

Working Papers No. 147/10

The Cost of Living in London, 1740-1834

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October 2010

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Half a century ago, Henry Phelps Brown and his research assistant Sheila Hopkins performed the signal service to economic historians of assembling a mass of data from a wide variety of sources and computing the consumer price index presented in their paper "Seven centuries of the Prices of Consumables compared with Builders' wage rates" (*Economica* Nov. 1956 pp. 296-314.) In this paper I present a new index for 1740-1837 which is conceptually superior to theirs and uses data from a wholly different source but nevertheless has the happy result of confirming that they got it right. Although the construction of my index naturally suffers from the fact that the administrators keeping accounts and drafting minutes in these years took little account of the requirements of economic historians living two centuries later, providing some problems to be solved and others to be skated over, the main message is clear.

The weaknesses of the Phelps Brown Hopkins index are as follows. Firstly, the weights were derived from very sketchy data. Second, because of the paucity of historical retail price data, such prices being ephemeral and rarely recorded, many of the price series used relate not to consumables but to raw materials, to wheat instead of bread and hops instead of corn. Thirdly, arbitrary, though sensible choices were made about substitutions of one commodity for another in response to developments in the British economy and to accommodate price series with limited durations, such fixed base price indexes have the well-known limitation of failing to take account of substitution effects in response to changes in relative prices. Thus their index could well have diverged significantly from an index measuring changes in the cost of preserving a constant standard of living which is what is wanted in principle.

True Cost of Living Indexes

Such an index, as Professor Diewert has famously demonstrated, can be well approximated by what he calls a 'superlative index' such as a Fisher index. However, even when full price and quantity data are available, the conditions necessary for such an index to be calculable and to reflect changes in the true cost of living are not met in practice. Preferences are not homothetic; preferences change (for example between summer and winter); the identical set of items are not purchased in all the times for which prices are to be compared (lamb was not sold in winter and gas was not used for illumination in the eighteenth century).

The notion of indexes measuring changes in the cost of living, which can be used to deflate incomes series, so providing indicators of past movements in the standard of living, is nonetheless appealing and meaningful even though these conditions were not fulfilled. Such indexes can be derived by applying an alternative method. This is to measure directly the evolution of what were the costs incurred in providing for some group of people whose standard of living is known to have remained more or less constant. Such an indicator is not impugned by changes in the composition of expenditure and it can be obtained even in the absence of price data. The results can be applied to deflate the money incomes of other groups if two conditions are fulfilled. One is that the composition of the expenditures of the group in question resembles that of other consumers. The other is that the prices paid for the items consumed by that group move in parallel with the prices paid by those other consumers. So an answer can be sought by finding a group of consumers whose standard of living did not change and ascertaining changes through time in how much it cost to look after them. Such a directly measured constant utility price index is what is presented here.

The index is computed quite simply by following the per capita cost of providing for the children at Christ's Hospital school in over almost a

hundred years. Advantage can be taken of the fact that surviving accounting records and the minutes of the Court of Governors and its committees provide much more extensive expenditure data than price data, though data on the cost of accommodation (rents) are lacking. The expenditures analysed here, on food, beer and milk, candles, soap, medicines, fuel, shoes, clothing and linen covered much the same items as were bought by adult households in the lower urban income groups. The composition of these expenditures incurred in clothing and feeding children cannot have been very different from the composition of such private household expenditures except that there was no payment for rent. Also, except for the lamplighter or tinman, the tailor and the cobbler, the expenditure components examined here include no services, though London households above the poverty level presumably spent some of their income on servants. But insofar as these employers provided their servants' board, this remuneration in kind is included in their expenditures on the components covered. The tradesmen with whom the schools dealt also sold to households, so that even though the schools presumably paid less than the households for wholesale quantities, price movements can be assumed to have been similar.

Children's Living Standards

The procedure followed here rests upon the assumption that the children's standard of living remained more or less constant over the period examined. This may seem to have been refuted by a report by the Clerk to the Committee of Almoners 7/4/1802 which claimed that in the past 20 years "the comforts of the children have been increased and provided for in a most important degree" However this improvement seems to have been largely confined to the way the children were looked after, by their "nurses", and the quality of their accommodation, two

components of the cost of living which do not enter into the data presented here which are limited to provisions and clothing. Thus occasional changes for the better, including new latrines, were recommended by the Almoners' Committee (Guildhall ms 12811). On 25/9/1788 it proposed that two clean shirts per week should be provided all year instead of only during the summer, though this would increase washerwomen's remuneration and expenditure on "sope". On 10/11/1802 it proposed that girls (of whom there were often as few as 60, none in London) should stay till the age of 15, as they would have better prospects in life if permitted to continue their education until that age. At its meeting on 12/10/03 it approved on a trial basis the Physician's recommendation "that the children's feet should be thoroughly washed in warm water at least once a week as a preventative to chilblains". The children no longer sleep two to a bed.

By the standards of the time the children were well looked after, which does not mean that every one of them was happy; the Steward regularly reported to the Almoners' Committee the number of boys who had "eloped" in the past few months, a clear indication of dissatisfaction. (These boys, when brought back, were sentenced to be publicly whipped three times at intervals of a week and sometimes subjected to "close confinement".) Furthermore, according to Coleridge, who was there in the seventeen-eighties, "Our diet was very scanty. Every morning a bit of dry bread and some bad small beer. Every evening a larger piece of bread, and cheese or butter, whichever we liked. For dinner: on Sunday, boiled beef and broth; Monday, bread and butter, and milk and water; Tuesday, roast mutton; Wednesday, bread and butter, and rice milk; Thursday, boiled beef and broth; Friday, boiled mutton and broth; Saturday bread and butter, and peas porridge. Our food was portioned; and, excepting on Wednesdays, I never had a bellyful. Our appetites were damped, never satisfied, and we had no vegetables"(Elia, p.14). However, as today, the

children had tuck too. They could buy fruit and gingerbread in a little shop within the school kept by the Beadles. "Inconvenience having been found from the quantity of food which the children indiscretely purchase, and with which they are indulged by their friends on Leave days, induced the governors to adhere closely to the established diet". (Minutes of Court 8.7.1791) The value of these sales as reported to the Committee of Almoners was of the order of £800 to £1,000 per year

Nevertheless, good or bad, the standard of the "established diet" and of the clothing provided by the Hospital remained astonishingly constant for years on end.

As regards diet, compare the description in a report by the Physician (Minutes of Court 8.7.1791, Guildhall ms 12806) of "the present diet *which has been in use upwards of a century*" (my italics) shown in the middle column, with the third column showing the weekday dinner diet recorded in the Minutes in July 1823, still with meat four times a week. Thereafter, the rice milk was replaced by plum pudding.

Table 1:

	<u>1791</u>	<u>1823</u>
Sunday dinner	Boiled beef and broth	
Sunday supper	Bread & butter	
Monday	Milk pottage with bread & butter	Boiled beef
Tuesday	Roast mutton	Rice Milk
Wednesday	Rice Milk with bread & butter	Roasted Mutton
Thursday	Boiled beef and broth	Boiled Beef
Friday	Boiled mutton & broth	Boiled Mutton
Saturday	Peas pottage with bread & butter	Peas Soup
Weekday suppers	Bread & cheese	

In 1791, and presumably in 1823 too, roast veal was provided twice a year, roast pork once a year, roast beef once a month and new cheese in the season. For breakfast there was one third of a twopenny loaf, and for dinner and supper the same.

The report of 1791 also stated that milk pottage and rice milk and peas pottage were made with an ample allowance of oatmeal. "To this quantity of Vegetables must be added the oatmeal used in the Broth three times a week; and the whole renders the proportion of vegetable diet considerably beyond the Animal Food which they receive.... In some plentiful seasons peas and beans have been supplied as substitutes for Milk, Pottage and Rice milk."

The report concluded that any considerable addition to the diet would "prove prejudicial to the Children's general Good State of Health" though potatoes might be provided when there was roast meat. The Almoners' Committee rejected this proposal. However, eighteen years later it was decided to add them to the diet on Tuesdays at the dinner of roast mutton. In 1816 the Governors agreed to "substitute Plumb Puddings, as at Hertford, for Milk Porridge, which is the present Mondays' dinner for the Boys in London. Then, in January 1824, there was an alteration in the diet of the children in London, the Governors deciding that "in lieu of the small Beer served out to them at Breakfast, they be allowed Milk and Water in such proportions as may thereafter be thought advisable by the Committee of Almoners". These substitutions may have been made in order to reduce costs but were presumably regarded as nutritionally equivalent.

The preservation of the children's standard of living ran into difficulties on the occasion of the extremely poor harvests of 1795 and 1800 when wheat, flour and bread prices rose to unprecedented levels; indeed bread became notably scarce. These movements show up in striking fashion in quarterly data but are somewhat damped in the averages for calendar years overlapping two harvest years. They resulted in temporary substitutions in the composition of the children's diet, as revealed in the Minutes of the Almoners' Committee. In July 1795 the Steward was allowed to alter the diet so as to lessen the consumption of

bread, an alteration which consisted principally of the substitution of rice for bread, saving 177 peck of loaves in six weeks (Minutes 9/12/1795). But on September 16th it was decided that there should be a reversion to "the usual regular diet". An allowance of two guineas was to be paid to the cook "for her extraordinary trouble during the temporary alteration". However in December it became necessary to resort to this measure once again. Also, bread was to consist of two-thirds household flour and one-third barley flour with the bran taken out and potatoes were to be served with the mutton on Tuesdays. Evidently these were not the only price-induced substitution effects, for in April the following year it was noted that the children had grown tired of peas pudding twice a week so bread should be provided instead as before.

Such substitutions restricted the rise in their cost of living to below the increase in a fixed-base index computed with unaltered pre-scarcity weights. Other substitutions, whether price-induced or resulting from the availability of new products had the same effect. Thus, an increased purchase of flour from 1819 restrained the growth of bills from the bakers. A different kind of factor was technical improvement. In June 1797 it was observed that the way meat was dressed was extremely wasteful and that a new grate for roasting would both reduce this waste and save coal, the current situation being that only 320 pounds of roast beef were produced from 518 pounds and 176 pounds of boiled mutton from 256 pounds. Again, the introduction of gas lighting in 1817 reduced the share of expenditure going to the tallow chandler

As regards apparel, the very distinct uniform at Christ's has remained unchanged for centuries, signifying an equally unchanged standard of living. Leigh Hunt in his autobiography p.99 wrote that "Our dress was of the coarsest and quaintest kind, but was respected out of doors, and is so. It consisted of a blue drugget gown, or body, with ample skirts to it; a yellow vest underneath in winter-time, small clothes of

Russia duck; worsted yellow stockings; a leathern girdle; and a little black worsted cap". The gowns were (and are) furnished with silver buttons whose number and position reflects the status of the wearer.

Here too there were some substitution effects; Russian Drab had replaced leather from 1760 onward and no doubt cotton replaced wool to some extent.

The conclusion is that the changes in the annual cost per head of the diet, linen and apparel of Christ's Hospital boys in London do furnish a good first approximation to movements in the cost of living, excluding accommodation and domestic service (e.g. laundering and child care), of a large section of the population of London, an approximation which is conceptually superior to a fixed-weight index. Its coverage is shown in the following table relating to two sub-periods, in the first of which bread prices were particularly high. It will be noted that the classification of expenditures is essentially a classification of tradesmen, since it is the records of payments of bills which furnish the expenditure data.

Table 2:

Christ's Hospital.

Composition of the annual expenditure data used

	Average 1794- 1804	Average 1824- 1834
Baker	22.7%	16.0%
Butcher	16.9%	15.7%
Kerseys (incl. long ells for girls' gowns & tailor 1828)	6.0%	12.9%
Linen (Holland and Dowlas) for sheets, table cloths, towelling	8.1%	6.2%
Cheesemonger (Butter & cheese)	9.0%	5.0%
Shoes including. cobbler's salary	4.8%	6.2%
Breeches (of Russian Drab, leather pre 1759)	3.4%	6.2%
Fuel (Coal and wood)	4.7%	4.8%
Tinwork, Lamplighting, Gas conductors and lights	1.4%	4.8%
Stockings	2.7%	3.5%
Upholstery:- Blankets, Coverlids etc.	2.0%	3.9%

Milk	0.0%	3.5%
Apothecary Medicines & disbursements	2.0%	1.8%
Small Ware (Haberdashery, gloves, worsted)	1.5%	2.0%
Soap	2.5%	0.9%
Brewer	1.5%	1.6%
Coatings, Baize, Green Say	2.7%	0.0%
Corn chandler (Rice, Potatoes)	2.0%	0.5%
Tailor	2.2%	0.3%
Leather girdles	0.5%	1.6%
Grocer	1.2%	0.5%
Tallow chandler	0.8%	0.6%
Flour factor	0.0%	1.0%
Dyer	0.5%	0.2%
Boys' woollen caps	0.4%	0.2%
Salt	0.3%	0.1%
Buttons	0.1%	0.0%

The Data

The annual expenditure data are available in the Treasurers' Ledgers (Guildhall ms 12823) and the Treasurers' Accounts (Guildhall ms 12819). Separate figures are provided for London and Hertford for Provisions (food, fuel, soap, salt, candles), the apothecary and shoes. These are used in conjunction with the figures for the number of children in London to provide the estimates of expenditure per child on these items in London only. Data on expenditures on apparel (clothing and linen) do not distinguish London and Hertford, presumably because these items were supplied to both places by the same tradesmen, so are used in conjunction with figures for the number of children in both places at Easter. The number of children in each calendar year is set at $\frac{3}{4}$ of the number including children with friends or absent on Easter Monday in that year plus $\frac{1}{4}$ of the corresponding number on Easter Monday in the following year (Guildhall ms 12876).

These data allow construction of two series, the first consisting of total expenditure per child in the whole school on apparel (clothing and

linen) and on shoes, the second consisting of London expenditure per London child on provisions (food, beer, milk, fuel, salt, soap, candles and lamplighting) and the apothecary. Domestic service, including laundry costs and the remuneration of the nurses who looked after the children, is omitted, though these do correspond to services consumed by many households. So are the school costs of teaching, expenditure on sand, stationery and books, matron's and steward's disbursements and wine. The work of tradesmen in maintaining the premises has also been omitted, though expenditures on the tinman, lamplighting and gas conductors and lights have been included within London Provisions. It will be noted that the classification of expenditures is essentially a classification of tradesmen, the records of payments of bills constituting the expenditure data.

Few of these data come from statistical tables; most come from annual accounts or have been extracted from periodic entries in registers or the minutes of governing bodies. The classifications employed did not all remain constant through time, and some entries and some documents are missing. The result is that some of the expenditure series used contain gaps. It appears best to fill these gaps. A comparison of expenditures in years y , $y+1$ and $y+2$, where one component is missing just for $y+1$, will show a misleading change from y to $y+1$ and from $y+1$ to $y+2$. Yet to leave out that component for all three years would be to waste valuable data. It is therefore preferable to impute a value for that component in $y+1$ by interpolation. Such interpolated values can be estimated for a one year gap as the mean of the values for the encompassing years y and $y+2$. For a longer gap, the value can be extrapolated forward proportionately to the movement of all the continuously recorded components, so that this determines the movement of the estimated grand total during the gap period. On the other hand, some longer gaps may indicate suspension of purchase for a

few years; I have assumed this to be the case for some of the 1804-37 expenditure series

These procedures cannot be applied where a component is missing for the initial years of the data set up to year y . An index up to and including year y could then be calculated as the movement of expenditure for all the continuously recorded components up to and including year y , linked to an index calculated as the movement of the larger total starting in year y . This would be equivalent to filling the gap by reinterpolating the missing component back to the beginning proportionately to the movement of all the continuously recorded components and then computing the index as the movement of the grand total. On the other hand, it may be that expenditure on a component had previously been incorporated in another item. There is no way of telling whether this was the case; these rather messy eighteenth century accounts lack explanatory notes! I have given the benefit of the doubt to their compilers, assuming that they got the totals right.

There are some cases where an expenditure component displays a marked seesaw pattern. It may be reasonable to suppose that these result from fluctuations in the timing of the payments or receipt of bills, rather than from year to year fluctuations in the volume of consumption. Similar fluctuations may arise in the case of expenditure components comprising semi-durable items such as linen, shoes and some clothing, where expenditure need not be made every year. Whereas dowlas for shirts and shifts and yarn for stockings were bought annually, white aprons, sheeting and pillow cases, for example, were bought every four years. In such cases, even when there are no missing observations for the component, some smoothing is desirable; use of the following rather mild smoothing formula $x_t = \frac{1}{4}x_{t-1} + \frac{1}{2}x_t + \frac{1}{4}x_{t+1}$ goes some way towards adjusting for this. Christ's Hospital total expenditures on apparel and shoes have been smoothed in this way. But the expenditures on

provisions have not been similarly smoothed, for some of them obviously reflect the timing of sharp price fluctuations. Others probably do not. The expenditures shown in the following example suggests this.

Table 3:

Year	Corn Chandler (Rice & Potatoes)	Soap	Salt and oil	Apothecary
1752	£34.8	£160	£13.17	£177.9
1753	£0	£74.8	£56.15	£88.8
1754	£73.9	£232	£56.325	£166.7

Less medicine may have been provided by the apothecary in 1753, but at least in the other three cases it seems likely that there were some divergences between the year of deliveries or payments and the year of consumption.

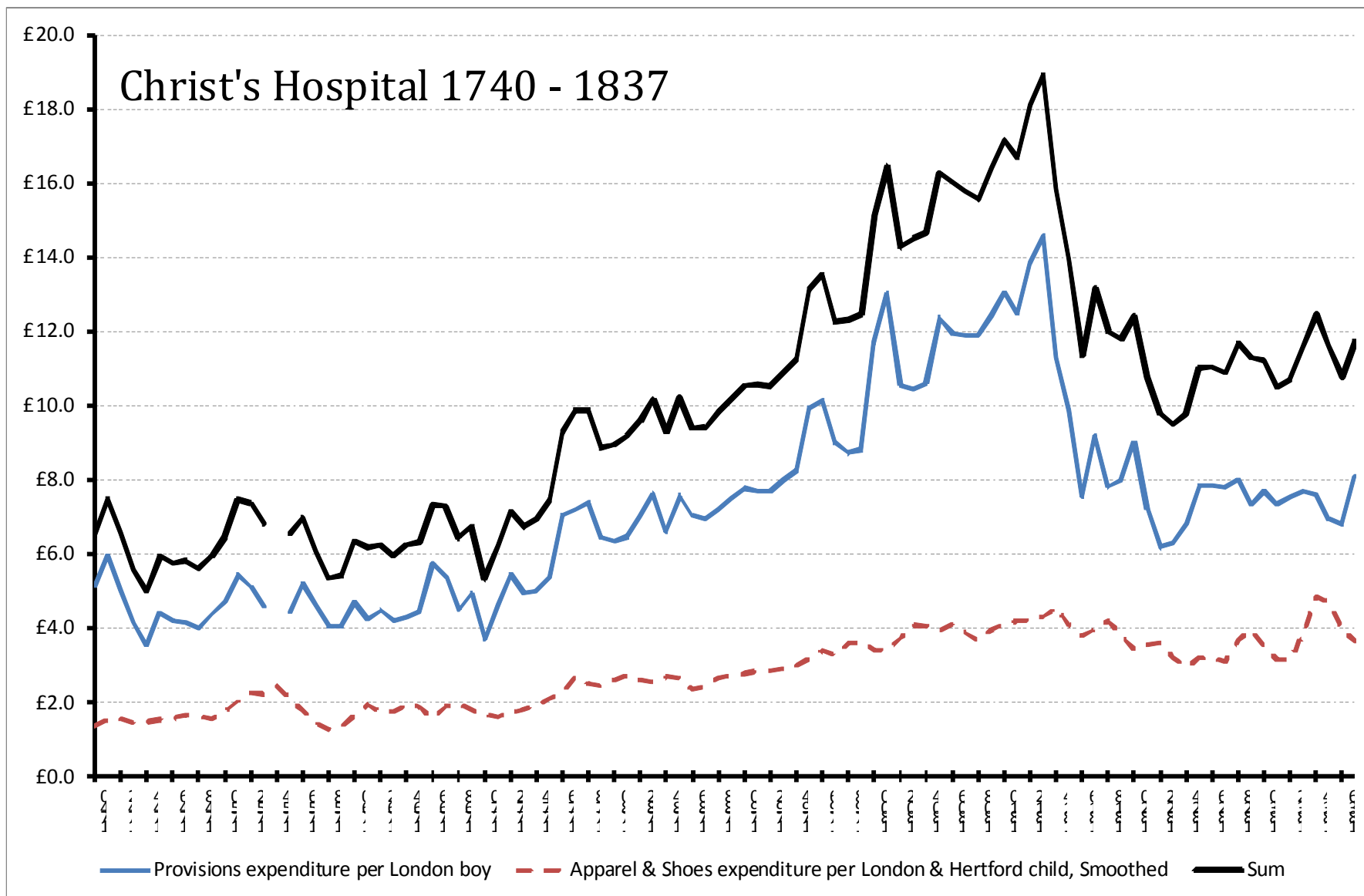
The Index

The results of this exercise are displayed in the accompanying chart and table. The chart's dotted line shows smoothed apparel and shoes expenditure per child for both London and Hertford; The line above shows provisions expenditure per London boy and the thick line shows their total.

Table 4:

	Provisions expenditure per London boy	Apparel & Shoes expenditure per London & Hertford child, Smoothed	Sum		Provisions expenditure per London boy	Apparel & Shoes expenditure per London & Hertford child, Smoothed	Sum
1740	£5.1	£1.4	£6.5	1789	£7.5	£2.7	£10.2
1741	£6.0	£1.5	£7.5	1790	£7.8	£2.8	£10.6
1742	£5.0	£1.5	£6.6	1791	£7.7	£2.8	£10.6
1743	£4.1	£1.4	£5.6	1792	£7.7	£2.8	£10.5
1744	£3.5	£1.5	£5.0	1793	£8.0	£2.9	£10.9
1745	£4.4	£1.5	£5.9	1794	£8.3	£3.0	£11.2
1746	£4.2	£1.6	£5.8	1795	£10.0	£3.2	£13.1
1747	£4.2	£1.6	£5.8	1796	£10.1	£3.4	£13.5
1748	£4.0	£1.6	£5.6	1797	£9.0	£3.3	£12.3
1749	£4.4	£1.5	£5.9	1798	£8.7	£3.6	£12.3
1750	£4.7	£1.7	£6.5	1799	£8.8	£3.6	£12.5
1751	£5.4	£2.0	£7.5	1800	£11.7	£3.4	£15.1
1752	£5.1	£2.2	£7.4	1801	£13.0	£3.4	£16.5
1753	£4.6	£2.2	£6.8	1802	£10.6	£3.7	£14.3
1754		£2.4		1803	£10.4	£4.1	£14.5
1755	£4.4	£2.1	£6.6	1804	£10.6	£4.1	£14.7
1756	£5.2	£1.8	£7.0	1805	£12.4	£3.9	£16.3
1757	£4.6	£1.5	£6.1	1806	£11.9	£4.1	£16.0
1758	£4.1	£1.3	£5.3	1807	£11.9	£3.9	£15.8
1759	£4.1	£1.3	£5.4	1808	£11.9	£3.7	£15.6
1760	£4.7	£1.7	£6.4	1809	£12.5	£4.0	£16.4
1761	£4.2	£1.9	£6.2	1810	£13.1	£4.1	£17.2
1762	£4.5	£1.8	£6.2	1811	£12.5	£4.2	£16.7
1763	£4.2	£1.7	£5.9	1812	£13.9	£4.2	£18.1
1764	£4.3	£1.9	£6.3	1813	£14.6	£4.3	£18.9
1765	£4.4	£1.9	£6.3	1814	£11.3	£4.6	£15.8
1766	£5.8	£1.6	£7.3	1815	£9.9	£4.1	£14.0
1767	£5.4	£1.9	£7.3	1816	£7.6	£3.8	£11.3
1768	£4.5	£1.9	£6.4	1817	£9.2	£4.0	£13.2
1769	£4.9	£1.8	£6.7	1818	£7.8	£4.2	£12.0
1770	£3.7	£1.6	£5.3	1819	£8.0	£3.8	£11.8
1771	£4.6	£1.6	£6.2	1820	£9.0	£3.4	£12.4
1772	£5.4	£1.7	£7.2	1821	£7.2	£3.6	£10.8
1773	£5.0	£1.8	£6.7	1822	£6.2	£3.6	£9.8
1774	£5.0	£1.9	£6.9	1823	£6.3	£3.2	£9.5
1775	£5.4	£2.1	£7.5	1824	£6.8	£3.0	£9.8

1776	£7.1	£2.2	£9.3	1825	£7.8	£3.2	£11.0
1777	£7.2	£2.7	£9.9	1826	£7.9	£3.2	£11.1
1778	£7.4	£2.5	£9.9	1827	£7.8	£3.1	£10.9
1779	£6.4	£2.4	£8.9	1828	£8.0	£3.7	£11.7
1780	£6.4	£2.6	£9.0	1829	£7.3	£4.0	£11.3
1781	£6.5	£2.7	£9.2	1830	£7.7	£3.5	£11.2
1782	£7.0	£2.6	£9.6	1831	£7.3	£3.2	£10.5
1783	£7.6	£2.5	£10.2	1832	£7.6	£3.1	£10.7
1784	£6.6	£2.7	£9.3	1833	£7.7	£3.9	£11.6
1785	£7.6	£2.7	£10.2	1834	£7.6	£4.9	£12.5
1786	£7.0	£2.3	£9.4	1835	£6.9	£4.7	£11.6
1787	£7.0	£2.5	£9.4	1836	£6.8	£4.0	£10.8
1788	£7.2	£2.7	£9.9	1837	£8.1	£3.6	£11.7



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