is an end-of-period figure; col. (8) at time t equals col. (8) at time $t - 1$ plus 10 times col. (7) at time t .

Sources: see text

to purchase ammunition and hire mercenaries at short notice. This might explain the build-up of foreign reserves during the entire period. The British current account deficit during the eighteenth century was therefore financed through capital flows and not through the depletion of reserves. The widely held view that the UK ran a current account surplus and exported capital is therefore true only for the nineteenth century. During the eighteenth century Great Britain ran a current account deficit, which is typical of countries in the early stages of economic development.

The balance of net foreign debt series is presented in table 2, column 8. This construction of the eighteenth-century balance of payments, added to Imlah's estimates, gives a picture of the stock of net foreign debt during British industrialization. In the eighteenth century, Great Britain was a net debtor, but in the nineteenth the UK was lending in many other countries. These facts have consequences for the methods by which investment was financed, as a surplus in the current account means that national saving financed domestic investment as well as investment abroad, while a deficit means that investment was financed not only by domestic saving but also through capital inflows. It is therefore important to check the robustness of these conjectures on the eighteenth-century balance of payments.

II

Feinstein has emphasized that all eighteenth-century data are subject to major errors of measurement.¹⁷ He has conjectured that the pre-1870 series display a margin of error in excess of 25 per cent. The same is probably true of estimates of trade balance flows. However, the error of measurement of the stock of debt is wider, since the series is built on past data, which are particularly sensitive to the choice of outstanding debt at the beginning of the period and to the interest rate.

Table 3 shows how the data are sensitive to changes in the outstanding net debt at the beginning of the period. In table 2 it was assumed that the initial net debt in 1710 was £2 million. This guess relies on the fact that Gregory King's data show a foreign lending of £0.7 million for 1688. From the Glorious Revolution on, links between Britain and Holland were strengthened, and capital flows into Britain became more important. Table 3 shows that, depending on the initial net debt ranging from £2 million to -£2 million, the foreign net debt in 1790 ranges between £31 million and £103 million. The foreign net debt series is also sensitive to the interest rate. In table 4 we can see how changing the interest rate from 2 to 6 per cent has an effect on the net debt, which ranges from £30 million to £241 million in 1790.

The intention of tables 3 and 4 is to underline that data on the British balance of debt abroad are subject to very large errors. The estimates presented here are very tentative, but are nonetheless a starting point in this empirical area. Moreover, the deficit in the current account is robust and is indeed backed up by historical evidence. There is evidence of

¹⁷ Feinstein, *National income expenditure*, p. 21.

Table 3. *Sensitivity test to changes in the outstanding debt at the beginning of the period (£ million)*

	Case A		Case B		Case C		Case D	
	Balance of foreign debt	Debt service	Balance of foreign debt	Debt service	Balance of foreign debt	Debt service	Balance of foreign debt	Debt service
1710	2.00		0.00		-0.70		-2.00	
1711-20	4.70	-0.10	1.70	0.00	0.65	0.04	-1.30	0.10
1721-30	17.33	-0.23	12.83	-0.08	11.26	-0.03	8.33	0.07
1731-40	32.91	-0.78	26.38	-0.58	24.10	-0.51	19.86	-0.38
1741-50	31.57	-1.48	22.11	-1.19	18.79	-1.08	12.64	-0.89
1751-60	24.81	-1.42	11.09	-0.99	6.29	-0.85	-2.63	-0.57
1761-70	42.00	-1.12	22.10	-0.50	15.14	-0.28	2.21	0.12
1771-80	75.45	-1.89	46.61	-0.99	36.51	-0.68	17.76	-0.10
1781-90	103.40	-1.89	67.34	-1.17	54.72	-0.91	31.29	-0.44
1791-1800 (a)	167.50	-2.58	122.43	-1.68	106.65	-1.37	77.36	-0.78
1791-1800 (b)	-17.54	-2.58	-27.52	-1.68	-43.30	-1.37	-72.59	-0.78

Note: case A is the one depicted in table 2. Scenario (a) and (b) from table 2.

Table 4. *Sensitivity test to changes in the interest rate (£ million)*

	Case A		Case B (2%)		Case C (4%)		Case D (6%)	
	Balance of foreign debt	Debt service	Balance of foreign debt	Debt service	Balance of foreign debt	Debt service	Balance of foreign debt	Debt service
1710	2.00		2.00		2.00		2.00	
1711-20	4.70	-0.10	4.10	-0.04	4.50	-0.08	4.90	-0.12
1721-30	17.33	-0.23	15.21	-0.08	16.58	-0.18	18.12	-0.29
1731-40	32.91	-0.78	26.02	-0.30	30.99	-0.66	36.77	-1.09
1741-50	31.57	-1.48	15.07	-0.52	27.24	-1.24	42.69	-2.21
1751-60	24.81	-1.42	-2.87	-0.30	17.17	-1.09	47.34	-2.56
1761-70	42.00	-1.12	2.57	0.06	30.06	-0.69	81.76	-2.84
1771-80	75.45	-1.89	17.64	-0.05	56.64	-1.20	145.37	-4.91
1781-90	103.40	-1.89	30.25	-0.35	88.38	-2.27	241.67	-8.72
1791-1800 (a)	167.50	-2.58	74.55	-0.61	161.99	-3.54	424.93	-14.50
1791-1800 (b)	-17.54	-2.58	-75.40	-0.61	-12.04	-3.54	274.98	-14.50

Note: case A is the one depicted in table 2. Scenario (a) and (b) from table 2.

substantial inflows of capital from foreign countries to Britain, in particular from Holland,¹⁸ the latter investment being used to finance both private assets and the British government debt.¹⁹ In 1770, Dutch investments in the English East India Company alone stood at around £10 million. In 1791 one-sixth of Bank of England stock was held by the Dutch. In 1773 the British government borrowed £1 million sterling from Holland to finance

¹⁸ See Grenville, *Essay on the supposed advantages*; Sinclair, *History of the public revenue*; Dickson, *Financial revolution*.

¹⁹ The national debt was financed in two ways: on the one hand, by the sale of annuities and perpetuities and by the holding of lotteries; on the other hand, 'indirectly' by the Bank of England, and the East India and the South Sea companies since they were lending to the government.

sugar plantations in the British West Indies (paying 8 per cent interest, compared with 2 to 3 per cent in Holland).²⁰ As regards the public debt, Dutch investment in British public debt in 1737 stood at £10 million (27.7 per cent of the total gross debt), in 1762, at £30 million (25 per cent of the total gross debt), in 1774, at £46.6 million (25 per cent of the total gross debt).²¹

One wonders how a country as small as Holland (with a population of 2 million in 1715) could be powerful enough to be a major international lender, and why it preferred to invest abroad. Its income and power stemmed from its role as the merchant of the world, providing trade-related services (warehousing, shipping, insurance, and banking), as well as producing and exporting manufactured goods. Dutch commercial and manufacturing power began to decline after the war of Spanish Succession.²² The demise of Dutch commercial power has been attributed to the slow disappearance of the need for a staple market, once trade became direct. Concomitantly, Dutch manufacturing was supplanted by its English rival because of protectionism, transplantation of their techniques of production to English soil, and lower wages.²³ It is not surprising therefore, that the Dutch, who could not find opportunities at home, and who were offered higher interest rates abroad, invested in foreign countries²⁴:

The great sums which they lend to private people in countries where the rate of interest is higher than in their own, are circumstances which no doubt demonstrate the redundancy of their stock, or that it has increased beyond what they can employ with tolerable profit in the proper business of their own country.²⁵

They lent to many European countries, including Sweden, Denmark, Germany, and Russia. However, the link between Holland and Britain was the most important. Political and economic factors were inextricably entwined to generate these ties: the strong bonds linking two protestant countries built up the familiarity and trust needed for financial links.

Thus inflows of capital from Holland to Britain were not insignificant. Feinstein estimates the overall net debt directly without building up the balance of payments. He considers that 'for 1760, we have detailed estimates for both British and Dutch sources indicating that total Dutch investment

²⁰ See Wilson, *Anglo-Dutch commerce*.

²¹ The data describing the Dutch share of Britain's national debt are the source of a great deal of controversy. There were already several competing viewpoints in the eighteenth century: Lord North proclaimed the share to be four-sevenths (57%), while Sinclair argued that it was 16%. Modern estimates are in the 15 to 25% range; Dickson argues for the lower and Carter for the upper figure. See Sinclair, *History of the public revenue*; Dickson, *Financial revolution*; Carter, 'Dutch foreign investment'.

²² Some experts have radically different views concerning the period at which the Dutch supremacy began to decline. See Riley, 'The Dutch economy', for a review of this subject. The data in this article corroborate Riley's view that 'if per capita income continued to increase after 1650-1680, then the failure of the Dutch to regain a status of competitive labour costs could be explained by the absence of any need to do so'. (*Ibid.*, p. 568)

²³ 'The wages of labour are said to be higher in Holland than in England': Smith, *Wealth of nations*, p. 91. The decline of Holland and the rise of Great Britain can be explained by the relatively high wages in Holland. See Brezis, Krugman, and Tsiddon, 'Leapfrogging in international competition'.

²⁴ See Serionne, *La richesse de l'Angleterre*.

²⁵ Smith, *Wealth of nations*, p. 92.

in Britain at that date was between £25m and £30m';²⁶ these data do not include investment in private assets. Moreover 'the extent of British investment abroad to be set against that is unknown but we may say £10-£15m'.²⁷ Thus, his estimate for 1760 (£20 million) is very close to my estimate in table 2.²⁸ Serionne, writing in 1771, estimates the gross foreign debt to be £100 million in 1770.²⁹

Between 1790 and 1815 the UK passed from being a debtor to being a creditor nation. The major restructuring of the international system occurring during this period unfortunately means that the data must be carefully qualified. As shown in table 2, the balance of foreign net debt in 1800 varies from -£18 million to £167 million depending on the transfer series. Errors of accounting during the Napoleonic wars for imports and exports of military expenditure prompt me to refrain from presenting the data of the balance of payments for the period 1800-15. This lack of data makes it impossible to pinpoint exactly when the series on net foreign debt changed sign, as is shown in column 8 of table 2.

The factors that led the UK to become a foreign creditor at the turn of the century include a reduction in the supply of funds as well as a contraction in the demand for these funds. The reduction in the supply occurred at the end of the eighteenth century. The 1780 Anglo-Dutch war and the French invasion of 1795 weakened Dutch links with Britain. At this time, Holland switched international investments towards the US and France, since French credit seemed good after Necker's reform of the annuities market.³⁰

Two factors contributed to the decline in the demand for inflows of capital. First, the government reduced its foreign expenditures since there was no longer a need for the recruitment of mercenaries, and it raised taxes to finance the war (when in previous years it had gone further into debt).³¹ Second, there was an increase in transfers from overseas as underlined by Davis: 'It is altogether more probable that Indian wealth supplied the funds that bought national debt back from the Dutch and others . . . leaving Britain nearly free from overseas indebtedness when it came to face the great French wars from 1793'.³² The reduction in supply might have been dominant since doing without Dutch funds may not have been as painless as it has been made out to be. Indeed, the period saw a 'depreciation of the British currency as measured by the price of the precious metals and the foreign exchanges', a sign of balance of payments weakness.³³

²⁶ Feinstein, 'Capital formation in Great Britain', p. 71.

²⁷ *Ibid.*

²⁸ His new estimate of £18 million is not very different. See Feinstein and Pollard, *Studies in capital formation*, p. 397.

²⁹ Serionne, *La richesse de l'Angleterre*, p. 87. This figure was already considered excessive in Serionne's time, as indicated by Wilson, *Anglo-Dutch commerce*.

³⁰ See Wilson, *Anglo-Dutch commerce*, p. 189.

³¹ Indeed, this period witnessed a revolution in warfare and military organization: 'Total war involving all the people with conscription for military duty and labour services took the place of the wars of the cabinets and mercenaries': Kinder and Hilgermann, *Anchor atlas*, p. 23. It could also be that the causality was reversed, i.e., that Pitt had to raise taxes because he was no longer able to finance the war by the traditional means of fresh borrowing.

³² Davis, *Industrial revolution*, p. 55.

³³ See Gayer, Schwartz, and Rostow, *Growth and fluctuation*, p. 106.

Despite the fragility of the data, the general conclusion must be that the UK was a net debtor in the eighteenth century, and the foreign capital flows, in great majority Dutch, financed budget deficits, domestic investments, and investment in the colonies (this last item being in fact an outflow of capital).³⁴ The UK became a net creditor only in the nineteenth century. The next task is to examine the influence of these flows of capital on British domestic investment.

III

The equation which relates saving to investment stems from the basic national income identity:

$$Y = C + I + G + NX \quad (1)$$

where Y is the GNP; C is consumption; I is investment; G is government expenditure; and NX is the current account surplus. By subtracting taxes and consumption from both sides of equation (1), we obtain equation (2):

$$S = I + NX + (G - T) \quad (2)$$

where S is private saving; T is taxes; and G minus T is the government deficit.³⁵ Since national saving, NS , is defined as private saving minus government deficit, we get:

$$NS = I + NX \quad (3)$$

Equation (3) shows that in order to compare investment and saving we need to estimate the current account surplus. Therefore when scholars equate national saving and investment, they omit the current account surplus. The current account surplus, NX , is the series presented in table 2, column 5.³⁶ These data are not exactly equal to the inflow of capital, the difference between them being the increase in foreign reserves. The series of equation (2) and (3) are displayed in table 5.

From 1740 to the end of the eighteenth century, the national saving rate increased by 50 per cent, and the investment ratio by 80 per cent. This means that, for the century as a whole, national saving was not sufficient to finance investment; there was a need for inflows of foreign capital. Column 10 highlights the fact that, during most of the eighteenth century, almost one-third of the investment was financed by inflows of foreign capital. The data also reveal that the decrease in government saving which occurred during the Napoleonic wars was not completely offset by an increase in

³⁴ The vast majority of investment in the colonies was directed towards the West Indies for investment in infrastructure (i.e., direct investment in housing, ports, and plantations). The East Indies, for their part, were self-financing through indigenous taxes. See Jenks, *Migration of British capital*.

³⁵ For more details see Dornbusch and Fischer, *Macroeconomics*.

³⁶ Feinstein estimates a series on net investment abroad by estimating the financial side. However, data from the financial side are often problematic and it is thus usual to obtain the desired series from the real side instead. Mokyr writes: 'An examination of Feinstein's methodology and notes does not inspire great confidence in these numbers': Mokyr, 'Has the industrial revolution been crowded out?', p. 296.

Table 5. *The national income accounts, 1740-1900: relation between private saving and investment*

Year	(£ m. per year, at current prices)						(%)			
	Nominal output	Nominal investment	Current account surplus	Budget deficit	Private saving	National saving	S/Y	NS/Y	I/Y	-NX/Y
	Y (1)	I (2)	NX (3)	G-T (4)	S (5)	NS (6)	(7)	(8)	(9)	(10)
1740	50.3	2.3	-0.33	0.00	1.97	1.97	3.9	3.9	4.6	14.3
1761-70	78.0	4.7	-1.70	3.95	6.95	3.00	8.9	3.8	6.0	36.2
1771-80	92.7	6.0	-1.65	4.65	9.00	4.35	9.7	4.7	6.5	27.5
1781-90	112.5	8.8	-1.38	4.95	12.37	7.42	11.0	6.6	7.8	15.7
1791-1800	176.0	14.9	-5.13 ^a	8.35	18.12	9.77	10.3	5.6	8.5	34.4
1801-10	266.5	21.9		19.35					8.2	
1811-20	296.0	29.5	8.82	5.85	44.17	38.32	14.9	12.9	10.0	-29.9
1821-30	315.5	35.8	7.58	-1.10	42.28	43.38	13.4	13.7	11.3	-21.2
1831-40	396.1	44.0	3.69	0.00	47.69	47.69	12.0	12.0	11.1	-8.4
1841-50	487.8	55.0	4.64	0.00	59.64	59.64	12.2	12.2	11.3	-8.4
1851-60	595.6	61.5	20.20	-1.05	80.65	81.70	13.5	13.7	10.3	-32.8
1861-70	827.5	52.0	36.74	-3.55	85.19	88.74	10.3	10.7	6.3	-70.7
1871-80	1,027.0	80.5	52.34	0.80	133.64	132.84	13.0	12.9	7.8	-65.0
1881-90	1,247.0	93.0	75.24	2.10	170.34	168.24	13.7	13.5	7.5	-80.9
1891-1900	1,588.0	144.0	51.63	4.90	200.53	195.63	12.6	12.3	9.1	-35.9

Notes: col. (5) = col. (2) + col. (3) + col. (4); col. (6) = col. (5) - col. (4).

^a For 1791-1800, the estimates are presented according to the figure displayed in scenario (a) from table 2.

Sources: see text

private domestic saving, since the national saving ratio decreased.³⁷ However, this decrease in the saving rate did not constrain the investment ratio since the UK borrowed overseas.³⁸ Indeed, the decrease in national saving at the end of the eighteenth century was counterbalanced by an increase in the current account deficit, financed by foreign flows of capital.

Theories of growth, following Ramsey and Solow, underline the intertemporal relationship linking saving, investment, and inflows of capital: that a country should be able to borrow in the early stages of capital formation is crucial.³⁹ There is agreement that intertemporal maximization will result in a country borrowing (and running a current account deficit) during the first stages of development.⁴⁰ Table 5 shows that Britain proceeded in just this fashion, borrowing from foreigners while increasing its stock of capital.⁴¹

The national income account identity tells us that both domestic private saving and net flows of capital were needed to finance investment and the government deficit (that is, purchases of government bonds). It does not allow us to infer a one-to-one relationship between specific investments and a particular form of saving (domestic or foreign).⁴² Since table 5 cannot tell us how much went to private investment, only historical evidence on the link between domestic saving and investment allows us to infer a potential path along which foreign capital flows were channelled towards domestic investment. A probable link was the working capital financed by merchant bankers.

In the seventeenth century and at the beginning of the eighteenth, when manufacturing was not mechanized (that is, when there was low fixed investment), saving was sufficient to finance working capital. In the eighteenth century, along with improvements in technology, came the necessity of investing in fixed assets, and saving was no longer sufficient to finance both working and fixed capital. The fact that working capital was one and a half times greater than fixed capital implies that the financing of

³⁷ Based on estimate (a) from table 2, the data show a decrease in the national saving. However, based on estimate (b), there is an increase in the national saving. This fact would run counter to the crowding out argument.

³⁸ Williamson claims that the failure of investment to increase was caused by the decrease in government saving. This is the crowding out hypothesis. See Williamson, 'Why was British growth so slow?'

³⁹ See Ramsey, 'Mathematical theory'; Solow, 'Contribution'.

⁴⁰ The period 1740-90 constitutes the first stage of British industrialization. That the investment ratio did not attain 11% until 1820 is irrelevant when it comes to determining the beginning of industrialization, according to growth theory. Moreover, Crafts et al. show that the industrial revolution obtained during the 1760s: Crafts, Leybourne, and Mills, 'Britain'.

⁴¹ The data show that Britain repaid its debt during the war years. Table 5 gives no clues as to why Britain chose to repay its debt. It is not abnormal for a country which no longer needs credit to repay its debts.

⁴² For example, in 1761-70 the ratio of capital inflow to nominal output was 2.2% and the investment ratio was 6.0%, while national saving was only 3.8%. Two completely different interpretations of these figures are possible: on the one hand, all capital flows could have been directed towards investment, including a portion of domestic saving (the other portion going towards financing the budget deficit); on the other hand, foreign capital could very well have financed the budget deficit, with domestic saving being directed into investment. With the data to hand, there is no way of distinguishing between these two (or many other) explanations. From the macroeconomic point of view it is not clear whether there is a need to distinguish between them.

working capital was crucial to the operation of the enterprise.⁴³ Usually working capital was provided by a merchant banker and did not come from the entrepreneur's own saving. The link existing between merchant bankers and non-domestic financiers allowed the channelling of the foreign flows of capital to investment in working capital. As Riley writes: 'non-government foreign lending from the [Dutch] Republic financed commercial flows and was sometimes used in the private sector to expand production in mining, industry, and plantation agriculture.'⁴⁴

In conclusion, the macroeconomic data presented in table 5 show that foreign as well as domestic national savings were needed to finance investment in new technologies required by the growth process which started in the middle of the eighteenth century.

IV

Among the different factors contributing to growth and development, particular attention had been paid to capital formation. This is because there is a close correlation between output per caput and the capital output ratio.⁴⁵ Sources of investment have therefore been seen as contributing to the industrialization of Britain. The assumption that saving and investment are equivalent led to a voluminous literature devoted to saving which has omitted foreign sources of investment. This article has sought to estimate British capital flows and to analyse the saving-investment relationship during the industrialization of Britain. The necessity of estimating the current account surplus has led to the construction of the balance of payments for the eighteenth century. These estimates are very tentative, but they are derived in a way consistent with that of Imlah, and are also supported by historical evidence.

The data show that in contrast with the nineteenth century, Great Britain was a net importer of capital in the eighteenth. This leaves us with the problem of dating the reversal of capital flows, but this is not an easy task, because during this period transfers probably played a major role.

The foreign saving and investment behaviour displayed by Britain in this period is typical of countries in the initial phases of development. Compared with Holland, Britain in the eighteenth century was in fact a less developed country, with low wages and high rates of return. Britain borrowed from Holland, which did not have good investment opportunities at home. These foreign inflows of capital financed the current account deficit, allowing investment to be greater than national saving. Therefore, foreign flows of

⁴³ See Feinstein, 'Capital formation'. This can be explained by stocks having to be kept for long periods of time; companies purchased for cash and sold for credit.

⁴⁴ Riley, *International government finance*, p. 219.

⁴⁵ The other factor usually underlined is technical progress. This article does not discuss the relative importance of those two factors. See Feinstein, 'Capital accumulation'.

capital as well as domestic private saving paved the way for the industrial revolution.

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APPENDIX: Estimates of the trade and service accounts

Net exports

The data on imports and exports of goods represent the most fully analysed aspect in the balance of payments. The raw data on imports, exports, and re-exports originate in the customs authorities' ledgers. As explained by Clark, by Schumpeter, and by Deane and Cole, a major problem exists with the official values in the ledgers: they are essentially volume indexes due to the ossification of the values in the eighteenth century.⁴⁶ Multiplying these 'real' values by the general price index is not appropriate, since the trade balance is affected by changes in the terms of trade. Therefore, one needs to convert separately to nominal values every item in the export and import statistics before aggregating up. Here the nominal values of imports and exports are estimated by using adequate group indexes for aggregation; this is the series of net exports presented in table 1.⁴⁷ For the nineteenth century, Imlah has constructed a series which takes care of the problem.⁴⁸ Imlah computes imports c.i.f. and exports f.o.b. For the eighteenth century, Deane and Cole attempted the same exercise using the data compiled by Schumpeter and noticing that the re-export series includes freight, insurance, and profits. This consistency in the construction of the series allows us to obtain a net import series for the years 1710-1900 by splicing the two. This is presented in table 1, column 1.

Smuggling and tourist expenditures

Smuggling was not particularly significant for the nineteenth century, as shown by Imlah. For the eighteenth century, on the other hand, illicit trade was a persistent feature of commerce and varied with the severity of duties imposed. As noted by Imlah in the context of the nineteenth-century data, 'translating these impressions into a series of annual values is a more troublesome matter'.⁴⁹ For the eighteenth century, and despite these difficulties, Cole arrived at an estimate which showed smuggling at a level of up to 25 per cent of recorded imports: 'It seems possible that £2 or £3 million worth of goods may have been smuggled into Britain each year'.⁵⁰ He also suggests a general increase in smuggling from 1724 to 1745, a resurgence again in the 1770s, and a decline after 1780 corresponding to the introduction of Pitt's reform.⁵¹ For the nineteenth century the data are Imlah's. His 'arbitrary treatment' was the following: take £1.5 million as the starting point for 1816 and assume a constant percentage of exports subsequently.⁵²

As for tourist expenditures, Imlah has noted that the British travelled abroad to a greater extent than other European nationalities, the 'grand tour' being an integral component of the education of any civilized individual. Imlah estimated that the ratio of tourism to GNP hovered around 0.3 per cent, and it is this figure that is adopted here. The series including smuggling and tourist expenditures is presented in table 1, column 2.

⁴⁶ See Clark, *English commercial statistics*; Schumpeter, *English overseas trade*; Deane and Cole, *British economic growth*.

⁴⁷ See E. Brezis, 'Estimates of British nominal imports and exports during the eighteenth century' (mimeo, Hebrew Univ. Jerusalem, 1992). Since the price series used for aggregation are estimated on a decadal basis, in order to be consistent, the balance of trade data are presented on the same basis.

⁴⁸ Imlah, *Economic elements*. There is also a series constructed by Davis, *Industrial revolution*. The difference between his and Imlah's estimates being of the order of 5%, I have not found it necessary to present Davis's data.

⁴⁹ Imlah, *Economic elements*, p. 59.

⁵⁰ Cole, 'Trends in eighteenth-century smuggling', p. 142.

⁵¹ Mui and Mui refute some of Cole's estimates. Cole replies that 'any estimate of smuggling was bound to be speculative' and those presented 'are a reasonable guess at the probable order of magnitude of the contraband trade': Mui and Mui, 'Trends in eighteenth-century smuggling'; Cole, 'The arithmetic'.

⁵² His own words.

Sales of ships

In the eighteenth century British shipbuilding did not meet the demands of the country's merchant marine. The necessary vessels were obtained from the Netherlands, the Baltic, and America.⁵³ After 1786 and until 1849, because of the Registration Act, no foreign vessels were officially acquired. After 1849 the British were able to supply the needed vessels themselves: 'any accession of vessels from [abroad] was by far outstripped by the number of British vessels which were sold to foreigners'.⁵⁴ Feinstein has estimated the total investment in new ships in 1760 to be £0.27 million.⁵⁵ It seems appropriate, therefore, to assume that 40 per cent of this total was bought abroad. The estimate of sales of ships or purchases of foreign ships is presented in column 3 of table 1.

Net credit from shipping

For the eighteenth century, data on net credit from shipping can be obtained from Davis's work.⁵⁶ Davis has collected data for the years 1686, 1715, and 1771 on entries and clearances of shipping engaged in foreign trade, as well as revenue per ton of freight, according to the trade route involved. This allows us to compute shipping revenue. For balance of payments purposes, however, it is necessary to know how much of this revenue accrued to Britain. Davis's discussion of British foreign trade, as well as Wilson's work, does shed some light on the relative importance of British and foreign carriers in British trade.⁵⁷

For the Baltic and northern Europe, the share of foreign shipping is estimated at 70 per cent in 1700, declining to 50 per cent in 1750, 40 per cent in 1760, and 30 per cent in 1780. These figures reflect the findings of Davis and Wilson, and if anything, are biased downwards. Wilson shows that 90 per cent of the Baltic trade was carried on foreign ships in 1698; in 1721, 'the bulk of British trade with France went in Dutch boats';⁵⁸ and in 1780 'there were 2,075 Dutch against 1,651 British ships trading'.⁵⁹ For southern Europe and the Mediterranean, referred to as the 'rich trade', I estimate that only 30 per cent of this lucrative route was handled by foreigners. The East Indies route was dominated by the British; a rough guess puts the British share at 70 to 75 per cent. To the West Indies and North America, the Dutch 'trade with the Americas and the colonies was by 1750 proving more difficult, though here again there was no obvious or startling decline . . . and in spite of the Asiento Treaty, the Dutch remained the most important slavers in West Africa'.⁶⁰ Davis confirms this view, and therefore a figure of 50 per cent was chosen for the British share.

⁵³ Craig writes: 'before 1786 a considerable number of very large merchantmen were built in the Baltic for British owners. . . . America became an active supplier of new tonnage early in the eighteenth century': Craig, 'Capital formation', p. 138.

⁵⁴ *Ibid.*, p. 139.

⁵⁵ Feinstein, 'Capital formation'.

⁵⁶ Davis, *Rise of the English shipping industry*; Barbour, 'Dutch and English'.

⁵⁷ Wilson, *Profit and power*. Davis also presents data on entries and clearances of foreign-registered vessels. However, these data are suspect because it is known that the Navigation Acts caused many captains to register their vessels falsely as being British. The weakness of Davis's data is crystallized in the following inconsistency: for the years 1686 and 1715, when the Navigation Acts had little effect and the importance of foreign shipping is well documented, Davis claims that only 15% of shipping (in tons) was carried on foreign-registered vessels—too low a figure. What is more damning for his case, however, is that for 1779, by which time British pre-eminence was well established, Davis gives a figure of 30%: this decrease in the share of shipping accounted for by British carriers is completely out of line with what is known to be a large increase in the importance of British shipping during the period.

⁵⁸ Wilson, *Profit and power*, p. 20.

⁵⁹ Macpherson, *Annals of commerce*, p. 649. The 90% figure in the previous sentence and Macpherson's figure of 2,075 include shipping unrelated to the UK and therefore do not reflect the British share of shipping.

⁶⁰ Wilson, *Profit and power*, pp. 258-9.

The estimates of foreign shipping are summarized in table A1. Net credit from shipping is presented in column 7, table A1 as well as in column 5, table 1.⁶¹

Insurance, brokerage, and shipping commissions

In the eighteenth century, the insurance industry was not highly developed: 'a large part of coastal and foreign bound shipping proceeded without cover. It is not until the beginning of the nineteenth century that the first reasonable, accurate account of the volume of business is available.'⁶² Nevertheless it is presumed that there existed a positive balance in Britain's favour in this service. Imlah finds a stable relationship between insurance and profits on foreign trade. It is reasonable to take half of Imlah's ratio in the calculations of insurance in the eighteenth century, because Amsterdam remained an important insurance centre. Imlah incorporates brokerage and shipping commissions into his series on insurance. For the eighteenth century, brokerage and shipping commissions are assumed to have constituted a small debit item and they are therefore omitted.⁶³ The series 'Insurance, brokerage, and shipping commissions' is presented in table 1, column 6.

Profits on foreign trade

The series 'Profits on foreign trade and services' should include profits made by British firms for export and import trade, net of the profits of foreign firms. Under this heading, one should also include banking and technical services rendered to foreigners. For the eighteenth century the average rate of profit assumed by Deane and Cole, based on Irving's computation, is 15 per cent.⁶⁴ For the nineteenth century, Imlah takes 5 per cent of the sum of imports, exports, and re-exports. In the series for the eighteenth century re-exports already include profits. As is the case with freight costs, profits on the import and export trade were divided between Britons and foreigners. It can be assumed that profits on exports flowed into British coffers and that those on imports were split evenly with the foreigners. Taking the same average rate of profit as Deane and Cole yields the series presented in table 1, column 7.

Transfers

During the eighteenth century, transfers consisted of emigrant funds, as well as government and private transfers. This series is not stable from one decade to the next, rendering extrapolation extremely hazardous. Assembling a comprehensive view of transfers for the eighteenth century is therefore problematic, and it is perhaps best to confine one's attention to what is known.

During the Seven Years War, Britain sent subsidies to Frederick the Great. Kennedy established that £6 million were sent every year between 1757 and 1760, financed chiefly by loans from the Dutch.⁶⁵ Moreover, British troops and mercenaries stationed in Europe were not living only on pillage. Those defence expenditures were not included in the figures. On the other hand, it is known that prizes (the most important being ships) were taken during most battles. Davis has gathered data on the number of merchant ships taken as prizes of war: 2,203 from 1702 to 1713; 1,499 from 1739 to 1748, and 1,855 from 1756 to 1763. Some of these ships changed hands several times, thus entailing much double counting.

We also know that there was Dutch and Huguenot immigration to Britain, as well as emigration to the American colonies. Crouzet has estimated that there were approximately

⁶¹ The trade balance is calculated taking exports f.o.b. and imports and re-exports c.i.f. In order to obtain net credit from shipping, therefore, I have to subtract foreign earnings on re-exports and on imports which are not included in the c.i.f. data from British revenues. I assume that foreign earnings on re-exports and on imports that are not included in the c.i.f. data amount to half of foreign revenues from trade. This series is shown in table 5, column 6.

⁶² John, 'London assurance company', p. 132.

⁶³ Commissions were not commonplace in the East India trade (which was dominated by the British). In northern and southern Europe, where commissions were more common, the majority of traffic was handled by the Dutch and other foreigners. Therefore commissions probably constituted a debit item and are thus already included under imports c.i.f.

⁶⁴ Deane and Cole, *British economic growth*.

⁶⁵ See Kennedy, *Rise and fall*, p. 98.

40,000 Huguenot refugees in Britain in 1690, each refugee bringing on average £10 into the country.⁶⁶ After the French Revolution, on the other hand, there is evidence of a large inflow of French immigrants and a stream of wealthy Dutch arrivals.

Davis and Philips argue for a substantial increase in remittances (amounting to up to £15 million per annum on average) from the East Indies during the last decade of the eighteenth century.⁶⁷ Moreover, repatriation of profits from West Indies (Antilles) plantations constituted an important source of inflows in and of themselves. As precise figures cannot be given, I display the results under the two extreme cases: the first scenario assumes zero remittances, the second, a full £15 million. This series is presented in table 2, column 2.

Net debt service

The series for net debt service is obtained by multiplying the outstanding net debt by the interest rate. The outstanding net debt is obtained by adding the outflow of capital to the previous outstanding debt. Data on interest rates are available from various sources. The interest rates appropriate to the public debt are available in Grenville: the interest rate in the first half of the eighteenth century was approximately 5 per cent; 4 per cent in the second half.⁶⁸ On gross private debt, the relevant interest rates are slightly higher. Turning to British foreign investment, on the other hand, we find higher rates of return than on gross British debt, especially in the end of the eighteenth century.⁶⁹ This implies that, although Britain was a net debtor during much of the eighteenth century, the effective rate of interest applicable to debt service on the net foreign debt was below the 4 to 5 per cent mark. The series of interest rates used is therefore: 5 per cent until 1730, 4.5 per cent for 1731-80, and 2.5 per cent for 1780-1800. For the nineteenth century we have Imlah's data on debt service. The series for net debt service is given in table 2, column 4. This series is not incompatible with the data on gross debt service available, for instance, from Grenville, who recorded that interest payments on the gross public debt to foreigners in 1767 amounted to £1.6 million.⁷⁰

Increase in foreign reserves

Data on the quantity of gold (and silver) in circulation in Britain during the eighteenth century are not easily available, and there are no records of gold and silver imports in the trade statistics.⁷¹ We do have data on gold coined at the Royal Mint, but this series does not distinguish between new coins minted from net imports of gold and silver, and re-coinage of old coins.⁷² In order to estimate net imports of gold and silver, we have to subtract re-coinage and the share of illicit trade paid for by illegal exports of gold from the 'gold coined at the Royal Mint' series.⁷³ For the nineteenth century, we have Imlah's series.⁷⁴ The complete series is presented in column 6 of table 2.

Output

The nominal output series, table 4, column 1, is GNP at current prices. For the eighteenth century I use Crafts's series.⁷⁵ For 1801-60 I use Deane and Cole, and from 1861 onwards

⁶⁶ See Crouzet, 'Huguenots'.

⁶⁷ See Davis, *Industrial revolution*; Philips, *East India Company*.

⁶⁸ Grenville, *Essay on the supposed advantages*. See also Dickson, *Financial revolution*.

⁶⁹ See Wilson, *Anglo-Dutch commerce*, p. 183.

⁷⁰ Cited by Carter, 'Dutch foreign investment'; Wilson, *Anglo-Dutch commerce*.

⁷¹ Macpherson in *Annals of commerce* emphasized that the records are only for exports.

⁷² See Craig, *Mint*.

⁷³ The series is consistent with the scanty data presented by Attman, which cover only the period 1720-40: Attman, *Dutch enterprise*. The series is different from Feinstein's estimate of the accumulation of gold and silver: Feinstein, 'Capital formation', p. 72. Feinstein presents an estimate of the stock of bullion in 1760 and then interpolates to obtain a series. However, in our case, interpolating the decade flows cannot be done because those flows were not steady during half a century. I therefore do not use these estimates.

⁷⁴ As pointed out by Feinstein, 'Capital formation', p. 645, n. 182, it is not at all clear how Imlah arrived at his series on the change in foreign reserves. Feinstein thinks that Imlah 'understated the imports in the period before 1858'.

⁷⁵ Crafts, 'British economic growth', p. 248.

Table A1. *British net credit from shipping, 1700-1780*

<i>Year</i>	<i>Trade route</i>	<i>Trade</i> (tons, '000) (1)	<i>Freight cost</i> (£ per ton) (2)	<i>Total revenues</i> (£ '000) (3)	<i>British share of</i> <i>route</i> (4)	<i>British revenues</i> (£ '000) (5)	<i>Foreign</i> <i>revenues</i> (£ '000) (6)	<i>Net credit from</i> <i>shipping</i> (7)
1700	Northern Europe	565	4	2,260	0.3	678	791	
	Southern Europe	102	3	306	0.7	214.2	45.9	
	East India	14	20	280	0.7	196	42	
	W. Indies and N. America	147	5	735	0.5	367.5	183.8	
	Total			3,581		1,455.7	1,062.7	393.1
1720	Northern Europe	551	4	2,204	0.4	881.6	661.2	
	Southern Europe	89	3	267	0.7	186.9	40.1	
	East India	13.8	20	276	0.7	193.2	41.4	
	W. Indies and N. America	156	5	780	0.5	390	195	
	Total			3,527		1,651.7	937.6	714.1
1750	Northern Europe	798	4	3,192	0.5	1,596	798	
	Southern Europe	106	3	318	0.7	222.6	47.7	
	East India	19.9	20	398	0.7	278.6	59.7	
	W. Indies and N. America	250	5	1,250	0.5	625	312.5	
	Total			5,158		2,722.2	1,217.9	1,504.3

1760	Northern Europe	698	4	2,792	0.6	1,675.2	558.4	1,791.4
	Southern Europe	87.1	3	261.3	0.7	182.91	39.2	
	East India	17.8	20	356	0.75	267	44.5	
	W. Indies and N. America	246.7	5	1,233.5	0.5	616.75	308.4	
	Total			4,642.8		2,741.86	950.5	
1770	Northern Europe	1,075	4	4,300	0.6	2,580	860	2,814.9
	Southern Europe	126	3	378	0.7	264.6	56.7	
	East India	28	20	560	0.8	448	56	
	W. Indies and N. America	396	5	1,980	0.5	990	495	
	Total			7,218		4,282.6	1,467.7	
1780	Northern Europe	1,108	4	4,432	0.7	3,102.4	664.8	3,189.1
	Southern Europe	100	3	300	0.7	210	45	
	East India	24.3	20	486	0.8	388.8	48.6	
	W. Indies and N. America	197	5	985	0.5	492.5	246.25	
	Total			6,203		4,193.7	1,004.65	

Notes: col. (3) = col. (1) times col. (2); col. (5) = col. (4) times col. (3); col. (6) = 0.5 times col. (3) times (1 minus col. (4)); col. (7) = col. (5) minus col. (6).

Sources: cols. (1) and (2), Davis, *Rise of the English shipping industry*; col. (4), see text.

Feinstein.⁷⁶ The Feinstein and the Deane and Cole series are similar for the period during which they overlap, and therefore the choice of which of the two to use is not critical.⁷⁷

Investment

Feinstein is the source of this series, with some minor reservations about his definitions. He defines total investment as investment in fixed capital plus stockbuilding plus overseas investment. This last item should not be included in what is called investment as defined in the national income accounts. Overseas investment is part of the capital account in the balance of payments, not part of investment. In the same way accumulation of gold and silver should not be included under stockbuilding (and neither should it be included under investment because it belongs to the category of changes in foreign reserves). Therefore column 2 in table 4 includes only investment in fixed capital and in stockbuilding. For the whole eighteenth century and for the nineteenth until 1860 the series I use is that reported in Feinstein.⁷⁸ From 1860 onwards the series is drawn from Feinstein.⁷⁹

Budget deficit

The budget deficit series is drawn from Deane and Cole.⁸⁰

⁷⁶ Deane and Cole, *British economic growth*, p. 282; Feinstein, *National income expenditure*, p. T4.

⁷⁷ Using nominal data allows one to avoid the price index issue. The debate is not about the nominal but rather about the real output series, and stems from a disagreement about which price index should be used.

⁷⁸ Feinstein, 'Capital formation', tab. 7, p. 41; tab. 16, p. 69.

⁷⁹ Feinstein, *National income expenditure*, p. T85.

⁸⁰ Deane and Cole, *British economic growth*, pp. 391-9.

Footnote references

- Attman, A., *Dutch enterprise in the world bullion trade, 1550-1800* (Göteborg, 1983).
- Barbour, V., 'Dutch and English merchant shipping in the seventeenth century', *Econ. Hist. Rev.*, II (1930), pp. 261-90.
- Brezis, E. S., Krugman, P. R., and Tsiddon, D., 'Leapfrogging in international competition: a theory of cycles in national technological leadership', *Amer. Econ. Rev.*, 83 (1993), pp. 1211-9.
- Carter, A., 'The Dutch and the English debt in 1777', *Economica*, xx (1953), pp. 159-61.
- Carter, A., 'Dutch foreign investment, 1738-1800', *Economica*, xx (1953), pp. 323-40.
- Chenery, H. B. and Syrquin, M., *Pattern of development, 1950-1970* (1975).
- Clark, G. N., *Guide to English commercial statistics, 1696-1782* (1938).
- Cole, W. A., 'Trends in eighteenth-century smuggling', *Econ. Hist. Rev.*, 2nd ser., x (1958), pp. 395-409.
- Cole, W. A., 'The arithmetic of eighteenth-century smuggling: a rejoinder', *Econ. Hist. Rev.*, 2nd ser., xxviii (1975), pp. 44-9.
- Crafts, N. F. R., *British economic growth during the industrial revolution* (Oxford, 1985).
- Crafts, N. F. R., 'British economic growth, 1700-1850: some difficulties of interpretation', *Exp. Econ. Hist.*, 24 (1987), pp. 240-68.
- Crafts, N. F. R., Leybourne, S. J., and Mills, T. C., 'Britain', in R. Sylla and G. Toniolo, eds., *Patterns of European industrialization* (1991), pp. 109-52.
- Craig, J., *The mint* (Cambridge, 1953).
- Craig, R., 'Capital formation in shipping', in J. P. P. Higgins and S. Pollard, eds., *Aspects of capital investment in Great Britain, 1750-1850* (1971), pp. 131-48.
- Crouzet, F., 'The Huguenots and the English financial revolution', in P. Higonnet, D. S. Landes, and H. Rosovsky, eds., *Favorites of fortune: technology, growth and economic development since the industrial revolution* (Cambridge, Mass., 1991), pp. 221-66.
- Davis, R., *The rise of the English shipping industry in the seventeenth and eighteenth centuries* (1962).
- Davis, R., *The industrial revolution and British overseas trade* (Leicester, 1979).
- Deane, P. and Cole, W. A., *British economic growth, 1688-1959* (Cambridge, 1967).
- Dickson, P. G. M., *The financial revolution in England* (New York, 1967).
- Dornbusch, R. and Fischer, S., *Macroeconomics* (New York, 1984).
- Feinstein, C., *National income expenditure and output of the United Kingdom, 1855-1965* (Cambridge, 1972).
- Feinstein, C., 'Capital formation in Great Britain', in P. Mathias and M. M. Postan, eds., *The Cambridge economic history of Europe*, VII, pt. I (Cambridge, 1978), pp. 28-96.
- Feinstein, C., 'Capital accumulation and the industrial revolution', in R. C. Floud and D. N. McCloskey, eds., *The economic history of Britain since 1700* (Cambridge, 1981), pp. 128-42.

- Feinstein, C. and Pollard, S., *Studies in capital formation in the United Kingdom, 1750-1920* (Oxford, 1988).
- Gayer, A. D., Schwartz, A., and Rostow, W. W., *The growth and fluctuation of the British economy, 1790-1850* (Oxford, 1953).
- Grenville, W., *Essay on the supposed advantages of a sinking fund* (1828).
- Hargreaves, E. L., *The national debt* (New York, 1966).
- Imlah, A. H., *Economic elements in the Pax Britannica* (Cambridge, Mass., 1958).
- Jenks, L. H., *The migration of British capital to 1875* (1938).
- John, A. H., 'The London Assurance Company and the marine insurance market of the eighteenth century', *Economica*, xxv (1958), pp. 126-41.
- Kennedy, P., *The rise and fall of the great powers* (New York, 1987).
- Kinder, H. and Hilgermann, W., *The anchor atlas of world history*, II (1974).
- Macpherson, D., *Annals of commerce* (1805).
- Mokyr, J., 'Has the industrial revolution been crowded out?', *Exp. Econ. Hist.*, 24 (1987), pp. 293-319.
- Mui, H. C. and Mui, L. H., 'Trends in eighteenth-century smuggling reconsidered', *Econ. Hist. Rev.*, 2nd ser., xxviii (1975), pp. 28-43.
- Neal, L., *The rise of financial capitalism* (Cambridge, 1990).
- Philips, C. H., *The East India Company, 1784-1834* (Manchester, 1961).
- Ramsey, F. P., 'A mathematical theory of saving', *Econ. J.*, 38 (1928), pp. 543-59.
- Riley, J. C., *International government finance and the Amsterdam capital market, 1740-1815* (Cambridge, 1980).
- Riley, J. C., 'The Dutch economy after 1650: decline or growth?', *J. Eur. Econ. Hist.*, XIII (1984), pp. 521-69.
- Rostow, W., *The stages of economic growth* (Cambridge, 1960).
- Schumpeter, E. B., *English overseas trade statistics, 1697-1808* (Oxford, 1960).
- Serionne, A., *La richesse de l'Angleterre* (1771).
- Sinclair, J., *The history of the public revenue of the British empire* (New York, 1791).
- Smith, A., *The wealth of nations* (1776; Chicago, 1976).
- Solow, R., 'A contribution to the theory of economic growth', *Qu. J. Econ.*, 70 (1956), pp. 65-94.
- Williamson, J., 'Why was British growth so slow during the industrial revolution?', *J. Econ. Hist.*, XLIV (1984), pp. 687-712.
- Williamson, J., 'Debating the British industrial revolution', *Exp. Econ. Hist.*, 24 (1987), pp. 269-92.
- Wilson, C., *Profit and power: a study of England and the Dutch wars* (1957).
- Wilson, C., *Anglo-Dutch commerce and finance in the eighteenth century* (Cambridge, 1966).