

**ENGLISH GROSS DOMESTIC PRODUCT, 1300-1700: SOME
PRELIMINARY ESTIMATES**

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Abstract: We provide annual estimates of GDP for England over the period 1300-1700, constructed from the output side. The GDP data are combined with population estimates to calculate GDP per capita. Estimates of nominal GDP are also provided by combining the volume series with a price index, based on a benchmark for 1688. Previous studies, based on the analysis of daily real wages, have found no trend growth over the period as a whole. In contrast, we find per capita income growth of 0.13 to 0.16 per cent per annum, with the strongest growth after the Black Death and in the second half of the seventeenth century. The modest trend growth in per capita income can be reconciled with the stability of real daily wages because of an “industrious revolution”, increasing the days worked per year. The positive growth of per capita income is also consistent with the evidence of rising personal wealth from probate inventories.

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I. INTRODUCTION

There are two conflicting views of the long run development of living standards in the English economy. One view, which is based largely on real wage evidence, paints a bleak picture of long run stagnation from the late thirteenth century to the middle of the nineteenth century, albeit with quite large fluctuations over sustained periods (Phelps Brown and Hopkins, 1981). This view has recently been supported by Clark (2005), who provides a real wage series which shows less extreme fluctuations than that of Phelps Brown and Hopkins, but leaves the trend unchanged. Furthermore, Clark (2007) adds new time series for land rents and capital income to arrive at a picture of long run stagnation in GDP per head. This view sits uneasily with evidence accumulated from the output side of the economy and from estimates of wealth, which appear to show modest but sustained growth of living standards between the middle ages and the Industrial Revolution. In particular, the output trends of agriculture, the largest sector of the economy at this time, show rising labour productivity as workers shifted into industry and services, where value added was higher and growth more rapid (Overton and Campbell, 1996). In addition, probate inventories show steadily rising wealth per capita, spread widely across social classes, and not just restricted to the very rich (Overton, Whittle, Dean and Haan, 2004).

This paper, together with Broadberry and van Leeuwen (2008) represents a first attempt to arrive at estimates of British GDP over the period 1270-1850, built up from the output side, and to provide a reconciliation with the daily wage data which underpins the stagnationist view. The key to reconciling the two approaches is the changing number of days worked per year, so that annual real wages grew while daily real wages stagnated. Hence, as van Zanden (2006) shows, it is possible to reconcile

growing GDP per head measured from the output side with stagnating daily real wages. This is what de Vries (1994) calls the “industrious revolution”, with workers toiling to obtain the new consumer goods which were increasingly showing up in the probate inventories. The reconciliation of the output and income approaches is also pursued for the agricultural sector by Allen (2005), using contemporary estimates of the length of time required for specific tasks, combined with wage rates.

The paper proceeds as follows. Sections II to IV describe the procedures for estimating output in agriculture, industry and services, respectively. Section V then aggregates the sectoral outputs into real GDP and combines this with data on population to derive estimates of per capita GDP. In section VI, real GDP is reflatd with a price index to provide a measure of nominal GDP, which can be compared with benchmark estimates by other authors. Section VII then explores the consistency between the output and income approaches, particularly in the agricultural sector, where the best evidence is available. Section VIII presents evidence on wealth, which provides a further consistency check on the GDP estimates.

II. AGRICULTURAL PRODUCTION

1. Arable farming

The starting point for arable production is the work of Overton and Campbell (1996), the Medieval Accounts Database assembled by Campbell (2000; 2007) and the Early Modern Probate Inventories Database constructed by Overton (2006) and Overton, Whittle, Dean and Haan (2004), which provide the sown acreage for the principal crops and yearly information on the yields per acre net of seed. These are presented

here in panels A and B of Table 1 and multiplied together to yield the outputs in panel C.

Finally, we need to make an allowance for the consumption of oats and pulses by animals working on the farms. The number of working horses and oxen per sown acre is taken from the Medieval Accounts Database and the Early Modern Probate Inventories Database. We assume that a mature horse consumed 16 bushels of oats per year, and a mature ox 2.72 bushels on demesnes (Allen, 2005; Langdon, 1982; 1986). These per head consumption figures fluctuate slightly in line with changes in the share of immature animals. Following Apostolides *et al* (2008), we also allow for the fact that immature animals consumed less than mature animals that the consumption of oats in the non-demesne sector was less than in the demesne sector. For pulses, we followed Allen (2005) in subtracting 27 per cent for consumption by animals in 1700 and 50 per cent in earlier years.

Although there are differences for individual crops in particular years, the picture of the arable sector presented here is broadly in line with that of Allen (2005) for benchmark years, but with the advantage that we provide annual estimates. The volumes obtained from Table 1 are multiplied by the prices of individual products to yield production values. The prices are taken largely from Clark (2004), who synthesises the published data from Beveridge (1939), Thorold Rogers (1886-1902) and the multi-volume *Agrarian History of England and Wales*, as well as integrating new archival evidence

2. Pastoral farming

A similar procedure is used to estimate pastoral production, although here there is less agreement in the literature over the most important magnitudes. In Table 2, we report in panel A our estimates of the number of non-working animals, drawn from the Medieval Accounts Database and the Early Modern Probate Inventories Database. Panel B presents our estimates of the yield per animal, drawn from a number of sources, including Campbell (2000), Allen (2005) and Clark (1991). To derive the output estimates in panel C, it is necessary to work out the number of animals slaughtered each year. Here, we start from the assumption of Holderness (1989: 147) that each year a quarter of the stock of cattle and sheep and all pigs, apart from those retained for breeding, was slaughtered. This was modified with estimates for 1300 from Clark (1991). The volume of milk produced is used to derive the output of the dairy sector.

Additional assumptions were needed to derive the output of hay for non-farm animals and hides for leather in Table 3. For hay, the number of non-farm horses is combined with an assumption of 2.4 tons of hay per horse from Allen (1994: 102). The number of non-farm horses is obtained from Allen (1994: 102) for 1700 and Wrigley (2006: 450) for 1300. Between 1300 and 1425, we assumed that non-farm horses grew in line with farm horses from Campbell (2000). Hides are derived from slaughtered cattle, horses, oxen and sheep, with yields from Clark (1991: 216) and Clarkson (1989: 470).

As with arable production, the volumes of pastoral production can be multiplied by the prices of individual products from Clark (2004) to yield production values. Note that for the dairy sector, total milk production is divided between cheese,

butter and fresh milk on the basis of assumptions derived from Biddick (1989) and Holderness (1989).

3. Total agricultural output

Total agricultural output is calculated as a weighted volume index of the individual arable and pastoral products, using the 1700 net value shares shown in Table 4. Table 5 presents data on average annual growth rates of agricultural output over 50-year periods between 1300 and 1700, calculated using 5-year averages. Agricultural output showed a downward trend between 1300 and 1400, followed by stagnation in the first half of the fifteenth century and a return to mildly positive growth after 1450. The first half of the seventeenth century saw a levelling off in the volume of agricultural output, but with a return to growth in the second half of the century. Over the four centuries, agricultural output grew at an annual rate of 0.14 per cent. Figures have been reported for the period 1300-1348 as well as for 1300-1350, since the Black Death caused an exceptionally sharp drop in arable output during 1349-50.

Figure 1 plots the output of arable and pastoral agriculture over the whole period 1300-1700. Between 1300 and 1400, both arable and pastoral output declined, while between 1400 and 1500, arable output remained more buoyant than pastoral output. After 1600, arable and pastoral output grew together. As a result, the share of the pastoral sector in current prices remained more or less constant between 1300 and 1700, shown in Figure 2A. In Figure 2B, however, we see that the share of the pastoral sector in constant prices increased between 1300 and 1700. This is explained by the falling price of pastoral output relative to arable output, shown here in Figure 3.

III. INDUSTRIAL PRODUCTION

For the period before 1700, it is possible to obtain volume measures of some of the key industries, including woollen textiles, iron, coal, tin and books. Exports of wool and woollen cloth are given by Carus-Wilson and Coleman (1963) for the period 1280-1554. However, the export of wool is negatively related to the export of cloth, so we use the production of wool from agriculture minus wool exports as an indicator of the woollen textile industry. King (2005) provides data on bar iron production for the period 1490-1700. The output of coal in the 1560s and circa 1700 is taken from Hatcher (1993: 68), interpolated using shipments of coal from Newcastle, taken from Nef (1932: 380-381). Book production is measured by the index of new English language book titles obtained from the English Short Title Catalogue (<http://www.rlg.org/estc.html>). Tin output is available on an annual basis for the whole period from 1300 with relatively few gaps, from Hatcher (1973: 156-159) and Mitchell (1988: 303-304).

We provide two indices of industrial production, using the weighting schemes shown in Table 6. For Index 1, the weights are taken from Broadberry, Földvári and van Leeuwen (2006), based on Hoffmann (1955), with an allowance for the printing industry. However, this index makes no allowance for the food and building industries, and therefore most likely overstates the growth rate for industry as a whole by over-weighting rapidly growing sectors such as iron, coal and books. This is countered in Index 2 by the inclusion of food processing, assumed to grow in line with agricultural output, and building, assumed to grow in line with population.

Table 7 presents data on industrial growth rates over fifty year periods. As in agriculture, there was a sharp increase in the growth rate of the industrial sector after 1500 and a clear deceleration during the second half of the seventeenth century. Both movements are clearly visible in Figure 4, and apply equally to both series.

IV. SERVICES

Our treatment of the service sector is inspired by the approach of Deane and Cole (1967), who broke eighteenth century services down into government, commerce, and housing and other services. For government, we use an 11-year moving average of real government revenue from O'Brien and Hunt (1999), which is available for the whole period from the European State Finance Database at <http://www.le.ac.uk/hi/bon/ESFDB/frameset.html>. We follow Deane and Cole in assuming that commerce grew in line with industry, which means that we have two variants of the service sector output index, depending on whether we use Index 1 or Index 2. Housing and other services are assumed to grow in line with population, as in Deane and Cole.

The weights for services are shown in Table 8, and are taken from the 1688 shares in Crafts (1985: 16). The resulting series for total service sector output are plotted in Figure 5, and the growth rates presented in Table 9. Because of the importance of housing and other services, which are assumed to move in line with population, total service sector output trended downwards between 1300 and 1500, before picking up strongly between 1500 and 1650. The fall in the growth rate during the second half of the seventeenth century was less pronounced than in industry or

agriculture. These trends are equally apparent in both Index 1 and Index 2, graphed here in Figure 5.

V. REAL GDP, POPULATION AND GDP PER CAPITA

It is now possible to construct an index of real GDP from the above series for agriculture, industry and services, using the sectoral weights from Crafts (1985) for circa 1700, shown here in Table 10. The resulting series can be used to calculate growth rates over 50-year periods, presented in Table 11. Again, there are two series, depending on whether we use Index 1 or Index 2 in industry (and hence also in services). Again, both series show similar patterns, with GDP falling slightly between 1300 and 1500, before showing strong growth between 1500 and 1650 and slower growth between 1650 and 1700. Over the whole period 1300-1700, the English economy averaged a growth rate of between 0.18 and 0.21 per cent per annum.

Ultimately, we are interested in what happened to GDP per capita, the most widely accepted indicator of material living standards over the long run. Although the population of England has been firmly reconstructed by Wrigley and Schofield (1989) and Wrigley, Davies, Oeppen and Schofield (1997) for the period since the compulsory registration of births, marriages and deaths, estimates before 1541 are more speculative. The data in Table 12 are based on the estimates of Wrigley, Davies, Oeppen and Schofield (1997), interpolated using Wrigley and Schofield (1989) for the period 1600-1871 and Overton and Campbell (1996) for earlier years. We have taken the mean of the Overton and Campbell estimates, which were reported on the basis of upper and lower bounds. Additional observations have been added between 1300 and 1380 by interpolation using assumptions derived from the literature. This involves the

assumption of a slow rate of decline in the population, punctuated by the dramatic decline of the Black Death years 1348-51 and a number of smaller crises. It should be noted that these population estimates are at the lower end of the range of possibilities that have been suggested for the end of the thirteenth century, with Hatcher (1977) and Smith (1991) arguing for a population of 6 million around 1300, compared with the range of 4.0 to 4.5 million suggested by Overton and Campbell (1996). However, as Overton and Campbell (1996) point out, such a high population estimate has implications for other variables such as land use, crop combinations, yields and kilocalorie extraction rates and the share of the population living in towns, which would be hard to square with other evidence.

Combining the population data with the real GDP series produces our estimates of GDP per capita growth in Table 13. Again there are two series depending on whether Index 1 or Index 2 is used for industry. The trend is of modest positive per capita income growth throughout the period 1300-1700, at a rate of between 0.13 and 0.16 per cent per annum. We find that GDP per capita was almost constant up to 1348, but received a sharp boost with the Black Death, and continued to grow during the rest of the fourteenth century. Per capita incomes continued to grow quite modestly between 1400 and 1550. Between 1550 and 1650, per capita incomes declined slightly before returning to growth in the second half of the seventeenth century. These trends can also be seen in Figure 9, which plots GDP per capita on both linear and logarithmic scales.

VI. PRICES AND NOMINAL GDP

Real GDP can be converted to current prices by reflatting the volume index by a price index. The base year is 1688, where we have used the nominal value of GDP from Snooks (1995: 50). This is taken from Lindert and Williamson (1982: 389), adjusted onto an England only basis in line with the relative populations of England and Wales. Estimates in Table 14 use two different price deflators, taken from Clark (2006) and Phelps Brown and Hopkins (1981). The estimates using the Clark (2006) deflator produce an estimate of GDP in 1300 which is higher than the independent benchmark estimates of Snooks (1995) and Mayhew (1995). However, using the Phelps Brown/Hopkins price deflator, the situation is less clear-cut. Using GDP1, our estimate of nominal GDP in 1300 is lower than suggested by both Snooks and Mayhew. However, if we use GDP2, our estimate for 1300 falls between those of Snooks and Mayhew.

VII. OUTPUT AND INCOME BASED MEASURES

Figure 10 charts the level of real wages between 1300 and 1700, which can be compared with the level of GDP per capita in Figure 10A. Note that while the real wage series is stationary, our estimates suggest positive trend growth of around 0.2 per cent per annum in per capita GDP between 1300 and 1700. We now investigate the compatibility between our output-based estimates and the real wage data. One possibility is simply that payments to other factors grew very rapidly, so that there was a sharp redistribution of income away from labour. However, there is no evidence to suggest that this was the case, and indeed it has never been seriously suggested in the literature. We are thus left with the possibility that the daily real wage is not a good guide to the annual earnings of workers because of an increase in the number of days worked per year. This idea has been argued most forcefully by de Vries (1994),

who coined the term “Industrious Revolution” to describe the extra effort made by workers to increase their incomes in order to purchase the growing variety of consumer goods appearing during the early modern period.

The quantitative implications of this approach have been explored by van Zanden (2005) in the context of a Cobb-Douglas production function, which has the property of maintaining constant factor shares. For the period 1500-1800, van Zanden shows that it is possible to reconcile a 20 per cent fall in the real wage with a doubling of annual per capita income so long as there was a substantial increase in the number of days worked per year. Without the increase in the number of days worked, the share of wages in national income would have fallen sharply. Starting from the initial assumption of a constant 50 per cent of the population working, van Zanden shows that the days worked per year must have increased from 200 to 350. It has been suggested by de Vries (1993: 110-111) that the number of feast days lost following the reformation was of the order of 50, while Voth (1998) argues for the loss of a further 50 holidays with the decline of “St. Monday”. However, it seems unlikely that most male labourers worked more than 300 days, so some of the extra days worked must have come from the increased labour supply of women and children.

The evidence on changes in the number of days worked and the reconciliation between output-based and income-based measures is most fruitfully pursued in the context of the agricultural sector, where the evidence is most abundant. In the national accounting framework, the value of net output should equal the value of the factor payments to labour, land and capital. Starting on the income side, to calculate payments to labour, we need data on daily wages and the number of days worked. The

agricultural population in Table 12 is taken from Overton and Campbell (1996), who start with the total population and subtract estimates of the urban and the rural non-agricultural population. This is converted into the number of agricultural families in Table 15 on the assumption that the average family consisted of two adults and 2.5 children (Allen, 2005). Allen then calculates the number of days needed to produce the output and divides this by the number of families to arrive at the days worked per family. We are close to Allen's figures for days worked per family in 1300 and 1700, but not for 1500, for two reasons. First, our estimate of output in 1500 is substantially lower than that of Allen, who finds that despite a halving of the population, agricultural output increased between 1300 and 1500. Second, the substantial increase in days worked which Allen requires would be hard to square with most accounts of the response to the Black Death, which suggest a decline in labour intensity (Bowden, 1967: 593-594). We thus find a substantial increase in days worked per family between 1500 and 1700, consistent with an "industrious revolution". Following Burnett (2004), we correct the male daily wage for the percentage women working and their daily wages.

Panel B of Table 15 requires data on rents and total acreage. Rents are obtained from the data of Clark (2002) and Turner, Beckett and Afton (1997). The acreage has to include pasture and meadow as well as arable land, and the former two are taken from Allen (2005). Capital costs and tithes and taxes for benchmarks are also taken from Allen (2005). Adding together wages, rents, capital income and tithes and taxes yields the total incomes in Panel C, which matches reasonably well the value of output.

VIII. WEALTH AND THE NATIONAL BALANCE SHEET

Table 16 presents data on probate inventory totals for Cornwall, Hertfordshire, Kent, Lincolnshire and Worcestershire, which are used by Overton (2006) to make inferences about what was happening to personal wealth in England between 1550 and 1750. The figures have been adjusted for the omission of the poorest 40 per cent of the distribution, who were assumed to have wealth of £1. Given the high degree of positive skewness and inequality in the distribution, indicated by the Pearson measure of skewness and the Gini coefficient, respectively, the median provides the best indicator of the path in average wealth at death. Over the period of two centuries covered, median wealth approximately doubled, from £11.31 to £22.35 in constant prices. This represents an annual growth rate of 0.34 per cent per annum. This is a bit higher than the growth of real per capita income, but in the same ballpark.

Interestingly, looking at the subperiods, we find a decrease in per capita wealth between 1550 and 1620, almost exactly in the period when per capita GDP also had a slightly negative trend. For both wealth and per capita GDP, this trend became positive afterwards.

IX. CONCLUSION

This paper provides annual estimates of GDP for England over the period 1300-1700, constructed from the output side. Previous studies, based on the analysis of daily real wages, have found no trend growth over the period as a whole. In contrast, we find per capita income growth of 0.13 to 0.16 per cent per annum, with the strongest growth after the Black Death and in the second half of the seventeenth century, and weaker but generally positive growth between 1400 and 1550, while the period of population growth between 1550 and 1650 was characterised by slightly negative per

capita growth. The modest trend growth in per capita income can be reconciled with the stability of real daily wages because of an “industrious revolution”, increasing the number of days worked per year. The positive growth of per capita income is also consistent with the evidence of rising personal wealth from probate inventories. Combined with the annual series for Great Britain from Broadberry, Földvári and van Leeuwen (2006), it is now possible to track the transition to modern economic growth in Britain using annual data for the whole period 1300-1850. The Industrial Revolution is seen to be the culmination of a long process of economic development and structural change, building on foundations laid in the fourteenth and seventeenth centuries, as well as developments in the eighteenth and nineteenth centuries.

TABLE 1: Output in arable farming

A. Land use (millions of acres)							
	Wheat	Rye/Maslin	Barley/Dredge	Oats	Pulses	Other/ fallow	Total arable
1300	2.22	0.50	1.05	2.62	0.37	3.77	10.53
1380	1.52	0.30	1.01	1.55	0.39	3.22	7.98
1420	1.26	0.25	0.94	1.31	0.36	2.97	7.09
1600	1.72	0.71	1.34	1.22	0.57	2.68	8.23
1700	1.87	0.40	1.71	1.08	0.92	3.01	9.00

B. Yield net of seed (bushels per acre)					
	Wheat	Rye	Barley	Oats	Pulses
1300-1349	8.24	10.36	9.46	6.60	6.14
1350-1399	7.46	9.21	9.74	7.49	5.86
1400-1449	5.89	10.46	8.44	6.55	5.42
1450-1499	6.48	13.96	8.56	5.95	4.49
1550-1599	7.88	9.21	8.40	7.87	7.62
1600-1649	10.45	16.28	11.16	10.97	8.62
1650-1699	11.36	14.19	12.48	10.82	8.39

C. Output net of seed (million bushels)					
	Wheat	Rye	Barley	Oats	Pulses
1300-1349	16.37	4.45	9.77	14.71	2.29
1350-1399	11.60	2.89	9.78	12.05	2.23
1400-1449	7.68	2.87	8.15	8.73	1.99
1450-1499	8.95	5.82	7.96	7.65	1.82
1550-1599	12.93	5.31	10.73	9.34	4.11
1600-1649	18.37	7.26	16.13	12.91	5.51
1650-1699	20.85	6.30	20.47	11.79	8.02

D. Output net of seed and animal consumption (million bushels)		
	Oats	Pulses
1300-1349	11.91	1.15
1350-1399	9.54	1.12
1400-1449	5.84	1.00
1450-1499	4.18	0.91
1550-1599	5.03	2.42
1600-1649	7.47	3.54
1650-1699	4.58	5.60

Sources: Derived from the acreages, gross yields and seed rates in Overton and Campbell (1996), the Medieval Accounts Database and the Early Modern Probate Inventories Database. For consumption of oats and pulses by animals, see text.

TABLE 2: Output in pastoral farming, non-working animals

A. Number of non-working animals (millions)						
	Milk cattle	Beef cattle	Calves	Sheep	Pigs	
1300-1349	0.59	0.53	0.59	13.66	0.92	
1350-1399	0.45	0.41	0.45	14.67	0.39	
1400-1449	0.26	0.24	0.26	15.13	0.34	
1450-1499	0.36	0.33	0.36	13.41	0.35	
1550-1599	0.65	0.58	0.65	14.05	0.94	
1600-1649	0.71	0.64	0.71	16.07	1.13	
1650-1699	0.85	0.77	0.85	17.31	1.50	

B. Yield per animal						
	Milk (gals)	Beef (lb)	Veal (lb)	Mutton (lb)	Pork (lb)	Wool (lb)
1300-1349	107.01	177.90	30.73	23.17	65.29	1.77
1350-1399	122.69	199.73	34.54	25.75	67.99	1.62
1400-1449	140.67	224.23	38.83	28.60	70.81	1.38
1450-1499	161.28	251.74	43.65	31.78	73.74	1.32
1550-1599	212.01	317.30	55.15	39.22	79.97	1.79
1600-1649	243.07	356.23	61.99	43.57	83.28	2.08
1650-1699	278.69	399.93	69.68	48.41	86.73	2.42

C. Percentage of animals producing						
	Milk	Beef	Veal	Mutton	Pork	Wool
1300	100	25	15.18	26	49	100
1420	100	25	17.54	26	49	100
1600	100	25	21.07	25	76.86	100

D. Output						
	Milk (m gals)	Beef m lb)	Veal (m lb)	Mutton (m lb)	Pork (m lb)	Wool (m lb)
1300-1349	62.77	23.42	2.82	82.15	29.27	23.92
1350-1399	55.36	20.25	2.59	98.04	12.93	24.00
1400-1449	37.21	13.32	1.81	112.75	11.97	20.88
1450-1499	58.13	20.41	2.93	110.06	13.35	17.57
1550-1599	136.59	46.10	7.30	140.52	49.72	25.68
1600-1649	170.49	56.41	9.36	174.72	71.40	33.32
1650-1699	235.75	76.44	13.27	209.50	105.92	41.85

Sources: Animal numbers derived from the Medieval Accounts Database, the Early Modern Probate Inventories Database, Allen (2005) and John (1989). Yields per animal derived from Clark (1991), Allen (2005) and Stephenson (1988). Percentages of animals producing are from Holderness (1989), Clark (1991) and Ecclestone (1996).

TABLE 3: Output in pastoral farming, working animals

A. Number of working animals (millions)						
	Total horses	Non-farm horses	Oxen			
1300-1349	0.24	0.05	0.37			
1350-1399	0.19	0.04	0.26			
1400-1449	0.23	0.04	0.14			
1450-1499	0.23	0.04	0.14			
1550-1599	0.25	0.05	0.17			
1600-1649	0.30	0.06	0.17			
1650-1699	0.40	0.09	0.11			

B. Consumption of hay by non-farm horses	
	Million tons
1300	0.11
1325	0.09
1350	0.10
	0.11
1375	
1400	0.12
1425	0.15
1700	0.22

C. Output of hides from working and non-working animals (million lb)						
	Horses (m. lb)	Oxen (m. lb)	Cattle (m. lb)	Calves (m. lb)	Sheep (m. lb)	Hides (m. lb)
1300-1349	0.66	1.84	7.41	0.74	3.69	14.34
1350-1399	0.54	1.33	5.70	0.60	3.97	12.14
1400-1449	0.63	0.71	3.31	0.37	4.09	9.12
1450-1499	0.66	0.67	4.55	0.54	3.63	10.05
1550-1599	0.75	0.92	8.91	1.15	4.39	16.12
1600-1649	0.96	0.98	10.32	1.38	5.47	19.11
1650-1699	1.45	0.78	14.04	1.94	7.35	25.55

Sources: Non-farm horses for 1300 from Wrigley (2006), and for 1700 onwards from Allen (1994) and Feinstein (1978). All other years obtained by interpolation on the basis of the number of farm horses. Oxen from Campbell (2000). The assumption that each horse consumed 2.4 tons of hay per year is taken from Allen (1994). Hide yields from Clark (1991), Ecclestone (1996) and Clarkson (1989: 470).

TABLE 4: Agricultural output weights**A. Arable products**

Year	Wheat	Rye	Barley	Oats	Pulses	Total arable products
1300	20.1	2.5	6.7	6.1	1.1	36.4
1380	17.7	2.0	13.2	5.8	1.5	40.2
1420	11.8	1.8	8.3	2.9	1.1	25.9
1600	12.9	4.6	6.4	2.1	2.2	28.2
1700	22.5	3.4	11.2	1.0	3.6	41.8

B. Pastoral products

Year	Dairy	Beef	Pork	Mutton	Hay	Wool	Hides	Total pastoral products
1300	8.1	2.2	21.4	13.9	0.7	15.8	1.3	63.6
1380	6.4	2.0	11.9	19.4	0.9	18.6	0.7	59.8
1420	4.6	1.3	14.9	29.1	1.6	20.7	1.9	74.1
1600	12.5	3.4	31.9	10.6	1.2	10.3	1.9	71.8
1700	13.9	3.8	19.0	10.6	3.1	6.5	1.4	58.2

Source: Derived from volumes in Tables 1-3 and prices from Clark (2004).

TABLE 5: Output growth in agriculture in constant 1700 prices (5-year moving averages)

	Arable sector (% <i>per annum</i>)	Pastoral sector (% <i>per annum</i>)	Total agriculture (% <i>per annum</i>)
1300-1350	-1.52	-0.09	-0.68
1300-1348	-1.05	-0.26	-0.68
1348-1400	-0.08	-0.52	-0.29
1400-1450	-0.22	0.27	0.02
1450-1475	0.76	0.09	0.42
1475-1555	0.20	0.39	0.29
1555-1600	0.34	0.48	0.42
1600-1650	-0.64	0.56	0.09
1650-1700	1.15	0.02	0.42
1300-1700	0.04	0.24	0.14

Source: Derived from Appendix 1. Growth rates calculated using 5-year averages.

TABLE 6: Industrial output weights in 1739-1761 (%)

	Index 1	Index 2
Tin	1.2	0.9
Iron	13.4	5.6
Books	9.8	4.4
Coal	9.6	4.0
Woollens	66.0	64.5
Food	0.0	10.7
Building	0.0	9.9
Total	100.0	100.0

Source: Derived from Hoffmann (1955), as described in Broadberry, Földvári and van Leeuwen (2006).

TABLE 7: Growth of industrial production (% per annum)

	Index 1	Index 2
1300-1350	0.62	0.16
1350-1400	0.16	0.00
1400-1450	0.18	0.14
1450-1490	0.10	0.09
1490-1560	0.74	0.48
1560-1600	0.94	0.69
1600-1650	0.46	0.45
1650-1700	0.18	0.14
1300-1700	0.43	0.27

Source: Derived from Appendix 1. Growth rates calculated using 5-year averages.

TABLE 8: Service sector weights, circa 1700

	(%)
Commerce	37.2
Housing and domestic	46.5
Government	16.3
Total	100.0

Source: Crafts (1985: 16).

TABLE 9: Growth of service sector output (% per annum)

	Index 1	Index 2
1300-1350	-0.26	-0.28
1350-1400	-0.36	-0.35
1400-1450	-0.05	-0.04
1450-1490	0.02	0.03
1490-1560	0.54	0.42
1560-1600	0.77	0.68
1600-1650	0.62	0.62
1650-1700	0.44	0.42
1300-1700	0.22	0.19

Source: Derived from Appendix 1. Growth rates calculated using 5-year averages.

TABLE 10: Sectoral shares in GDP, circa 1700 (%)

	(%)
Agriculture	37
Industry	20
Services	43
Total	100

Source: Crafts (1985: 16).

TABLE 11: Growth of GDP (% per annum)

	Index 1	Index 2
1300-1348	-0.15	-0.16
1300-1350	-0.27	-0.29
1350-1400	-0.31	-0.32
1400-1450	0.03	0.03
1450-1490	0.09	0.09
1490-1560	0.61	0.51
1560-1600	0.64	0.56
1600-1650	0.50	0.50
1650-1700	0.32	0.31
1300-1700	0.21	0.18

Source: Derived from Appendix 1. Growth rates calculated using 5-year averages.

TABLE 12: Population**A. Levels of total and agricultural population (millions)**

	Total population	Agricultural population
1300	4.25	3.34
1348	3.83	3.01
1351	2.56	2.01
1380	2.37	1.79
1520	2.20	1.65
1600	4.12	2.87
1700	5.20	2.78

B. Growth rates of total and agricultural population (% per annum)

	Total population	Agricultural population
1300-1348	-0.22	-0.22
1300-1350	-0.74	-0.74
1350-1400	-0.44	-0.53
1400-1450	-0.05	-0.06
1450-1490	-0.05	-0.06
1490-1550	0.43	0.37
1550-1600	0.78	0.69
1600-1650	0.51	0.25
1650-1700	-0.04	-0.31
1300-1700	0.05	-0.05

Source: Derived from Overton and Campbell (1996); Wrigley, Davies, Oeppen and Schofield (1997), interpolated using Wrigley and Schofield (1989).

TABLE 13: Growth of GDP per capita (% per annum)

	Index 1	Index 2
1300-1348	0.00	-0.01
1300-1350	0.60	0.58
1350-1400	0.20	0.19
1400-1450	0.09	0.09
1450-1490	0.15	0.14
1490-1560	0.18	0.08
1550-1600	-0.14	-0.22
1600-1650	-0.01	-0.01
1650-1700	0.36	0.35
1300-1700	0.16	0.13

Source: Derived from Appendix 1. Growth rates calculated using 5-year averages. Note that 1300-1350 is an outlier because of the sharp drop in population during the Black Death.

TABLE 14: GDP in current prices (£m)**A. Clark price deflator**

	GDP1	GDP2	Snooks	Mayhew
1300	5.08	5.57	4.07	4.66
1380	4.26	4.62		
1490	4.34	4.70		
1600	30.48	30.70		
1688	50.80	50.80	50.80	
1700	70.06	70.01		

B. Phelps Brown/Hopkins price deflator

	GDP1	GDP2
1300	3.84	4.36
1380	3.26	3.65
1490	3.43	3.83
1600	31.61	31.84
1688	50.80	50.80
1700	68.31	68.26

Sources: GDP1 and GDP2 from Appendix 1; Price deflators from Clark (2006) and Phelps Brown and Hopkins (1981); Other benchmark estimates from Snooks (1995: 50) and Mayhew (1995: 58).

TABLE 15: Income and output values in agriculture

A. Annual wage bill					
	Agricultural families (millions)	Days worked per family	Total days worked (millions)	Wage (d per day)	Wage bill (£m)
1300	0.74	381	282	1.26	1.48
1380	0.40	331	132	2.93	1.61
1450	0.38	266	102	3.40	1.44
1600	0.64	404	258	6.22	6.68
1700	0.62	405	249	8.94	9.29

B. Rents and other non-wage incomes					
	Rent (s. per acre)	Acres (millions)	Total rent (£m)	Capital costs (£m)	Tithes and taxes (£m)
1300	0.941	12.53	0.59	0.30	0.45
1380	0.931	10.73	0.50	0.30	0.30
1450	0.922	11.09	0.51	0.27	0.20
1600	6.588	15.21	5.01	2.17	1.05
1700	11.731	18.98	11.13	2.88	2.13

C. Income and output values (£m)		
	Total incomes	Value of output
1300	2.82	2.99
1380	2.71	2.74
1450	2.42	2.26
1600	14.91	15.50
1700	25.43	25.87

Sources: See text.

TABLE 16: Probate inventory totals for Cornwall, Hertfordshire, Kent, Lincolnshire and Worcestershire at constant prices adjusted for the poor

	Mean (£)	Median (£)	SD (£)	Skewness	CV	Gini
1550-59	34.17	11.31	63.69	1.08	1.86	0.65
1560-69	35.29	11.41	72.44	0.99	2.05	0.69
1570-79	40.75	11.44	82.60	1.06	2.03	0.70
1580-89	40.21	10.59	79.80	1.11	1.98	0.71
1590-99	47.44	10.69	95.47	1.15	2.01	0.73
1600-09	40.30	9.54	79.51	1.16	1.97	0.74
1610-19	41.21	8.15	94.11	1.05	2.28	0.76
1620-29	47.01	8.87	112.71	1.02	2.40	0.77
1630-39	48.09	8.57	109.32	1.08	2.27	0.76
1640-49	63.39	14.28	160.62	0.92	2.53	0.76
1650-59	57.90	19.02	95.08	1.23	1.64	0.70
1660-69	67.03	14.02	144.83	1.10	2.16	0.76
1670-79	83.00	15.23	221.44	0.92	2.67	0.78
1680-89	87.33	16.67	235.63	0.90	2.70	0.78
1690-99	90.38	16.72	174.87	1.26	1.93	0.75
1700-09	89.50	16.54	180.41	1.21	2.02	0.76
1710-19	109.42	17.45	233.44	1.18	2.13	0.76
1720-29	110.78	18.63	227.02	1.22	2.05	0.76
1730-39	125.43	23.94	306.32	0.99	2.44	0.75
1740-49	123.72	22.35	240.47	1.26	1.94	0.75

Source: Overton (2006).

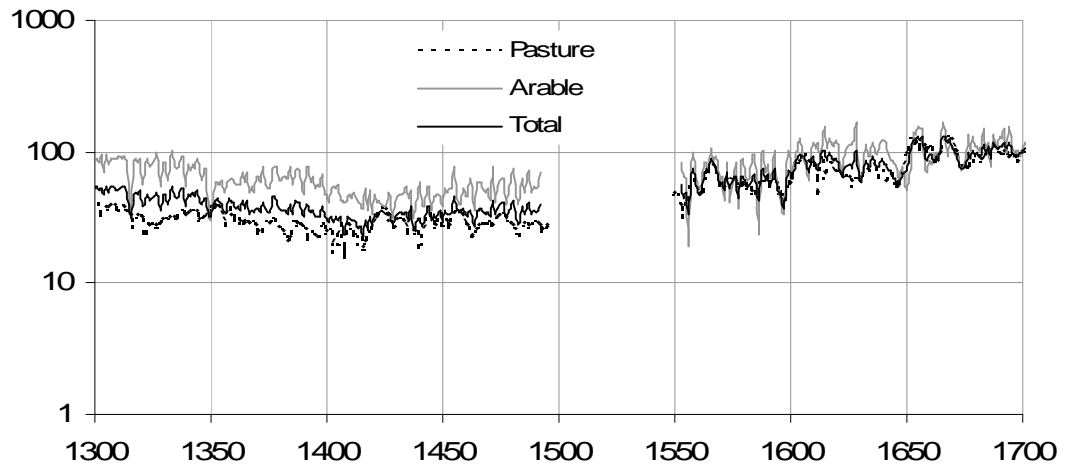
FIGURE 1: Output in arable and pastoral agriculture (1700=100, log scale)

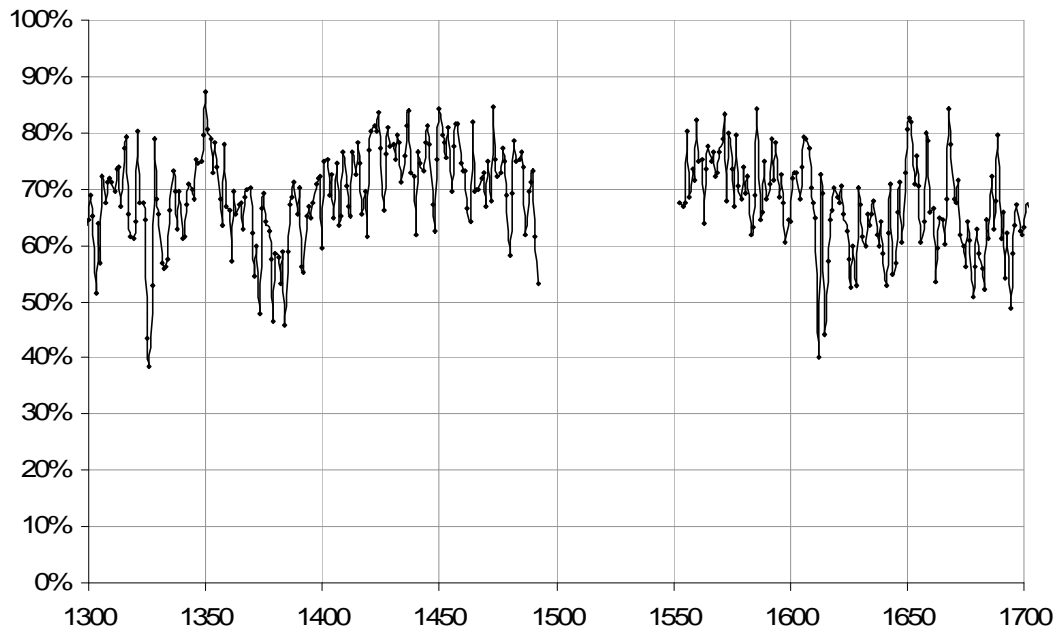
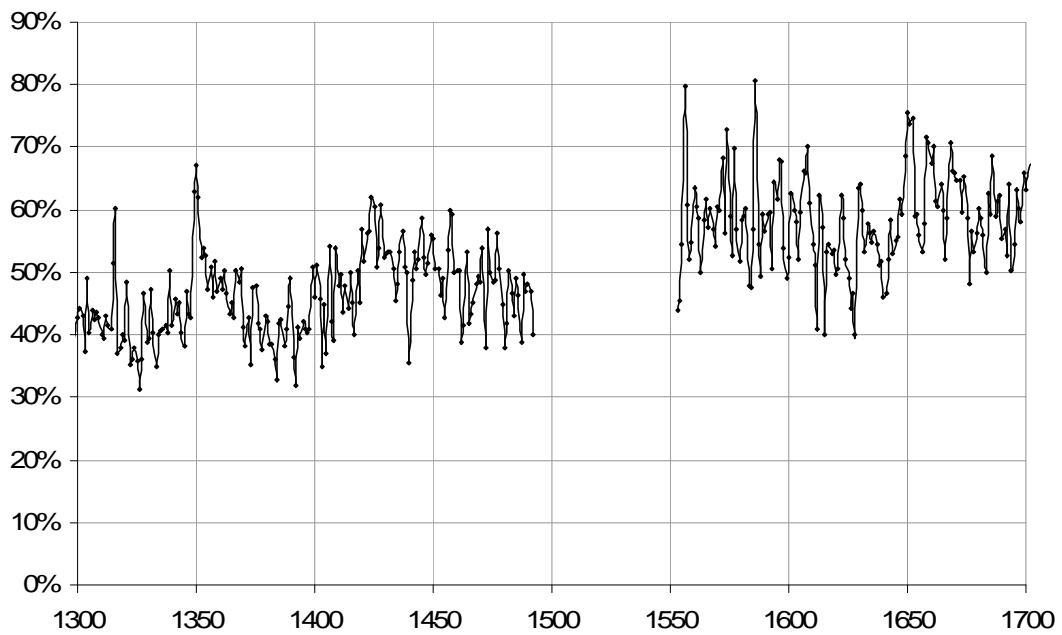
FIGURE 2: Share of pasture in total agricultural output**A. At current prices****B. At constant 1700 prices**

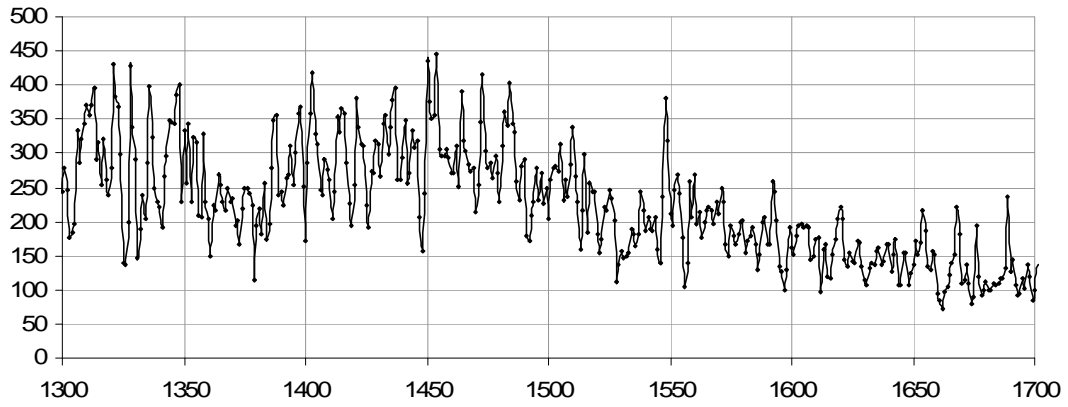
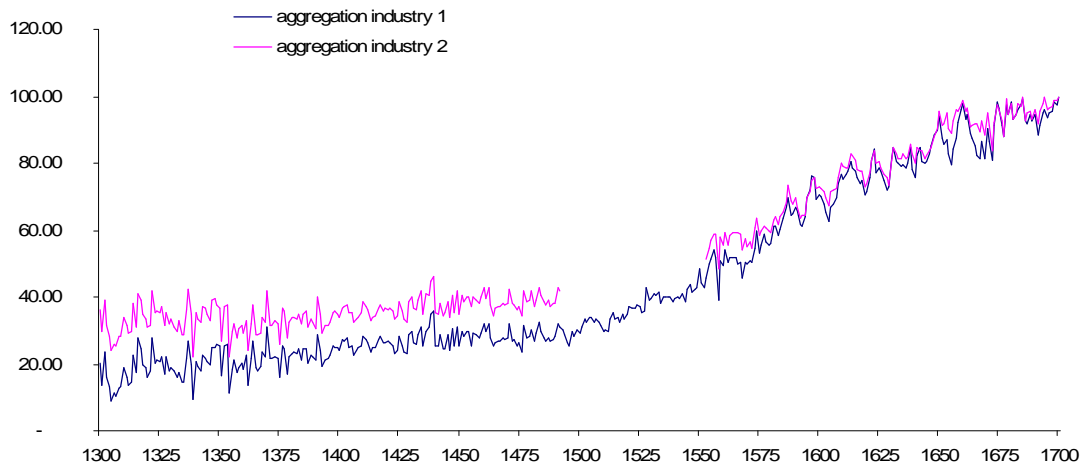
FIGURE 3: Ratio of pastoral to arable prices (1700=100)**FIGURE 4: Industrial production indices (1700=100, log scale)**

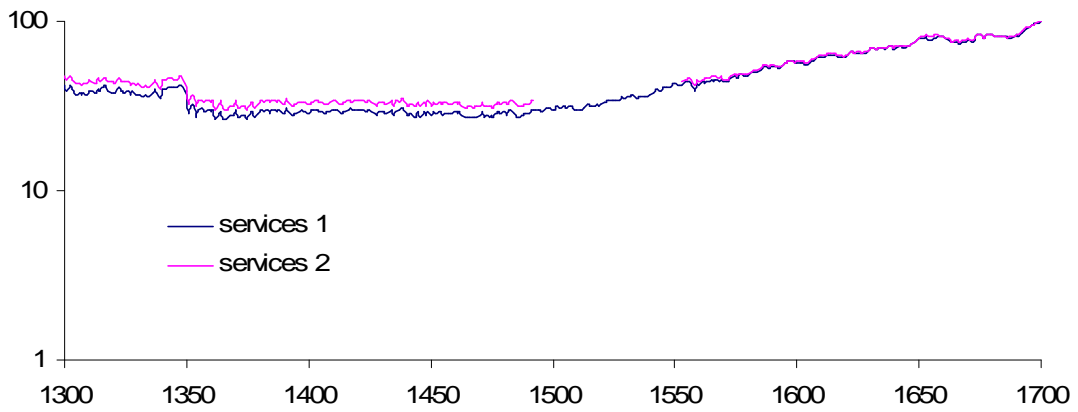
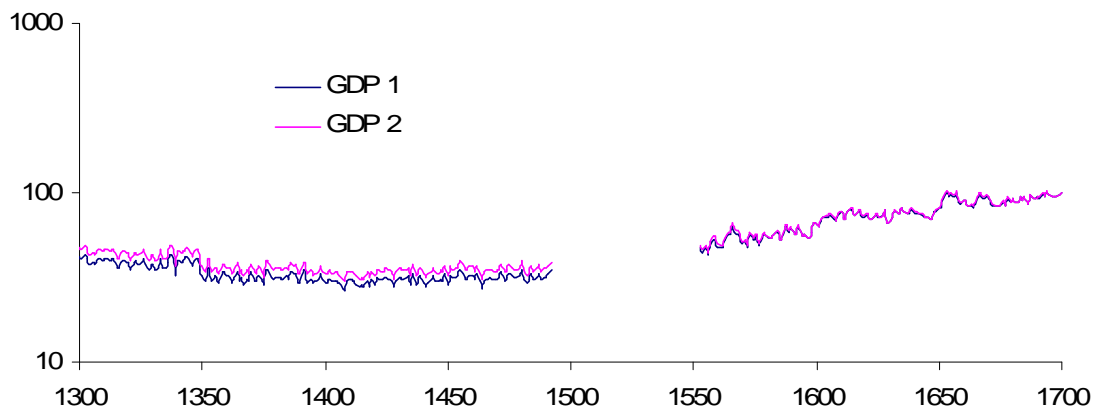
FIGURE 5: Service sector output (1700=100, log scale)**FIGURE 6: Real GDP (1700=100, log scale)**

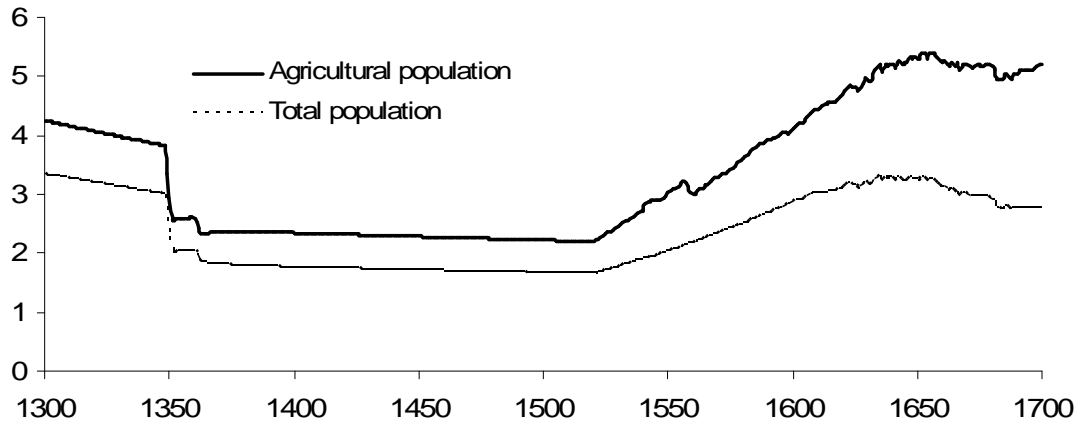
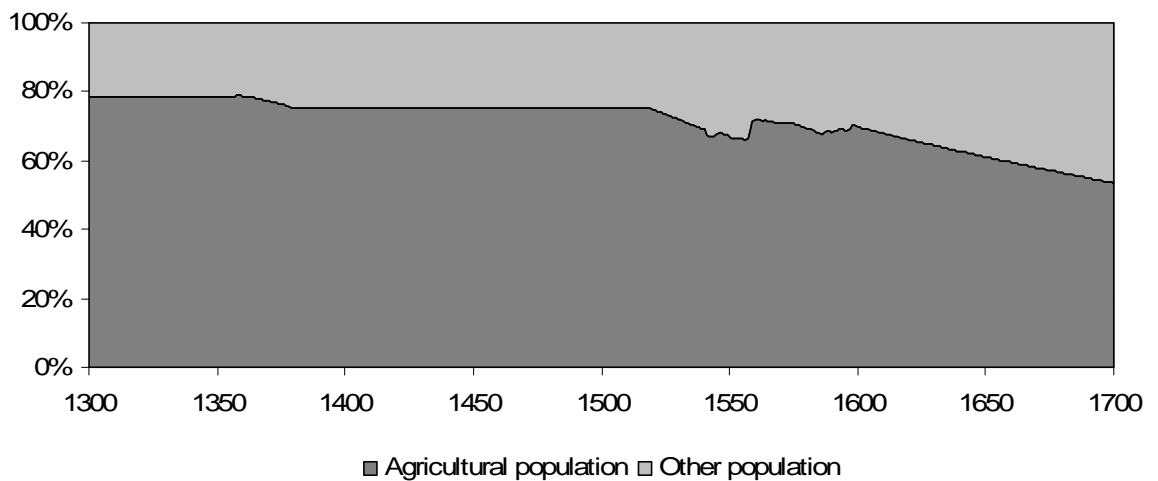
FIGURE 7: Total and agricultural population (millions)**FIGURE 8: Share of agricultural population in the total population (%)**

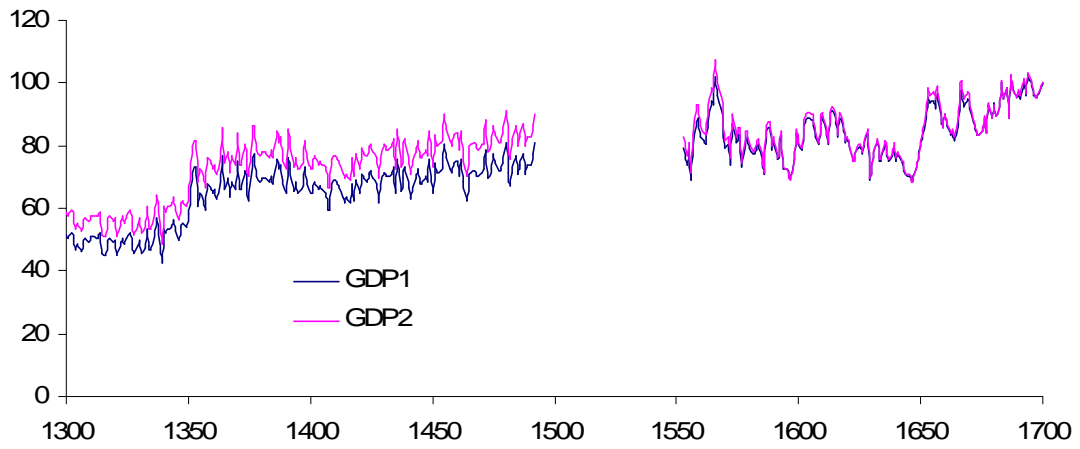
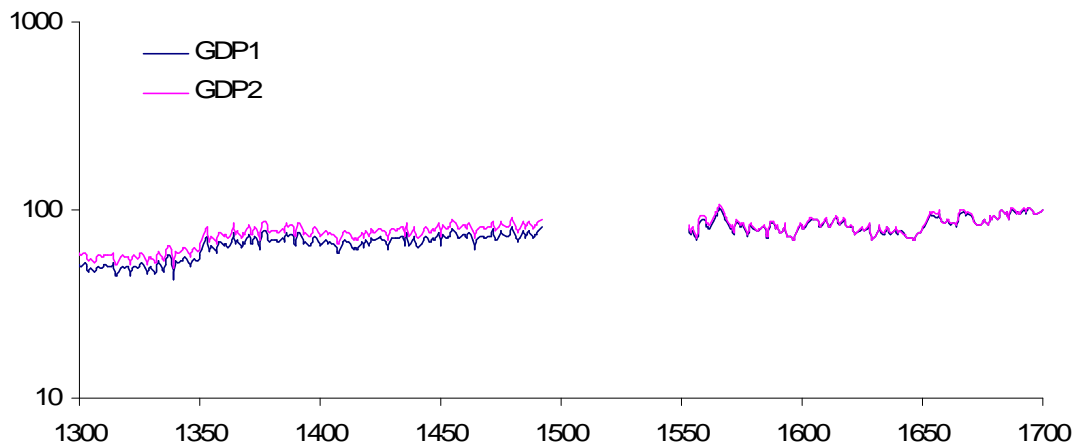
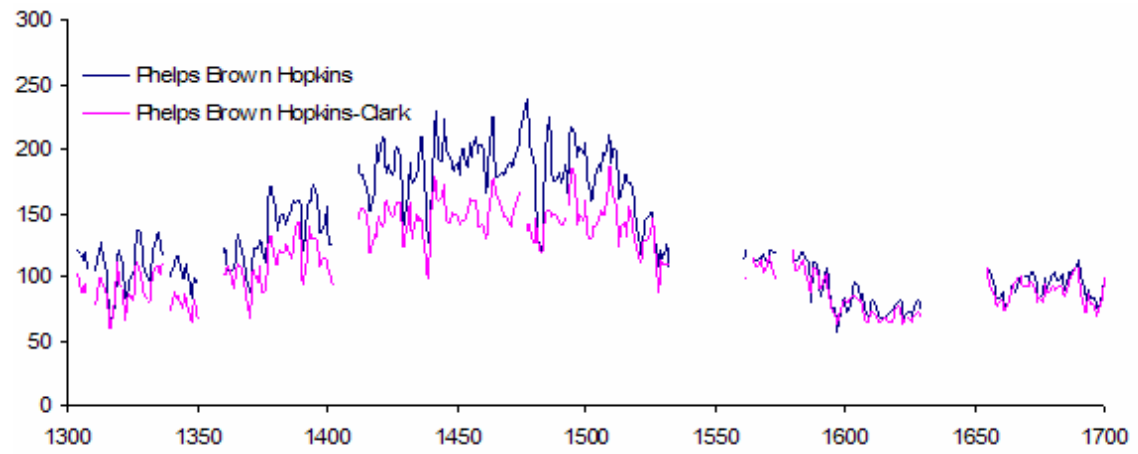
FIGURE 9: Real GDP per capita**A. 1700=100, linear scale****B. 1700=100, log scale**

FIGURE 10: Daily real wage of unskilled building workers (1700=100)

APPENDIX 1: VOLUME INDICES (1700=100)

year	agriculture	industry1	industry2	services1	services 2	GDP1	GDP2
1300	55.40	20.25	36.03	41.38	47.14	42.34	47.97
1301	58.74	13.78	29.57	39.26	44.91	41.37	46.96
1302	53.38	23.39	39.08	42.27	48.06	42.60	48.23
1303	55.33	16.07	31.57	39.64	45.23	40.73	46.23
1304	50.15	13.31	28.03	38.73	44.02	37.87	43.09
1305	57.80	8.94	24.21	37.28	42.67	39.20	44.57
1306	51.61	11.13	25.82	37.37	42.61	37.39	42.58
1307	57.53	10.26	25.56	36.97	42.39	39.23	44.62
1308	58.42	12.93	28.43	37.58	43.12	40.36	45.84
1309	56.45	13.07	28.34	37.33	42.79	39.55	44.96
1310	54.48	18.66	33.94	39.24	44.80	40.76	46.21
1311	56.50	16.22	31.60	38.45	44.01	40.68	46.15
1312	57.61	13.79	29.16	37.66	43.16	40.26	45.71
1313	57.28	14.42	29.77	37.59	43.09	40.24	45.68
1314	52.64	22.77	38.07	40.30	45.95	41.36	46.85
1315	42.91	17.34	31.22	38.56	43.63	35.92	40.88
1316	32.95	27.69	41.06	41.67	46.74	35.65	40.50
1317	44.81	24.41	38.91	40.56	45.96	38.90	44.12
1318	51.71	19.93	34.93	38.87	44.36	39.83	45.19
1319	50.05	18.88	33.63	38.20	43.59	38.72	43.99
1320	53.48	16.11	31.07	37.46	42.87	39.12	44.43
1321	40.83	17.82	31.44	37.81	42.80	34.93	39.80
1322	41.53	27.65	41.86	40.76	46.11	38.42	43.57
1323	50.56	20.30	35.11	38.48	43.91	39.31	44.61
1324	45.78	21.25	35.56	38.68	43.95	37.82	42.95
1325	49.29	20.84	35.50	38.26	43.64	38.85	44.10
1326	52.73	22.12	37.22	38.43	43.99	40.46	45.87
1327	49.36	16.94	31.37	36.77	42.00	37.46	42.60
1328	37.80	21.95	35.33	38.41	43.39	34.89	39.71
1329	47.01	17.78	31.95	36.98	42.15	36.85	41.91
1330	50.09	18.80	33.35	37.21	42.53	38.29	43.49
1331	42.09	17.69	31.27	36.62	41.58	34.86	39.71
1332	47.39	15.78	29.84	35.94	41.04	36.15	41.15
1333	57.57	17.48	32.79	36.60	42.14	40.54	45.98
1334	49.00	14.37	28.49	35.49	40.58	36.26	41.28
1335	46.96	14.61	28.49	35.70	40.72	35.65	40.58
1336	48.52	21.76	36.34	38.07	43.44	38.67	43.90
1337	55.26	26.71	42.40	39.83	45.67	42.91	48.56
1338	56.26	19.72	34.98	37.94	43.51	41.07	46.52
1339	40.51	9.45	22.20	35.42	39.97	32.11	36.61
1340	51.11	20.58	35.33	39.66	45.07	40.08	45.36
1341	48.49	19.25	33.58	39.68	44.93	38.85	43.98
1342	52.44	17.82	32.46	39.45	44.78	39.93	45.15
1343	49.38	22.40	36.97	40.90	46.29	40.34	45.57
1344	54.18	21.71	36.76	40.63	46.17	41.86	47.25
1345	47.23	20.68	34.87	40.55	45.78	39.05	44.14
1346	41.64	19.58	33.06	40.42	45.40	36.70	41.54
1347	44.97	25.04	39.22	42.37	47.68	39.87	44.99
1348	47.34	24.97	39.39	42.37	47.76	40.73	45.93
1349	34.48	25.74	37.83	38.83	43.44	34.60	39.00

APPENDIX 1 (CONTINUED): VOLUME INDICES (1700=100)

year	agriculture	industry1	industry2	services1	services 2	GDP1	GDP2
1350	33.99	25.45	36.64	34.89	39.18	32.67	36.75
1351	38.89	16.57	27.02	28.90	32.77	30.13	33.89
1352	45.12	25.43	37.16	31.46	35.91	35.31	39.57
1353	46.99	25.73	37.69	31.55	36.09	36.10	40.44
1354	43.32	11.32	21.93	27.45	31.28	30.09	33.86
1355	42.56	18.48	29.48	29.84	33.93	32.27	36.23
1356	36.68	21.38	31.93	30.59	34.58	31.00	34.83
1357	36.67	17.30	27.58	29.13	32.96	29.55	33.26
1358	46.79	19.05	30.58	29.64	33.92	33.87	38.02
1359	43.88	20.20	31.49	29.90	34.12	33.13	37.20
1360	43.51	18.24	29.36	29.42	33.55	32.40	36.40
1361	39.24	22.42	33.14	29.97	34.03	31.89	35.78
1362	40.95	13.65	23.84	26.45	30.18	29.26	32.90
1363	38.27	21.88	32.08	28.26	32.14	30.69	34.39
1364	44.69	26.59	37.79	29.58	33.88	34.58	38.66
1365	39.53	18.64	28.80	26.71	30.51	29.84	33.51
1366	44.57	17.83	28.51	26.45	30.41	31.43	35.27
1367	35.80	19.48	29.28	26.96	30.66	28.74	32.29
1368	38.27	23.40	33.71	28.03	31.97	30.89	34.65
1369	36.65	22.33	32.40	27.48	31.32	29.84	33.51
1370	39.88	31.03	41.98	30.13	34.41	33.92	37.95
1371	39.07	21.43	31.72	27.04	30.94	30.37	34.10
1372	37.21	21.49	31.59	27.28	31.11	29.80	33.46
1373	44.21	22.11	33.02	27.55	31.67	32.63	36.58
1374	39.13	21.49	31.80	27.63	31.54	30.66	34.40
1375	37.12	16.21	26.00	26.28	29.92	28.28	31.80
1376	46.22	25.48	36.82	29.19	33.51	34.75	38.87
1377	48.63	24.31	35.86	28.77	33.14	35.23	39.42
1378	45.99	16.94	27.76	27.04	31.04	32.03	35.91
1379	38.75	21.97	32.41	28.81	32.77	31.12	34.91
1380	38.66	23.27	33.79	29.56	33.57	31.67	35.50
1381	38.46	23.46	33.97	29.86	33.87	31.76	35.59
1382	38.67	23.11	33.62	29.55	33.56	31.64	35.46
1383	35.70	24.62	34.91	29.96	33.92	31.02	34.77
1384	41.60	21.13	31.79	28.90	32.93	32.05	35.91
1385	35.64	24.43	34.68	29.90	33.84	30.93	34.67
1386	44.67	24.50	35.72	29.98	34.24	34.32	38.40
1387	44.50	20.29	31.17	28.92	33.00	32.96	36.89
1388	44.13	22.45	33.43	29.67	33.82	33.58	37.56
1389	38.31	22.29	32.61	29.25	33.17	31.21	34.96
1390	34.49	20.95	30.75	28.79	32.52	29.33	32.89
1391	42.06	28.92	40.06	30.94	35.26	34.65	38.73
1392	41.52	24.22	35.00	29.44	33.56	32.87	36.79
1393	37.05	19.32	29.26	28.08	31.83	29.65	33.25
1394	38.66	21.23	31.48	28.68	32.56	30.88	34.60
1395	33.84	21.56	31.30	28.76	32.47	29.20	32.74
1396	34.53	22.55	32.43	29.12	32.90	29.81	33.41
1397	34.00	25.43	35.45	29.78	33.66	30.47	34.14
1398	41.48	24.89	35.69	29.43	33.56	32.98	36.92
1399	35.16	24.85	34.94	29.43	33.32	30.64	34.33

APPENDIX 1 (CONTINUED): VOLUME INDICES (1700=100)

year	agriculture	industry1	industry2	services1	services 2	GDP1	GDP2
1400	32.62	24.07	33.83	28.89	32.66	29.31	32.88
1401	31.00	27.16	36.92	29.76	33.58	29.70	33.29
1402	34.39	26.84	36.96	29.77	33.71	30.89	34.61
1403	30.49	27.79	37.53	30.00	33.83	29.74	33.33
1404	34.34	25.10	35.10	29.02	32.88	30.20	33.87
1405	32.25	25.56	35.35	29.32	33.12	29.65	33.25
1406	33.83	22.71	32.50	28.36	32.11	29.25	32.83
1407	26.90	24.10	33.20	28.83	32.38	27.17	30.52
1408	24.57	25.17	34.08	29.31	32.81	26.73	30.01
1409	34.27	25.26	35.25	29.35	33.21	30.35	34.01
1410	32.98	28.39	38.42	30.18	34.12	30.86	34.56
1411	32.43	27.43	37.34	29.97	33.85	30.37	34.02
1412	32.44	26.28	36.12	29.68	33.51	30.02	33.64
1413	31.07	23.49	32.99	28.83	32.50	28.59	32.07
1414	27.57	24.81	33.99	29.34	32.93	27.78	31.16
1415	28.89	25.06	34.40	29.49	33.14	28.38	31.82
1416	24.52	27.52	36.57	30.22	33.81	27.57	30.93
1417	31.67	28.01	37.87	30.47	34.34	30.42	34.06
1418	26.51	26.36	35.55	30.00	33.62	27.98	31.38
1419	34.08	26.45	36.48	30.10	34.00	30.84	34.53
1420	28.46	26.68	36.10	30.28	33.99	28.89	32.37
1421	35.70	26.54	36.76	30.25	34.22	31.53	35.27
1422	35.05	25.49	35.57	29.95	33.85	30.95	34.64
1423	35.98	23.29	33.32	29.24	33.09	30.54	34.21
1424	38.05	24.11	34.44	29.35	33.31	31.52	35.29
1425	35.85	28.17	38.54	30.36	34.41	31.96	35.77
1426	36.12	25.57	35.79	29.35	33.29	31.10	34.84
1427	35.80	23.55	33.59	28.47	32.32	30.20	33.86
1428	29.54	23.10	32.42	28.03	31.64	27.61	31.02
1429	31.82	28.85	38.82	29.48	33.40	30.22	33.90
1430	35.58	29.68	40.12	29.53	33.62	31.80	35.65
1431	36.83	26.33	36.67	28.32	32.31	31.07	34.85
1432	37.22	25.79	36.15	28.30	32.29	31.10	34.89
1433	35.80	28.68	39.08	29.04	33.10	31.47	35.29
1434	36.25	31.19	41.81	29.71	33.88	32.42	36.34
1435	31.38	25.27	34.95	27.92	31.68	28.67	32.22
1436	40.33	29.83	40.80	29.50	33.77	33.57	37.60
1437	26.38	31.13	40.67	29.88	33.70	28.83	32.38
1438	28.71	34.63	44.67	30.88	34.92	30.83	34.57
1439	32.02	35.65	46.12	31.07	35.28	32.34	36.24
1440	33.05	25.38	35.24	27.89	31.71	29.30	32.91
1441	28.85	25.60	35.01	27.95	31.62	27.81	31.27
1442	30.52	28.49	38.30	28.86	32.72	29.40	33.02
1443	37.81	24.26	34.56	27.43	31.37	30.64	34.39
1444	41.34	24.64	35.35	27.66	31.75	32.12	36.02
1445	31.98	28.83	38.78	28.98	32.89	30.06	33.73
1446	35.76	23.80	33.81	27.42	31.26	29.78	33.43
1447	32.85	30.45	40.59	29.41	33.42	30.89	34.64
1448	35.40	25.42	35.49	27.89	31.78	30.18	33.86
1449	38.45	31.07	41.86	29.61	33.84	33.17	37.15

APPENDIX 1 (CONTINUED): VOLUME INDICES (1700=100)

year	agriculture	industry1	industry2	services1	services 2	GDP1	GDP2
1450	31.12	25.27	34.85	27.97	31.69	28.59	32.11
1451	38.54	29.67	40.38	29.31	33.49	32.80	36.74
1452	35.91	28.29	38.61	28.78	32.81	31.32	35.12
1453	35.70	29.76	40.16	29.10	33.17	31.67	35.51
1454	37.30	29.45	40.01	28.93	33.05	32.13	36.02
1455	49.03	25.56	37.14	27.65	32.04	35.14	39.35
1456	40.81	29.22	40.14	28.86	33.10	33.35	37.36
1457	37.54	28.71	39.24	28.53	32.62	31.90	35.77
1458	36.30	27.97	38.31	28.22	32.24	31.16	34.96
1459	39.30	29.31	40.06	28.49	32.68	32.65	36.60
1460	36.86	32.15	42.82	29.32	33.53	32.68	36.62
1461	34.08	29.58	39.76	28.34	32.33	30.71	34.46
1462	38.26	31.87	42.66	28.95	33.19	32.98	36.96
1463	33.80	27.63	37.64	27.60	31.50	29.90	33.58
1464	28.51	25.22	34.48	26.95	30.56	27.18	30.58
1465	36.21	26.40	36.58	27.21	31.15	30.38	34.11
1466	37.96	26.93	37.31	27.21	31.22	31.13	34.94
1467	38.93	26.75	37.22	27.06	31.10	31.39	35.22
1468	36.57	27.97	38.25	27.41	31.42	30.91	34.69
1469	36.03	27.32	37.51	27.38	31.34	30.57	34.31
1470	37.01	27.98	38.30	27.64	31.66	31.17	34.97
1471	33.93	32.15	42.43	28.96	33.03	31.44	35.24
1472	45.88	27.00	38.23	27.38	31.68	34.15	38.25
1473	34.87	27.32	37.46	27.53	31.47	30.20	33.93
1474	39.78	25.52	36.08	27.26	31.31	31.54	35.40
1475	44.05	26.27	37.35	27.71	31.95	33.47	37.51
1476	42.86	23.47	34.22	26.98	31.06	32.15	36.06
1477	33.17	31.54	42.05	29.52	33.67	31.27	35.16
1478	36.99	27.84	38.51	28.35	32.48	31.44	35.35
1479	39.09	28.04	38.95	28.46	32.68	32.31	36.30
1480	44.81	30.00	41.68	29.03	33.54	35.06	39.34
1481	36.28	26.67	37.15	27.99	32.04	30.79	34.63
1482	29.34	29.07	38.96	28.92	32.82	29.10	32.76
1483	30.78	32.69	42.98	29.94	34.03	30.80	34.62
1484	40.17	29.56	40.69	28.86	33.17	33.18	37.26
1485	35.03	27.96	38.38	28.01	32.06	30.60	34.42
1486	39.30	26.94	37.78	27.44	31.61	31.73	35.69
1487	43.39	27.65	38.99	27.63	31.98	33.46	37.60
1488	36.07	26.72	37.18	27.68	31.72	30.59	34.42
1489	37.88	27.46	38.17	28.37	32.51	31.70	35.63
1490	37.35	28.17	38.32	28.75	32.72	31.82	35.55
1491	37.54	32.19	42.67	30.03	34.18	33.24	37.12
1492	42.14	30.88	41.78	30.04	34.30	34.69	38.70
1493	-	29.99	-	29.85	-	-	-
1494	-	28.61	-	29.67	-	-	-
1495	-	26.16	-	29.15	-	-	-
1496	-	25.25	-	29.06	-	-	-
1497	-	29.65	-	30.97	-	-	-
1498	-	28.17	-	30.55	-	-	-
1499	-	30.15	-	30.97	-	-	-

APPENDIX 1 (CONTINUED): VOLUME INDICES (1700=100)

year	agriculture	industry1	industry2	services1	services 2	GDP1	GDP2
1500	-	29.05	-	30.30	-	-	-
1501	-	31.14	-	30.85	-	-	-
1502	-	33.46	-	31.56	-	-	-
1503	-	32.68	-	30.98	-	-	-
1504	-	33.90	-	31.48	-	-	-
1505	-	33.67	-	31.46	-	-	-
1506	-	32.51	-	31.00	-	-	-
1507	-	33.39	-	31.25	-	-	-
1508	-	32.33	-	30.50	-	-	-
1509	-	31.44	-	30.31	-	-	-
1510	-	29.48	-	29.70	-	-	-
1511	-	30.03	-	29.82	-	-	-
1512	-	29.76	-	29.83	-	-	-
1513	-	33.24	-	31.15	-	-	-
1514	-	35.33	-	32.11	-	-	-
1515	-	33.41	-	31.59	-	-	-
1516	-	34.10	-	31.96	-	-	-
1517	-	32.62	-	31.65	-	-	-
1518	-	34.63	-	32.28	-	-	-
1519	-	33.43	-	31.81	-	-	-
1520	-	34.93	-	32.19	-	-	-
1521	-	37.19	-	33.03	-	-	-
1522	-	36.94	-	33.03	-	-	-
1523	-	36.73	-	33.93	-	-	-
1524	-	37.45	-	34.37	-	-	-
1525	-	37.02	-	34.34	-	-	-
1526	-	35.41	-	33.82	-	-	-
1527	-	35.65	-	33.93	-	-	-
1528	-	42.84	-	36.12	-	-	-
1529	-	39.27	-	35.03	-	-	-
1530	-	39.72	-	35.27	-	-	-
1531	-	40.78	-	35.85	-	-	-
1532	-	40.44	-	36.06	-	-	-
1533	-	41.32	-	36.63	-	-	-
1534	-	38.32	-	35.11	-	-	-
1535	-	40.21	-	35.90	-	-	-
1536	-	40.01	-	35.91	-	-	-
1537	-	40.17	-	36.22	-	-	-
1538	-	39.91	-	36.34	-	-	-
1539	-	38.81	-	36.38	-	-	-
1540	-	39.38	-	36.91	-	-	-
1541	-	39.79	-	38.05	-	-	-
1542	-	39.31	-	38.63	-	-	-
1543	-	40.85	-	39.33	-	-	-
1544	-	38.81	-	39.23	-	-	-
1545	-	42.42	-	40.66	-	-	-
1546	-	43.54	-	41.26	-	-	-
1547	-	41.27	-	40.63	-	-	-
1548	-	42.41	-	41.15	-	-	-
1549	-	42.95	-	41.48	-	-	-

APPENDIX 1 (CONTINUED): VOLUME INDICES (1700=100)

year	agriculture	industry1	industry2	services1	services 2	GDP1	GDP2
1550	-	48.65	-	43.52	-	-	-
1551	-	44.04	-	42.36	-	-	-
1552	-	42.99	-	41.84	-	-	-
1553	54.68	45.51	51.50	42.19	44.06	47.47	49.47
1554	43.12	49.91	54.80	43.54	45.06	44.66	46.29
1555	49.97	51.17	56.78	43.75	45.49	47.54	49.41
1556	33.95	53.97	58.86	44.56	46.06	42.52	44.14
1557	54.50	51.71	58.65	43.27	45.42	49.11	51.43
1558	76.54	39.11	48.59	38.76	41.74	52.81	55.99
1559	63.69	50.60	58.00	42.59	44.88	52.00	54.46
1560	54.31	49.53	55.75	42.33	44.26	48.21	50.28
1561	48.00	54.05	59.24	44.04	45.63	47.51	49.23
1562	50.78	50.21	55.68	43.18	44.87	47.40	49.22
1563	61.80	51.57	58.16	44.02	46.06	52.11	54.31
1564	72.68	51.83	59.41	44.47	46.83	56.38	58.91
1565	72.42	51.88	59.36	44.97	47.29	56.51	59.00
1566	90.16	49.71	59.22	44.56	47.54	62.47	65.65
1567	80.40	50.12	58.59	45.04	47.68	59.14	61.97
1568	78.99	45.84	54.12	44.10	46.70	57.36	60.13
1569	67.84	50.42	57.31	45.39	47.54	54.70	57.00
1570	57.20	49.78	55.18	44.09	45.76	50.08	51.88
1571	59.30	50.96	56.45	44.12	45.82	51.10	52.93
1572	49.39	50.35	54.71	44.38	45.73	47.43	48.88
1573	68.94	54.75	60.91	46.00	47.91	56.24	58.29
1574	54.76	59.89	63.54	47.78	48.89	52.78	53.99
1575	65.44	53.35	58.17	45.96	47.45	54.65	56.25
1576	64.94	55.48	59.99	46.88	48.26	55.28	56.78
1577	44.87	59.02	61.08	48.42	49.03	49.22	49.90
1578	63.94	56.48	60.72	47.92	49.22	55.56	56.97
1579	67.55	55.43	59.80	47.73	49.08	56.60	58.05
1580	62.22	55.86	59.09	48.16	49.15	54.90	55.97
1581	54.75	60.96	63.00	50.00	50.60	53.95	54.62
1582	57.08	61.27	63.89	50.54	51.33	55.11	55.97
1583	63.12	58.34	61.63	49.83	50.83	56.45	57.54
1584	66.59	60.29	63.97	50.66	51.78	58.48	59.70
1585	52.76	63.41	65.23	51.83	52.36	54.49	55.08
1586	44.35	66.81	68.04	53.35	53.69	52.71	53.10
1587	68.65	69.74	73.63	54.38	55.55	62.73	64.01
1588	75.25	64.32	68.87	52.61	54.00	63.33	64.84
1589	62.18	64.85	67.55	53.17	53.98	58.84	59.73
1590	67.95	66.69	69.57	54.29	55.15	61.82	62.77
1591	56.24	65.71	67.05	54.07	54.45	57.20	57.63
1592	63.45	61.51	63.34	53.00	53.54	58.57	59.17
1593	76.42	61.12	64.37	52.88	53.87	63.24	64.31
1594	53.14	64.11	64.66	54.26	54.40	55.81	55.98
1595	49.28	69.70	69.66	56.50	56.44	56.47	56.44
1596	45.14	72.18	71.62	57.55	57.32	55.88	55.67
1597	37.70	76.08	74.73	58.64	58.16	54.38	53.90
1598	50.29	75.66	75.75	58.33	58.30	58.82	58.83
1599	74.19	69.37	72.25	56.66	57.52	65.69	66.63

APPENDIX 1 (CONTINUED): VOLUME INDICES (1700=100)

year	agriculture	industry1	industry2	services1	services 2	GDP1	GDP2
1600	69.12	70.37	72.74	57.31	58.01	64.29	65.07
1601	65.27	70.33	72.42	57.59	58.20	62.98	63.66
1602	82.95	67.62	71.57	57.07	58.27	68.76	70.06
1603	90.71	65.48	69.86	56.54	57.88	70.97	72.42
1604	96.19	62.50	67.51	55.69	57.24	72.04	73.71
1605	92.87	67.01	71.50	57.46	58.84	72.47	73.96
1606	94.00	67.56	72.19	57.86	59.28	73.17	74.71
1607	83.55	69.82	72.65	59.04	59.89	70.26	71.19
1608	73.79	74.00	75.75	60.72	61.23	68.21	68.78
1609	87.18	76.93	79.85	62.06	62.92	74.33	75.28
1610	94.70	75.18	78.96	61.59	62.73	76.56	77.80
1611	79.88	76.49	78.78	62.29	62.96	71.64	72.38
1612	73.31	77.48	78.75	62.73	63.07	69.59	70.00
1613	90.71	80.24	83.05	63.69	64.52	77.00	77.91
1614	98.38	78.60	82.37	63.07	64.20	79.24	80.48
1615	95.67	77.61	80.75	63.00	63.94	78.01	79.04
1616	83.07	75.90	78.17	62.37	63.04	72.73	73.48
1617	99.98	73.77	77.63	61.67	62.84	78.27	79.54
1618	93.38	74.65	77.50	62.09	62.94	76.18	77.12
1619	86.35	70.79	73.14	61.17	61.88	72.41	73.18
1620	89.87	71.59	73.82	61.77	62.44	74.13	74.87
1621	85.72	75.94	77.31	63.49	63.88	74.21	74.65
1622	67.94	80.99	80.97	65.81	65.75	69.63	69.61
1623	68.62	84.17	83.70	67.09	66.88	71.07	70.89
1624	79.65	77.34	79.92	64.76	65.53	72.79	73.63
1625	81.82	78.58	80.45	65.30	65.84	74.07	74.67
1626	75.20	77.52	78.39	64.57	64.80	71.09	71.36
1627	83.98	74.76	76.56	64.35	64.88	73.69	74.28
1628	98.56	71.82	75.61	64.54	65.70	78.58	79.84
1629	63.33	73.06	73.55	65.70	65.83	66.30	66.45
1630	60.76	81.56	80.91	68.35	68.09	68.18	67.94
1631	69.51	84.50	84.62	69.05	69.03	72.31	72.32
1632	88.54	80.42	82.80	68.29	68.99	78.21	78.99
1633	79.83	80.06	81.34	69.00	69.36	75.22	75.63
1634	78.27	79.09	81.19	69.19	69.81	74.53	75.22
1635	94.32	79.38	82.89	69.41	70.48	80.62	81.78
1636	86.85	78.35	81.29	68.32	69.20	77.18	78.15
1637	78.16	79.96	81.87	69.71	70.27	74.89	75.51
1638	78.31	84.63	85.72	70.82	71.11	76.35	76.70
1639	92.17	78.29	82.77	69.12	70.50	79.48	80.97
1640	82.30	75.54	79.85	68.53	69.86	75.03	76.46
1641	80.62	82.14	84.60	70.11	70.83	76.40	77.21
1642	74.22	84.59	83.62	71.46	71.10	75.11	74.76
1643	74.51	80.62	83.97	70.92	71.94	74.19	75.30
1644	66.26	80.20	81.53	70.58	70.97	70.91	71.34
1645	65.49	80.58	82.31	71.23	71.74	70.98	71.54
1646	59.48	82.81	83.87	72.12	72.42	69.58	69.92
1647	58.76	85.06	84.67	73.53	73.37	70.37	70.22
1648	70.56	88.35	87.92	74.75	74.57	75.92	75.76
1649	73.26	89.86	90.49	77.11	77.27	78.24	78.43

APPENDIX 2: NOMINAL GDP (£m)

year	GDP1	GDP2	year	GDP1	GDP2	year	GDP1	GDP2
1300	5.77	6.33	1350	4.62	5.03	1400	4.18	4.54
1301	5.32	5.84	1351	4.89	5.32	1401	4.50	4.89
1302	5.32	5.82	1352	6.45	7.00	1402	5.26	5.71
1303	4.80	5.27	1353	5.22	5.65	1403	4.41	4.79
1304	4.18	4.60	1354	3.87	4.21	1404	3.87	4.20
1305	5.04	5.54	1355	4.87	5.29	1405	3.70	4.02
1306	4.66	5.13	1356	4.76	5.18	1406	3.44	3.74
1307	4.74	5.21	1357	4.77	5.20	1407	3.37	3.66
1308	5.27	5.79	1358	5.46	5.93	1408	3.78	4.10
1309	5.86	6.45	1359	4.99	5.42	1409	4.61	5.00
1310	6.84	7.50	1360	5.04	5.48	1410	5.38	5.83
1311	6.62	7.27	1361	5.04	5.47	1411	4.54	4.92
1312	5.33	5.86	1362	4.30	4.68	1412	4.01	4.34
1313	5.29	5.81	1363	5.12	5.56	1413	3.68	4.00
1314	5.69	6.24	1364	6.11	6.62	1414	3.52	3.82
1315	5.41	5.95	1365	4.75	5.16	1415	3.69	4.00
1316	7.74	8.51	1366	4.66	5.06	1416	4.21	4.57
1317	8.33	9.14	1367	4.38	4.76	1417	4.98	5.40
1318	6.26	6.87	1368	5.20	5.65	1418	4.06	4.41
1319	4.48	4.92	1369	5.13	5.58	1419	4.56	4.94
1320	5.19	5.70	1370	7.98	8.64	1420	3.79	4.10
1321	5.13	5.66	1371	5.17	5.61	1421	4.46	4.82
1322	7.62	8.36	1372	4.52	4.91	1422	4.04	4.37
1323	6.92	7.60	1373	5.50	5.97	1423	3.70	4.01
1324	5.61	6.17	1374	4.51	4.90	1424	3.93	4.26
1325	6.17	6.78	1375	5.03	5.47	1425	4.27	4.62
1326	5.46	5.99	1376	6.28	6.80	1426	3.97	4.31
1327	4.36	4.80	1377	4.83	5.23	1427	3.76	4.08
1328	4.57	5.03	1378	4.09	4.44	1428	3.38	3.68
1329	5.42	5.96	1379	3.78	4.10	1429	4.80	5.21
1330	5.70	6.27	1380	4.65	5.05	1430	4.98	5.40
1331	5.70	6.28	1381	4.55	4.94	1431	4.11	4.46
1332	5.66	6.24	1382	4.25	4.60	1432	3.81	4.13
1333	5.04	5.53	1383	4.21	4.57	1433	4.71	5.11
1334	4.41	4.86	1384	4.27	4.63	1434	4.29	4.65
1335	4.24	4.67	1385	3.99	4.33	1435	3.75	4.07
1336	4.94	5.42	1386	4.88	5.28	1436	4.54	4.92
1337	5.02	5.50	1387	4.28	4.63	1437	3.86	4.20
1338	4.43	4.85	1388	4.01	4.34	1438	5.47	5.93
1339	3.23	3.56	1389	3.54	3.84	1439	6.34	6.87
1340	5.22	5.72	1390	4.25	4.61	1440	4.46	4.85
1341	4.28	4.69	1391	5.88	6.36	1441	3.07	3.34
1342	4.68	5.12	1392	4.45	4.82	1442	3.40	3.69
1343	4.55	4.97	1393	3.40	3.69	1443	3.72	4.04
1344	5.45	5.96	1394	3.77	4.08	1444	3.84	4.16
1345	4.31	4.72	1395	3.62	3.93	1445	3.40	3.69
1346	4.28	4.69	1396	3.71	4.02	1446	3.85	4.18
1347	5.76	6.29	1397	4.60	4.99	1447	4.22	4.58
1348	6.15	6.71	1398	4.79	5.19	1448	3.86	4.19
1349	4.06	4.43	1399	4.23	4.59	1449	4.34	4.71

APPENDIX 2 (CONTINUED): NOMINAL GDP (£m)

year	GDP1	GDP2	year	GDP1	GDP2	year	GDP1	GDP2
1450	3.75	4.08	1500	-	-	1550	-	-
1451	4.54	4.92	1501	-	-	1551	-	-
1452	4.19	4.54	1502	-	-	1552	-	-
1453	4.28	4.64	1503	-	-	1553	11.04	11.47
1454	4.15	4.50	1504	-	-	1554	10.72	11.07
1455	4.20	4.55	1505	-	-	1555	13.84	14.33
1456	4.09	4.43	1506	-	-	1556	14.69	15.20
1457	3.89	4.22	1507	-	-	1557	18.60	19.41
1458	4.17	4.53	1508	-	-	1558	13.05	13.79
1459	4.54	4.92	1509	-	-	1559	13.80	14.40
1460	4.51	4.89	1510	-	-	1560	14.11	14.66
1461	4.60	5.00	1511	-	-	1561	15.18	15.67
1462	4.86	5.27	1512	-	-	1562	15.02	15.54
1463	3.40	3.69	1513	-	-	1563	16.64	17.28
1464	2.97	3.23	1514	-	-	1564	18.67	19.44
1465	3.47	3.77	1515	-	-	1565	15.51	16.14
1466	3.73	4.05	1516	-	-	1566	18.22	19.07
1467	3.94	4.28	1517	-	-	1567	16.44	17.17
1468	4.09	4.44	1518	-	-	1568	15.99	16.70
1469	4.00	4.34	1519	-	-	1569	16.70	17.33
1470	4.21	4.56	1520	-	-	1570	13.97	14.42
1471	4.41	4.79	1521	-	-	1571	13.81	14.25
1472	4.47	4.85	1522	-	-	1572	14.03	14.40
1473	3.69	4.01	1523	-	-	1573	17.86	18.45
1474	3.67	3.99	1524	-	-	1574	19.82	20.20
1475	3.86	4.19	1525	-	-	1575	16.99	17.42
1476	3.75	4.07	1526	-	-	1576	17.70	18.11
1477	4.45	4.84	1527	-	-	1577	17.81	17.99
1478	4.28	4.66	1528	-	-	1578	18.32	18.72
1479	4.63	5.03	1529	-	-	1579	18.25	18.65
1480	5.35	5.81	1530	-	-	1580	16.94	17.21
1481	4.07	4.43	1531	-	-	1581	19.42	19.59
1482	4.47	4.86	1532	-	-	1582	19.47	19.70
1483	5.07	5.52	1533	-	-	1583	18.94	19.23
1484	4.89	5.32	1534	-	-	1584	19.55	19.88
1485	3.91	4.26	1535	-	-	1585	19.31	19.45
1486	4.04	4.40	1536	-	-	1586	22.32	22.40
1487	4.42	4.80	1537	-	-	1587	26.94	27.39
1488	3.94	4.29	1538	-	-	1588	22.35	22.79
1489	4.26	4.64	1539	-	-	1589	21.71	21.96
1490	4.27	4.62	1540	-	-	1590	25.40	25.70
1491	4.58	4.95	1541	-	-	1591	24.05	24.15
1492	4.61	4.98	1542	-	-	1592	21.71	21.85
1493	-	-	1543	-	-	1593	24.21	24.53
1494	-	-	1544	-	-	1594	24.46	24.45
1495	-	-	1545	-	-	1595	28.44	28.32
1496	-	-	1546	-	-	1596	29.91	29.69
1497	-	-	1547	-	-	1597	32.16	31.76
1498	-	-	1548	-	-	1598	32.97	32.85
1499	-	-	1549	-	-	1599	30.01	30.33

APPENDIX 2 (CONTINUED): NOMINAL GDP (£m)

year	GDP1	GDP2	year	GDP1	GDP2
1600	29.58	29.82	1650	63.61	63.70
1601	29.51	29.72	1651	60.82	61.48
1602	30.33	30.79	1652	61.50	62.71
1603	31.26	31.78	1653	61.25	62.66
1604	32.22	32.85	1654	50.33	51.47
1605	33.93	34.50	1655	50.89	52.33
1606	33.95	34.54	1656	57.52	59.00
1607	34.02	34.34	1657	64.51	66.11
1608	38.47	38.65	1658	61.22	61.70
1609	42.61	43.00	1659	63.23	63.32
1610	39.07	39.56	1660	61.70	61.65
1611	37.23	37.48	1661	64.19	64.54
1612	38.12	38.20	1662	63.95	64.15
1613	44.72	45.09	1663	55.65	55.87
1614	45.01	45.55	1664	54.54	55.19
1615	43.72	44.13	1665	53.16	54.28
1616	41.19	41.46	1666	56.86	58.56
1617	45.03	45.60	1667	54.47	55.73
1618	42.94	43.31	1668	52.99	53.98
1619	37.89	38.15	1669	57.70	58.93
1620	36.30	36.53	1670	56.81	57.49
1621	37.37	37.45	1671	54.03	54.77
1622	41.21	41.04	1672	49.10	49.47
1623	41.09	40.83	1673	51.99	51.96
1624	40.50	40.82	1674	59.19	58.71
1625	41.67	41.86	1675	57.30	57.02
1626	41.12	41.12	1676	50.89	51.03
1627	38.83	39.00	1677	50.88	50.74
1628	41.28	41.79	1678	59.30	59.46
1629	35.77	35.72	1679	57.01	56.81
1630	43.56	43.25	1680	56.63	56.34
1631	49.63	49.46	1681	56.10	55.88
1632	48.86	49.17	1682	54.89	54.72
1633	45.29	45.38	1683	58.34	58.48
1634	44.09	44.33	1684	56.67	56.39
1635	49.85	50.38	1685	62.78	62.57
1636	47.87	48.29	1686	50.52	50.30
1637	47.51	47.73	1687	55.15	55.51
1638	52.35	52.39	1688	50.80	50.80
1639	48.55	49.27	1689	49.00	48.92
1640	42.41	43.06	1690	52.09	52.16
1641	47.28	47.60	1691	50.56	50.96
1642	42.62	42.27	1692	62.54	63.26
1643	44.07	44.57	1693	66.98	67.36
1644	42.50	42.61	1694	69.84	70.50
1645	42.25	42.44	1695	63.55	63.82
1646	43.66	43.72	1696	69.51	69.53
1647	51.23	50.93	1697	69.80	69.86
1648	61.62	61.26	1698	74.28	74.05
1649	61.77	61.69	1699	71.52	71.63
			1700	65.19	64.96

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